BURNING ISSUES:

CONTROL OF FIRE MANAGEMENT

IN CENTRAL KALIMANTAN, INDONESIA

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DEDICATION

For Marion, Phil and Carol

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nephew – you have always been a source of love and inspiration! This dissertation was strengthened by each of these individuals and organizations; any shortcomings in this work are my own.

ABSTRACT

In 1997 – 1998 an estimated eight million hectares of forest and land went up in flames and caused a haze crisis that darkened skies across the region for three months. Local, national and international stakeholders were moved to improve fire management capacity; but their visions, strategies and ability to maneuver diverged markedly. This dissertation is based on applied research carried out in Central Kalimantan, Indonesia between November 1997 and May 1999. It sought to identify the factors that influenced responses to the fire and haze crisis and to understand what led a group of university faculty and students to independently initiate local fire brigades. Perhaps more importantly, this dissertation asks why they did not succeed. Building on developments in political ecology, institutional analysis and disaster management, this dissertation argues that marginalized stakeholders leveraged opportunities created by the fire crisis to further broader agendas and mitigate non-fire related risks but that the planning process failed to recognize how other risks to personal, community, and organizational and national security influence participation in the initiative. The sustainability of fire management, like disaster management and most environmental management initiatives relies on recognition of shared risks and a commitment to identifying mutually agreeable solutions. The true challenge to institutionalizing fire management is building commitment among a broad range of organizations at local national and international levels. Navigating the diverse perceptions of risk and approaches to problem solving should be a part of the planning process.

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LIST OF ACRONYMS

ADB	Asian Development Bank
ADPC	Asian Disaster Preparedness Center
AMME	ASEAN Ministerial Meeting on the Environment
ASEAN	Association of South East Asian Nations
ASMC	ASEAN Specialized Meteorological Service
ASOEN	ASEAN Senior Officials on Environment
ASSET	ASEAN Sub-Regional Environmental Trust
Bapedal	Indonesia's Environmental Impact Management agency
BOMTIK	Nickname for Water Bomb
CIDA	Canadian International Development Agency
CIFOR	Center for International Forestry Research
COP	Conference of Parties (to the UN Climate Change Convention)
ENSO	El Niño Southern Oscillation
EU	European Union
FAO	Food and Agriculture Organization
GIS	Geographic Information System
HTTF	Haze Technical Task Force
IDNDR	United Nations International Decade of Natural Disaster Reduction
IDRB	International Development and Reconstruction Bank
IFFM	Integrated Forest Fire Management Project
IPK	Indonesian Forest Concession Permit
ISDR	International Strategy for Disaster Reduction
IUCN	International Union for the Conservation of Nature
JICA	Japan International Aid Agency
KATIR	Method for building fire breaks
KKN	Indonesian abbreviation for "Corruption, Collusion and Nepotism"
LH	Indonesian Ministry of Environment
MF	Indonesian Ministry of Forestry
NGO	Non governmental Organizations
OFDA	Office of Foreign Disaster Assistance (USAID)
Posko KLH	Command Post for Forest and Land Fires
PUSDALKARHUTDA	Regional Center for Forest Fire Control
PUSDALKARHUTNAS	National Center for Forest Fire Control
RETA	Regional Technical Assistance (ADB funded Project)
RHAP	Regional Haze Action Plan
SATGAS	Forest Fire Management Task Force

SATLAK	Disaster Management Task Force (*kecematan* level)
SRFA	Sub-Regional Fire Fighting Arrangements
TKNPKLH	National coordinating team for prevention of forest and land fires
TSA	"Tim Serbu Api" or "Fire Attack Squad"
UN	United Nations
UNDAC	United Nations Disaster Assistance Committee
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNOCHA	UN Office for the Coordination of Humanitarian Assistance
USAID	United States Agency for International Development
WWF	Worldwide Fund for Nature (World Wildlife Fund)

CHAPTER 1
INTRODUCTION

On Fire

Wildfires are widespread on every continent and occur in every vegetative ecosystem. An estimated 20-40 million hectares of tropical forests burn annually, often escalating to disastrous scales – destroying habitats, threatening biodiversity, contributing to global warming and affecting the health and livelihoods of people around the world. But wildfires are not all wild, it is estimated that human activities may account for up to 90% of all fires globally (Levine et al 1999). Intensified land-use and development, forest conversion and escaped agricultural fires, combined with more frequent and intensive drought episodes have resulted in a global surge in uncontrolled wildland fires.

Despite the risks, fire suppression and prevention remains poorly developed in many parts of the world. The primary challenges are not technical but rather socio-political. Nascent fire management systems are impeded by the difficulties of negotiating a shared and sustained commitment to fire risk reduction and agreeing on appropriate institutional mechanisms and approaches to prevention. These challenges are illustrated by the pursuit of formal fire management initiatives in Indonesia following the fire and haze disaster of 1997-1998.

In critically examining the case of Indonesia, this dissertation argues that crisis conditions created a window of opportunity in which traditionally marginalized stakeholders were temporarily empowered to participate in the development of a new system, however the proponents failed to resolve underlying tensions between stakeholders, sectoral interests, varied perceptions of risk and divergent approaches to the

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planning process. In the end the momentum generated by the crisis faltered and now, over

five years later, Indonesia has only nominally addressed wildland fire risk.

The Ring of Fire

In Indonesia an estimated 500,000 hectares burn annually[1] but in 1997 and 1998,

eight million hectares of forest and land went up in flames. Both natural and

anthropogenic fires have been part of the seasonal landscape in the archipelago for

millennia as land is cleared for farming at the end of the wet season. But, by March of

1997, the meteorological service announced that El Niño conditions would bring drought,

there were already indications that the year's fire season would be intense.

Fires were reported in the national papers as early as June and continued to appear

throughout the summer. By early August, satellite imagery registered over six hundred

simultaneous hot spots[2] on the islands of Java, Sumatra and Kalimantan. In September,

the Minister of the Environment announced that fires had destroyed over 300,000

hectares of forests in Sumatra and Kalimantan. Central Kalimantan was especially

vulnerable considering that peat[3] a highly flammable fuel source is the dominant soil type

in the province and significant land clearing initiatives were underway.

In addition to the devastation wrought by the fires themselves, charred peat

releases aerosols and particulates into the atmosphere creating a dense haze. In 1997,

visibility was so poor that residents of Central Kalimantan literally did not see the sun for

three months. Photosynthesis was interrupted and crops were damaged (Limin 1997).

The airport in Palangkaraya, the provincial capital, was closed because of poor visibility

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[1] Estimates of historic fire are difficult to obtain because Indonesia has only recently begun documenting fire events.
[2] "Hot spot" is the generic term for fires potential fires identified through satellite images.
[3] Peat is comprised of organic debris that accumulates over thousands of years and reaches depths of 20 meters or more.

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and remained closed almost every day until November. The same was true for airports in other Indonesian cities such as Jambi, Pekan Baru, Padang, Palembang, Pontianak, Banjarmasin and Samarinda. Boating and road accidents were rife. Respiratory illness and eye irritation reached epidemic levels. Moreover, the cumulative effects of exposure to airborne toxins in Kalimantan may likely have long-term implications for public health and life expectancy in the region.

Figure 1.1. Map of Fire Distribution in Kalimantan and Sumatra
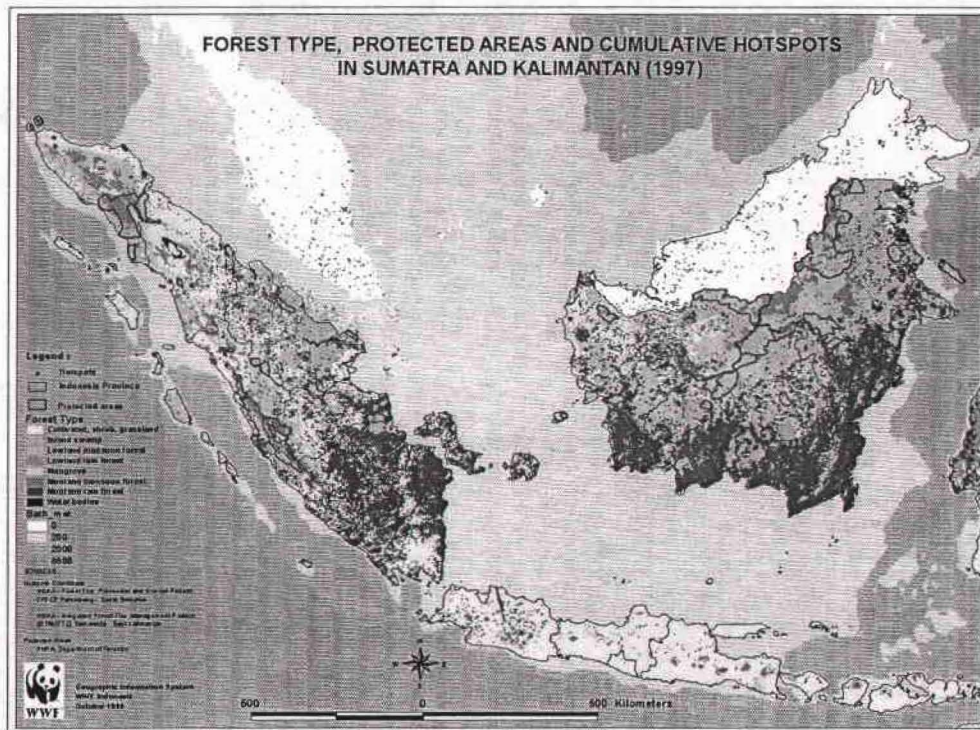
Source: World Wide Fund for Nature (WWF) 1998

The impacts of the excessive smoke extended far beyond the fire sites. Particulates infiltrated the entire airshed[4] and darkened the skies across Singapore, Malaysia and Thailand. At least one tragic plane crash has been linked to the haze[5].

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[4] An air shed is the atmospheric equivalent to the watershed and is recognized as the regional confluence of jet streams.
[5] On September 26, 1997, the pilot of Garuda Indonesia Airlines Flight 152, flying between Jakarta and Medan, directed the plane into mountainous terrain that was obscured by smoke and haze. The plane went down killing all 222 passengers and 12 crewmembers.

Airports in Singapore and Malaysia were closed as well. Several fatal boating accidents

in the shipping lanes between Indonesia and Malaysia were also attributed to the

hazardous haze conditions. When children began fainting in schoolyards in Kuching,

the Government of Malaysia declared a state of emergency and closed all offices and

schools for ten days.

Using various methods of assigning value to environmental losses, James

Schweithelm and David Glover attempted to capture some of the downstream costs of

fire and haze (see Table 1.1) and provided perhaps the most thorough damage assessment

to date. They estimate that Indonesia suffered 2.7 billion dollars in fire-related damage

and additional 1 billion dollars in haze-related damages.

Table 1.1. 1997-1998 Fire and Haze Damages (USD millions)

Type of Loss	Loss to Indonesia	Loss to Other Countries	Total
Fire-related Damages			
Timber	493.7	-	493.7
Agriculture	470.4	-	470.4
Direct forest Benefits	705.0	-	705.0
Indirect Forest Benefits	1077.1	-	1077.1
Capturable Biodiversity	30.0	-	30.0
Fire-fighting Costs	11.7	13.4	25.1
Carbon Release	-	272.1	272.1
Subtotal	2,787.9	285.5	3,073.4
Haze-related Damages			
Short-term health	924.0	16.8	940.8
Tourism	70.4	185.8	256.2
Others	17.6	181.5	199.1
Subtotal	1,012.0	384.1	1,396.1
Total Damages	3,799.9	669.6	4,469.5

Source: Adapted from Schweithelm and Glover 1999

At a meeting of ASEAN Environmental Ministers in September 1997, President

Suharto issued a formal apology to Indonesia's neighbors. He declared the fires and haze

to be a natural disaster and set the national disaster management apparatus into motion. The United Nations deployed an assessment team. International consultants arrived and soon Indonesia was in the process of consolidating hitherto fragmented initiatives into a national wildland fire management program. An institutional response to the fires was developing, but not only at the national level.

At the same time in Central Kalimantan, one of the worst affected provinces, a small group of faculty and students from the University of Palangkaraya organized a brigade to fight fires in the area. Their success at mobilizing and training local residents inspired the ambition to establish the brigade more formally and to prepare the community to prevent or withstand future fire events. This team, Tim Serbu Api (TSA), eventually began to coordinate their efforts with Indonesia's national environmental management agency (Bapedal) and the Association of Southeast Asian Nations (ASEAN). This tentative alliance of organizations, however, failed to evolve a compelling and mutually agreeable approach to managing fire.

Key Questions

Given the energy and resources of these three groups and the considerable pressure to establish strong fire management institutions, why did this initiative fail? Others might ask, given the long-standing *laissez-faire* approach to fires in the region, why did these organizations begin to fight fires at all? This dissertation aims to answer these and related questions.

Given the historical disinterest in national level fire management programs in the region, why did Indonesia pursue fire management so aggressively in 1997-1998? What led a group of university faculty and students to independently initiate local fire brigades

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and why did they fail to extend the time-space reach of their initiative? How were varied agendas of participants accommodated in the planning process? What factors shaped the evolution of the Central Kalimantan Fire Management Initiative?

Thesis

In examining the ways that different communities responded the 1997-1998 conflagrations, I hypothesize that fire management is not only about limiting fire's negative impact on socially valued resources; it is also about the benefits of development. Fire management projects, like many development projects, are coveted prizes that bring both income and access to decision-making authority. The values at risk for the team in Central Kalimantan were those of autonomy in the development process.

The designation of the fires as a disaster in September 1997 afforded some people in Central Kalimantan access to resources and power that were not otherwise available and provided opportunities to craft a win-win fire management institution which met both international concerns and local concerns over risk and security. In the end, I conclude the challenges of reducing the impacts of fire and haze aren't technical challenges that might be expected, but the challenge of negotiating the political economy of development that affects the ability to pursue fire prevention, mitigation and suppression initiatives.

In the case of Indonesia, the emergence of new fire management systems is mired in politics at the local, national and international levels as a range of variously represented interest groups compete, cooperate and compromise in the development of Indonesia's fire management capacity. Building capacity to meet the challenges of fire management requires the engagement and commitment of a broad and diverse range of actors. Not all stakeholders have equal adaptive capacity or opportunity to participate.

Nor do all participants share similar perceptions of risk or approaches to risk reduction. The process of building this sustained institution can affect its sustainability and efficacy.

Perceiving Risk

As environmental historian and fire ecologist Stephen Pyne (2000) reminds, fire is inherently neutral. It performs valuable ecological functions. Ecosystems and biodiversity that support human communities have co-evolved with fire, so much so that Pyne describes Earth as a "fire planet" and humans as "fire people". As a tool, fires meet a range of human wants and needs. While fire has always been dangerous, perceptions of risk vary widely and it is only since the emergence of modern European forestry and agriculture that fire in wildlands was perceived as a problem warranting investment of considerable public resources. To a large extent, this shift in attitude mirrors changing social perceptions of nature, the value of so-called wild lands and the hegemony of European property and land use institutions. The common belief that fire should be excluded entirely from the environment is an ethnocentric product of western European forestry and agriculture.

The risks that move a community to action extend beyond the immediate hazards of fire. Geographer Piers Blaikie (1994) asks why should people be concerned with hazards when they face more deadly and urgent risks in their everyday life? Indeed, society inhabits a world of risk. A host of natural and social forces jeopardize the security of households, communities and nations daily. For many, particularly the poor, survival is a struggle. Risk of crop failures, uncertain land tenure and disease are priority issues in subsistence strategies and development plans. In some senses, it is a luxury to commit limited social resources to mitigating the potential damages caused by fire and

haze. Even at "ground zero" in Kalimantan where the haze was most dense, many local residents were more concerned with the concurrent drought. As several provincial doctors suggested, people are more concerned with food, shelter and clothing than with respiratory disease and long-term impacts of smoke inhalation. This is especially true for marginalized stakeholders who traditionally have fewer response options and, hence, less adaptive capacity.

Varied segments of society, in their capacities as politicians, program managers, funding officers, scientists, activist and private citizens had mobilized in response to the extreme events of 1997-1998. Some were responding to the destruction caused by the fires or moved by the plight of the orangutans, others were fearful that the haze would ignite an international crisis and Indonesia would be called to task for reparations, still others were concerned that the degradation would exacerbate an already untenable mode of development.

Conflicting interests were not resolved in part because of the historic tensions between specific individuals and organizations involved in planning namely, a group of indigenous Dayak, national and provincial government agencies. The rivers and forests of Central Kalimantan were once the domain of indigenous Dayak communities.. But, over the years, access to the island's rich resources was usurped by colonial rulers then later by the Indonesian state and powerful concessionaries while the Dayak communities were marginalized from both the resources and the benefits of development. The historic underdevelopment of the province contributes significantly to local perceptions of risk.

Regardless of the motivations, these individuals were operating within institutional structures that framed the range of response options and were seeking to

establish new arrangements that would help to protect the values and livelihoods they feared were at risk. The ability of contemporary fire management regimes to achieve the goals of fire prevention and suppression are in large part contingent on the ability of diverse actors to collaborate which, in turn, is premised on the ability of potential collaborators to recognize and negotiate the multiple concerns that bring each to the table and to value the different skills and resources that each has to offer.

Overview of Dissertation

Understanding risk and vulnerability affords an opportunity to respond appropriately. This is one of the most fundamental functions of social organizations. Even a cursory overview of vulnerabilities reinforces the importance of looking beyond the immediate impacts of natural hazards to see risk in a broader holistic context. The interplay of various vulnerabilities is apparent in the organization of fire management institutions. Engaging broad participation and commitment in the fire management requires planners to recognize linkages between building capacity for fire risk management and building capacity for sustaining safer and more secure communities.

This dissertation will investigate the fire management institutions that began to emerge in Indonesia in 1997-98. More specifically, as an anthropologist, I investigate the practices of crafting a fire management system, and in so doing, address important questions about how people mobilize collective action in response to risk.

This chapter introduced the problem of Indonesia's fire crisis and suggested that varied perceptions of risk, problem formulations and responses give structure to contemporary fire management initiatives. Strategic acts of crafting institutions and more

broadly, guiding responses, are identified as key domains of inquiry in understanding fire management.

Among the themes that underpin this investigation of fire management are that fire management assumes urgency only in specific value contexts and that these contexts extend beyond the goal of preventing the spread of fire. Also, it should always be recalled that fire management is a collaborative venture.

Chapter Two presents an historical overview of anthropological attention of fire management and disaster management with special emphasis given to ethnoecology and political ecology. The chapter also establishes a framework for assessing the planning structures and planning processes involved in developing a fire fighting research and training center in Central Kalimantan. Chapter Three outlines the methods employed in this study including participant observation, multi-scalar ethnography and applied approaches.

Chapter Four describes the fire regime, which comprises the biophysical environment of fire and haze. Chapter Five outlines the specific structures, institutions and processes in place at the start of the 1997-1998 fire events with specific reference to the Ministry of Forestry and the Ministry of Environment in Indonesia. It also looks at the Association of South East Asian Nation's (ASEAN) regional agenda and offers an overview of the international aid agencies and NGOs that were active during the fire crisis.

Chapter Six provides a detailed account of the process of establishing a new fire management program from the perspective of a small group of students and faculty in Central Kalimantan who initiated an *ad hoc* fire brigade to fight fires in their community

and then later sought to replicate their success by establishing similar brigades throughout the province. This chapter focuses on the challenges and opportunities encountered as they pursued their vision.

Chapter Seven revisits the questions of perceiving risks and processes of realizing opportunities. It looks specifically at key events in the planning process and argues that fire management is a development project and that the fire fighting research and training center proposed by the team in Central Kalimantan met a range of development needs and aimed to mitigate more broadly defined vulnerabilities. Finally, Chapter Eight revisits political economy and institutional frameworks in light of the evidence and, finally, specific recommendations for further research and improving problem solving capacity are presented.

CHAPTER 2
APPROACHES TO FIRE MANAGEMENT

Introduction

While anthropology offers many conceptual tools useful for assessing the human

role in fire history, few have been applied directly to the investigation of fire or fire

management, the focus and general contribution of this dissertation. Countless

ethnographies make some reference to fire use; but attention to fire has, for the most part,

been incidental. Omer Stewart asserts, even more directly, that fire is the "forgotten side

of ethno-geography" (Stewart 2002). Investigations of the processes by which

contemporary fire management systems emerge and evolve are fewer still.

For decades, ecologically oriented anthropologists have looked at the interface

between socio-cultural and biophysical systems. Ecological anthropologists have not

only written environmental histories but have also influenced those histories through the

application of academic and policy-oriented studies targeting issues of conservation and

development. In this chapter, I look first at how some influential approaches in

contemporary ecological anthropology have treated the question of fire management.

Next, I explore the broad applicability of institutional analysis to the study of fire

management, and finally I elaborate a framework for examining the development of

formal fire management organizations in Central Kalimantan through investigation of the

planning process.

Ethnoecology

In 1926, Walter Hough published an encyclopedic account of the use of fire,

though he focused on its application for heat and light, he compared fire technologies

across cultures and examined a variety of beliefs about fire (Hough 1926). In addition

to its vital role in cooking and tool making, fire was also the primary tool for making wildlands habitable. Still, today, fire remains the primary technology for land conversion, agriculture, grazing and hunting in many parts of the world. Henry Lewis is among the few anthropologists to investigate the use of fire technologies among hunter gathers. Through his work in North America and Australia, Lewis argues that by altering the seasonality and frequency of natural fires, prescribed fires were used to control the distribution, diversity and relative abundance of plant and animal resources; thus significantly affecting biodiversity and possibly laying the groundwork for the agricultural "revolution" (Lewis 1982).

Discussion of fire technologies used in agricultural societies is much more common in the anthropological literature. Early investigations of indigenous knowledge systems included the groundbreaking work of Harold Conklin (1956) who studied "slash and burn" or swidden horticulture in Southeast Asia. His work and that of others, such as Michael Dove (1985) and Jefferson Fox (2000), have been instrumental in demonstrating the viability and ecological sustainability of indigenous land and resource management systems and illustrating the depth and scope of traditional knowledge of fire ecology.

Ethnoecology has emerged as a popular anthropological endeavor and has even affected the trajectory of contemporary environmentalism and conservation programs worldwide. Studies of indigenous knowledge systems have prompted a rush to the forest to reveal indigenous knowledge of medicinal plants and practices of forest management. They have also fueled public debate over issues of intellectual property rights and have often been the basis for bringing indigenous people into state sponsored environmental

management initiatives (Brosius 1999).   Indigenous knowledge continues to be applied

to natural resource management and policy (Posey et al 1984; DeWalt and Pelto 1994;

Sillitoe, 2000; Ganz and Moore 2002; Etkin 2002).

Traditional knowledge of fire and fire management was long overlooked by

Western-educated foresters and land managers reflecting their ignorance and prejudice.

Swidden horticulture was viewed as the practice of the poor or ignorant[6] but recent

investigations indicate that many swidden systems are based on nuanced ecological

knowledge.   In swidden systems, fire is controlled by selecting appropriate timing to

achieve the most efficacious burn (temperature, moisture, fuel and wind conditions) and

understanding the ecological dimensions of the land being converted.   Indigenous

knowledge of fire use included sophisticated knowledge of the edaphic, hydrological and

agronomic dimensions of fire ecology as well as its application to local economies.

In the 1980's a huge debate over the value of prescribed burning erupted among

land managers, particularly in US forest and parks services.   It was realized that

excluding fire from an ecosystem could be more devastating because wild fires fed by

fuel-wood accumulation can do significantly more damage (Ganz and Moore 2002).

Throughout this debate, which continues to date, anthropologists and other social

scientists have contributed insights from traditional farming, indigenous peoples or rural

communities (Lewis 2002; Danks 2000), often providing insights from marginalized

people who are otherwise prevented from sharing their knowledge and wisdom.

Equally important to the development of fire management institutions is the

awareness that local people have of socio-political systems in and beyond their

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[6] See Cronon 1983 for a comparison between western agriculture and swidden systems in 18th century New England colonies.

communities and their knowledge of how to maneuver within those systems. Planning, negotiation and fiscal administration are all essential skills. Knowing how to mobilize collective support for management activities is important in this regard as well. Ethnoecology, however, says little about best management practices, about organization of management, institutional structure and decision-making all of which are essential ingredients in a fire management knowledge system. This knowledge and the practices leading from them are an important part of the ecology of any region.

Ethno-science, a variation of ethnoecology, refers to the study of alternative knowledge systems; that is, alternatives to western scientific knowledge (insofar as the knowledge of western trained academics, planners and decision makers is recognized as an extension of some unified knowledge system), but it also encompasses the study of research and problem solving stratagems employed in the development of knowledge systems (Brodt 1998). In terms of the fire management initiatives examined in this study, the issue is how diverse approaches to planning and management are incorporated in the formation of fire management institutions.

The literature on conservation and development is often problematized by Third World academics, such as Arturo Escobar (1995), who charge that Western hegemonic discourse has not only shaped development and conservation projects but has also influenced scientific investigations of the phenomena. Much has been made of investigating indigenous science and indigenous epistemological structures, although, as Sonja Brodt (1998) suggests there are not many epistemological differences between the etic and emic approaches to hypothesis testing (see also Dove 2000).

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This dissertation will explore some of the types of knowledge employed in the development and deployment of natural resource management schemes[7]. In promoting the development of an ethnoscience of planning and management practice, this dissertation is less concerned with distinctions such as etic/emic; local/foreign; indigenous/western scientific than it is concerned with the individual actors[8] involved in the development of fire management initiatives and their ability to bring their knowledge and experiences to joint problem solving activities. In some circumstances, such distinctions are not only problematic, but also counterproductive.

Political Ecology

Political ecology, which has emerged as another important trend within ecological anthropology, seeks to explain human actions and their environmental impacts with an emphasis on political aspects. While not unique to anthropology, political ecology has a long history within the discipline. Benjamin Orlove notes a key paradigmatic shift within ecological anthropology characterized as a processual approach to human environmental relations in which the mechanisms and processes of change are of central importance. This stands in contrast to the older approach of cultural ecology, which viewed culture as adaptation to the environment; and later neo-evolutionist, neo-functionalist paradigms in which adaptation is inferred from certain advantageous cultural behaviors (Orlove 1980).

Following John Bennett, human ecology may be viewed as human behavior whereby cultural elements are translated into active behavioral tendencies involving responses and adaptations made by real people in real life contexts (Bennett 1993: 74). These activities include ensuring individual and collective survival as well as the survival

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[7] See Little 1999
[8] Ibid

of preferred ways of life. Such pursuits, however, are often undertaken collectively and involve the establishment of the institutional arrangements that guide practices. Determining the appropriate guidelines for behavior is seldom based on universal agreement, rather, competing interests must be accommodated or subverted. Recognizing this tension, Bennett remarked, "human ecology is political ecology" (Bennett 1993).

Political ecology, according to Greenberg and Park (1994), expands ecological concepts to include political activity within the analyses of ecosystems. This notion closely parallels, Bennett's early formulation of socio-natural regions that aimed to integrate cultural and ecological systems within a unified theory (Bennett 1976). However, the evolution of political ecology in anthropology has a more complex genealogy.

Richard Peet and Michael Watts (1996) trace the term *political ecology* to the 1970's when it emerged as a response to the theoretical need to integrate land use practice with political economy from the local to the global levels (Wolf 1972) and as a reaction to the growing politicization of the environment. In the view of geographers Piers Blaikie and Harold Brookfield (1987), political ecology combines the concerns of ecology with a broadly defined political economy. The land manager stands at the center of political ecological analyses and his/her relationship to nature must be considered in historical political and economic context (Ibid). Environmental problems in the Third World, for example, are less a problem of poor management, overpopulation, or ignorance, than they are a problem of social action and political economic constraints (Bryant and Bailey 1997).

Over the years, anthropological political ecology has developed a strong critical approach in which concepts such as class, rights, power and conflicts dominate (Little 1999). The conflicting interests in allocating natural, financial and social resources, are clearly evident in the development of fire management institutions.

Moreover, these conflicting interests are historically located in the changing relationships between the groups with which individuals identify.. Roseberry asserts that anthropological subjects should be situated in the intersections of local and global histories but the social and cultural phenomenon investigated also need to encompass examination of circumstances associated with getting a living and the structures of power that shape and constrain activity (Roseberry 1988).

The inclusion of politics in the study of human ecology introduces causality at a number of new levels which complement rather than replace the causality associated with evolutionary processes (Greenberg and Park 1994). Historian Fernand Braudel has argued persuasively that, historical forces operating at a range of scales including short-term events, medium-term processes spanning decades, and long-term structural processes measured in centuries combine to shape the environment within which individual decisions are made (Braudel 1981).

In perhaps the most succinct articulation of the political ecological approach so far, Schmink and Wood (1987) consider what has become a seminal question in ecological anthropology: Why have so many development plans and environmental efforts gone awry?" Based on studies in the Amazon Basin, they conclude that the ability to recognize sources of political opposition (and support) is essential to formulating and implementing projects designed to alter existing forms of resource use.

The few scholars who have examined the case of Indonesian fire through the lens of political ecology have generally emphasized the causes of fire set within the context of the politics of land management, land clearance, deforestation and even retaliation. Wakker (1999), for example, argues that the fires are the result of the politically motivated agenda of oil palm plantation expansions that facilitate the assertion of state power over indigenous land claims. In a similar article, Gellert (1998) argues that the 1997-1998 fires and the monetary crisis stem from the same political challenges that allow for unfettered access to natural resources in exchange for financial support of the political status quo.

Political economic analyses direct investigations to questions of power imbalances in key decision-making contexts that affect land use practices. As with studies that address the relationship between the state and marginalized peoples in land use and land management/ resource management in Indonesia (Dove 1996; Peluso 1992; Tsing 1994), fire is associated with the structures of power that enable unfettered land clearance. Few though have looked at the political economy of fire *management* explicitly. Yet, clearly, economic and power relations affect the formation of fire management strategies as well as fire use. The very decision to manage fire and then exactly how to manage it are political choices guided by nuanced priorities and objectives. These decisions reflect the political constraints and power imbalances facing fire managers. The challenge for researchers is to identify how these political motives and power differentials are played out in practice.

In the context of institutional development, anthropologist Mary Douglas argues that the normal sociological posture for thinking about institutions is to leave out

individuals altogether, or to start with an individual threatened or controlled by institutions (Douglas 1992). She argues that there must be room for the idea that there may be some individuals who are setting up and maintaining the institutions as part of a process of incorporating others in their own life projects. She also calls for a theory of the origins of institutions that is set in the context of cultural theory, economics and political theory. Such a general theory has yet to be elaborated and there has certainly been no attempt to examine these factors as they relate to the emergence of fire management regimes.

Despite the potential contributions of anthropological perspectives to describing the social aspects of contemporary fire management, the greatest contributions to the field come from beyond the discipline. Two of the most prolific authors on the topic are Stephen Pyne and Johan Goldlammer. The former places fire management in historical context while the latter considers the policy implications of various approaches to fire management at the global scale.

Fire History

One the most comprehensive treatments of contemporary fire management to date comes from the prolific work of environmental historian Stephen Pyne whose research integrates both ecological and sociological perspectives. Humans, he argues, are the primary force shaping the frequency, distribution and intensity of fire on the planet (Pyne 1993). Since the emergence of our species, fire regimes on the global scale have been transformed by the competition between lightning and anthropogenic ignition sources. With the advent of the combustion engine, fossil fuel hydrocarbons have replaced biomass as the dominant fuel source at the global scale. At the same time, changing land

use and forestry practices have altered the fuel load. These developments have had significant impacts on the fire environment, impacts which are matched by planned intervention in the fire regime.

Fire management practices, having evolved from European forestry, have over the past two centuries pursued a program of fire exclusion or, as Pyne (1990) refers to it, "fire conservancy". These practices have reduced the incidence of natural light burning which had historically served to moderate undergrowth. Fire exclusion allows an unprecedented accumulation of fuel in forests such that when fires do occur, they are more intense, inflict more damage on ecosystems and are nearly impossible to extinguish.

The emergence of wildland fire protection is directly related to the development and spread of modern forestry practices from Europe to its colonies. However, an even earlier precursor is found in the changing land use practices in Britain driving the land enclosure movement of the 17th and 18th centuries. Land enclosure caused landowners to take a more aggressive stand against the then common fires which had begun to threaten properties and land holdings. The ensuing decades saw the emergence of modern forest management practices wherein landowners aimed to protect valued timber. These practices were exported to America, Australia and British India; but the practice of fire exclusion was not easily transferred to the foreign social and ecological settings. In Burma for instance, the imposition of fire prohibition was viewed as a form of oppression and led to a rebellion in the colony in 1907, which only ended when the local administrators agreed to allow for some burning in teak plantations. Pyne argues that the British "built empires not by fire and sword but by overthrowing fire and axe...foresters were in many ways, soldiers of the empire" (Pyne et al 1996).

Over the years, fire management became increasingly associated with questions of organization and system that is, organizing labor and resources to effectively combat the threat of fire. Pyne suggests that fire management regimes are the product of historical trends and idiosyncratic events. Recounting the history of fire administration in the United States, Pyne argues that fire control emerged at a time when fires were identified as a social problem at the end of the 19th century. This coincided with a shift from agricultural to industrial production and the creation of parks and public lands throughout America. Prior to this transition in the American relationship to fire, the Western Frontier burned much like today's Kalimantan. The transformation from a *laissez faire* attitude to one of concern over fire control was precipitated by government agencies much to the consternation of the many Americans who continued to use fire as a tool to prepare land for agricultural and other uses.

Fire control initially came under the jurisdiction of the newly established United States Forest Service in 1910. Pyne argues that over the course of the century, the American approach to fire control may be characterized by the dominant challenges facing the organization at that time. He traces five major eras characterized by their responses to "frontier fires", "backcountry fires", "mass fires", "wilderness fires" and "intermix fires" respectively (Table 2.1). He further characterizes fire management by the official United States policy towards fire control, which generally provided guidelines for the fire fighter to organize their resources strategically. Early on, the "economic theory" dominated. At the same time, the strategies of United States Forest Service generally capitalized on whatever resources were abundant at the time whether it was flush funding, surplus equipment, information or cooperative partners. Finally he

distinguished between the strategic objectives and tactical emphases adopted by the Forest Service.

Each of these five eras is further characterized by changes in the wider social political scene. First the establishment of national parklands, then the policies of Franklin D. Roosevelt's New Deal which sought to use the forest service to create new jobs. During World War II fires were associated with enemy activities, and the American people prepared to battle fires in much the same manner as fighting a war. The next period is characterized by activist social reform when the idea of wilderness preservation dominated and the there were great debates as too what constituted wilderness – fire exclusion or prescribed burning. Today, the philosophical questions of wilderness have been replaced by more of a public-relations oriented approach that responds to high profile cases.

Pyne provides a valuable framework for understanding fire management in the United States in terms of values, idiosyncratic events and political concerns. He urges those interested in understanding the development of fire management to consider the dominant philosophy of fire management in the period in question. It is critical to see the "fire problem" as one dimension in a complex of human disturbances (Sponsel 1996).

Nevertheless, while Pyne indicates some of the factors affecting change in fire management programs, the specific mechanisms by which these factors enter the decision-making process of fire management planners remains unresolved. This dissertation aims to advance understanding of these mechanisms.

Table 2.1. History of Fire Use Policy in the United States.

Date	Problem Fire	Policy	Strategic Concept	Tactical Emphasis	Research	Abundance
1910-1930	Frontier Fire	Economic Policy	Systematic Fire Protection	Administration	Fire as Forestry	Land (from Transfer Act); Emergency Fire Fighting Funds
1930-1949	Backcountry Fire	10 am Policy	Hour Control	Manpower		Emergency Conservation Funds
1950-1969	Mass Fire		Conflagration Control	Mechanization	Fire Physics	War Surplus Equipment
1970-1989	Wilderness Fire	Fire by Prescription	Prescribed Burn	Fire Behavior Information	Fire Effects Biology Economics	Information
1990-today	Intermix Fire		Integrated Fire Service	Incident Command System	Global Change (?)	Rural and Volunteer Departments

Source: Adapted from Pyne et al 1996

Global Fire Management

Johan Goldlammer, a forester who has written extensively on the global dimensions of fire, is another prominent figure in the study of contemporary fire ecology and management. Much of his recent work comes from the published proceedings of international workshops and the non-published materials associated with a range of international initiatives that reflect the applied nature of his research.

Central to his research is the study of the ecological impacts of fire exclusion. He argues that natural or anthropogenic fires have affected the equatorial tropical rainforest only at extremely long intervals but these forests are now highly vulnerable to fire pressure. Fire exclusion has altered the fuel load and has thus affected forest succession and global environmental change. He argues that when fuel is minimal, high intensity fires are infrequent. The absence of naturally occurring dry season fires, for instance, impedes the recovery process and allows for the permanent transition to open savannah and grasslands. Moreover, he argues that altered fire regimes contribute to global

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environmental change by altering soil hydrology, soil nutrient balances and atmospheric chemistry (Goldlammer 1993).

Together with D. Mueller-Dumbois, Goldlammer (1990) characterizes a number of tropical fire regimes ranging from climax forest to savannah and grassland along several key sociological and ecological gradients. Fire regimes in the climax forests are characterized by low population density, natural ignition sources, limited grazing pressure and economic focus on extraction of non-timber forest products rather than timber. Policies on fire exclusion are prevalent in regions where timber is harvested commercially. Both human pyrogenic activities and fire exclusion practices have dramatically affected the spatial and temporal distribution of fire patterns.

Regarding management options, Goldlammer (1993) advocates a range of systems rather than a one-size fits all "fire-out" approach. The system should be tailored to local conditions, needs and objectives. He recognizes that political concerns are a factor, especially because it is easier for fire fighters to battle for budget dollars than prevention or other aspects of fire management systems. Nevertheless, he recommends that the architects of fire management be familiar with localized fire regimes and establish goal specific practices in fire management linked to social and ecological functions. Thus, Goldlammer reinforces the important fact that while social policy may affect the fire regime, the chosen approach to fire management can also have significant economic implications for communities that rely on forest resources.

Integrated fire management

Given the potential implications of fire exclusion, the social and economic pressures to prevent uncontrolled burning and the enhanced risk of intense fires in

degraded lands at the margins of human settlements, preferred management options lies

somewhere between the extremes. An integrated approach to fire management advocates

for a mix of management approaches based on understanding of local social and

environmental conditions. Based on Goldlammer's framework, this might include a

combination of light burning coupled with fire suppression in highly valued resources or

properties. Some degree of uncontrolled, but monitored, fire may also be acceptable

under the right circumstances (see Table 2.2).

Table 2.2. Aspects of integrated fire management options in tropical forests

	Fire Exclusion	*Uncontrolled Wildfires*	*Prescribed Fire*
Ecological Impacts	High diversity of species, habitats and niches. High water retaining and soil protection capability	Selection of fire-resistant/tolerant tree species. Opening forest formation	Controlled selection of tree species. Advantageous for stimulation and harvest of selected non-wood forest-products.
Economic and management implications	Economic wood production difficult because of high diversity of species. Increase of non-wood forest products.	Species composition and relevant management and marketing opportunities out of control.	Integrated fire management system requires availability of relevant ecological background knowledge, trained personnel, and infrastructural facilities to prevent and control undesired wildfires and conduct safe prescribed burning activities.

Source: Adapted from Goldlammer 1993

From a broader perspective, this entails setting fire management policy and

practices within the context of a community's needs and the aspirations of decision

makers who are positioned within local, national and international communities and

power structures (Ganz and Moore 2002). It also implies a cross-sectoral approach in

which agriculture, forestry, disaster management and other relevant agencies coordinate

activities.

Disaster Management

Integrated fire management might thus encompass prevention and preparedness as well as emergency response capacity. This range of approaches mirrors recent changes in the field of disaster management. Disaster management had traditionally emphasized emergency response and provision of relief for disaster victims but sharp criticism of the social and economic costs of relief aid has led in recent decades to a more holistic approach (ISDR 2002; Carter 1991). More resources are now committed to prevention and preparedness. The various aspects of disaster management encompass the functions illustrated below.

The first phase of the disaster management cycle begins with national development programs that establish the social and economic conditions in which risk is manifested. The cycle also ends with national development, as disaster's impacts will affect the success of the development agenda. Prevention aims to prevent the hazard from occurring. Fire prevention initiatives might include, for instance, public awareness campaigns about fire safety; adjustments to fire –based land use practices or even prescribed burning to keep the fuel load in check. Mitigation is closely aligned to prevention but, based on the assumption that the hazard will strike, aims to reduce the impact. Establishing and maintaining fuel breaks around settlements, for instance, is an example of mitigation in the context of fire. Because any given action might serve multiple functions, distinguishing between what constitutes prevention as opposed to mitigation is not as important as ensuring that the functions have been achieved.

Figure 2.1. The Disaster Management Cycle
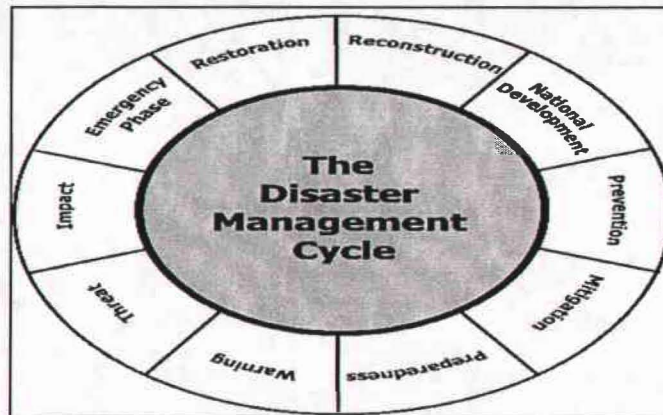
Source: Adapted from Carter 1991

Another series of activities that need to take place in advance of an immediate fire

threat may be broadly characterized as preparedness activities. These involve alerting the

public and decision makers to what actions should be taken in the event of fire and

providing the resources to ensure their ability to carry out those actions. Some examples

in the context of fire include fuel mapping, fire weather and fire danger-rating systems,

all of which are aspects of a warning system that alerts people to impending risk and

signals people to modify their behavior accordingly. Planning for resource deployment in

the event of fire and developing contingency plans are critically important components of

preparedness.

During the emergency phase, fires are suppressed and immediate relief for victims

is administered. In 1997, this entailed huge international disaster relief and fire

suppression support. Local non-governmental organizations (NGOs) also distributed

masks and medicine for respiratory illness. The recovery and reconstruction phases

involves activities that return the community to a state of "normalcy" with, perhaps, an

enhanced awareness of the disaster risk and more concerted effort in preparedness and

prevention. This enhanced awareness should be built into development planning at all scales. Thus these various phases, though not proceeding in a linear timeline, constitute a cycle of disaster management.

Approaching questions about responses to wildfire from a disaster management perspective has several distinct advantages. First it provides a framework for considering the range of initiatives carried out in the wake of Suharto's declaration of disaster. These included local, national and international interventions targeted primarily at improving emergency response capacity. In addition, recent advances in disaster management paradigm have shifted the focus from the hazard itself (in this case fire) to the underlying vulnerabilities that put people at risk. When looking at the impacts of fire or any disaster it is important not only to ask what happened but why impacts were distributed they way they were. The attention to vulnerability raises the issue of exposure and sensitivity to the hazard but also addresses the significant role of adaptive capacities that can reduce vulnerability.

In Asia, disaster management is in its infancy and great investments have been made in developing institutional capacity, in some cases beginning with the establishment of entirely new government ministries. In Indonesia, the disaster management infrastructure had little capacity for monitoring or responding to the fire crisis (Kishore et al 2000). Moreover, ASEAN's fire management initiatives were led by the region's environmental ministries, which were even less familiar with advances in disaster management. With this in mind, the disaster management perspective is well suited to an analysis of the institutional arrangements and institutional capacities, which are the central subject of this dissertation.

Disaster management has assumed more attention in international aid and development, particularly with the shift from emergency response to mitigation and preparedness. The International aid budget has a strong disaster management component. In the aftermath of the Gujarat earthquake, United States Agency for International Development Office of Foreign Disaster Assistance (OFDA) convinced congress to pass the Crowley amendment allowing US$ 25 million over five years to be spent on preparedness. The United Nations, ASEAN and the European Union likewise have strong disaster management focus. Now, linking disaster to climate change brings disaster preparedness into the realm of adaptation options that will compliment mitigation of greenhouse gas emissions. Similar links with development and environmental conservation can be seen as well.

Living with Risk

Humans are remarkably adaptive and respond to risk and adversity in many and varied ways. Traditional subsistence strategies frequently mitigate debilitating loss through a variety of coping strategies including, for instance, crop diversification. At the household and country level, responses to risk can be clearly identified. The case of drought is especially illustrative of this point as it is a slow-onset hazard and the household coping strategies change as drought progresses or persists. Subbiah (1997) describes this as a hierarchy of risk aversion (see Table 2.3).

Table 2.3. Progression of Household level Risk Aversion strategies

Risk Minimization	Altering agricultural practices
	Diversification of income sources
	Pastor lists to hold mixed species of herds
	Temporary migration in search of work
	Drawing upon common property resources
	Drawing upon social relationships
Risk Absorption	Reducing and modifying consumption
	Borrowing of repayable loans
	Sale of non-productive assets
	Participating in relief works
Risk Survival	Disposing of productive assets
	Distress migration
	Reliance on famine foods

Source: Subbiah 1997

These risk aversion strategies however make no mention of the opportunity to mobilize collective action to mitigate risk. There are numerous opportunities to draw on external resources, both political and economic, to improve unfavorable situations. Various forms of resistance to the structures of oppression that generate vulnerability exist – demonstrations, civil disobedience, political pressures and other types of collective action have the potential to offset the social causes of risk. Despite obvious power imbalances and systems that thwart grassroots action, at times charismatic leaders emerge. Such responses to risk need not be violent, especially when there is sufficient understanding of how to manipulate political and economic systems to compel change. The opportunity for success in this regard is enhanced in the immediate aftermath of disaster.

Risk Management and Adaptation

The concept of adaptation is both an explanation and description of human behavior because, "instead of abstractions from behavior, like culture, or the reductive formulas of psychology or genetics, [the concept of adaptation] focuses on human actors who try to realize objectives, satisfy needs, or find peace while coping with present

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conditions" (Bennett 1993:24). In this sense, fire management constitutes such a pursuit. Whether or not it succeeds, the ability to organize such initiatives is a reflection of adaptive capacity.

By analyzing the factors that guide the choices of strategies, one gains knowledge of the possibility and direction of change as well as a deeper comprehension of the relation of human behavior to the social and physical environments we inhabit (Bennett 1993). Understanding the factors that guide the choice of strategy not only helps us to understand the relationship between nature and society but also places us in a better position to reflect on those choices and evaluate the likelihood of successfully achieving the desired outcome in which we anticipate a safer, more secure world.

The desire to make sense of human behavior has led many anthropologists to view a particular activity not as the solution to a problem, but rather as one step toward the realization of an ultimate goal (Jochim 1981). The distinction is important because in the context of problem solving, numerous, often conflicting, and sometimes-capricious goals may guide individual's decisions, whereas in the context of a single unifying goal, the decisions seem to be more harmonious and comprehensible. While some suggest that the goal is genetic survival (Durham 1991), others suggest a more nuanced goal structure. Andrew Vayda and Roy Rappaport (1965), for instance, contend that humans seek also to perpetuate culture or ways of behaving. For many, the goal is perpetuation of the household, the family name, the nation, or even the perpetuation of the ways of life that support individual and collective ambitions. Thus, it is important that the possible futures envisioned and anticipated by social actors be recognized as an inherent part of the design of fire management.

Adaptation may thus be described as active rather than passive human behavior; more specifically, the practice of anticipating and pursuing social and environmental change. This resonates with Orlove's third paradigmatic shift in ecological anthropology, which he characterizes as a processual approach to human environmental relations in which the mechanisms and processes of change are of central importance. The questions of "who responds to risk and how" assume key significance. Formal institutions such as environmental and disaster management organizations are often explicit in their articulation of mission and objectives, and as such are amenable to empirical observations.

Institutional Arrangements

Fire management institutions, as described earlier, are constituted of rules, both formal and informal, that structure the repetitive activities involved in maintaining the optimal balance of fire in the environment as defined by social values economic concerns and ecological functions. Fire management involves the repetitive activities of preparing for, preventing and responding to fire; as well as planning, evaluating and coordinating programs. All of these activities are structured within institutional arrangements.

Scales and Activities

Fire management, much like disaster management and natural resource management, is as much the management of people as it is the management of the fire, environment or physical hazards. It may be viewed as a social system that includes individuals operating simultaneously within multiple social structures and cultures or

sub-cultures. These structures might include administrative and scientific hierarchies, subsistence communities, private industry and other organizational forms.

Managing fire comprises varied and numerous activities: on the fire line, in policy making arenas, in research and training programs, in public education campaigns, in administrative offices and donor conferences. Appropriate and effective fire management demands that a significant number of individuals be familiar with the basic principles of fire use and control and be clear about what role they are expected to play in minimizing fire risk.

Figure 2.2. Illustrative Fire Management Options

Select Strategic Option Allow Controlled Burning Manage Fuel Load Fire Suppression Prevent Unwanted Fires	Intermediate and Supporting Activities Planning Coordination Administration	Select Strategic Activities Monitoring Fuel Deploy Fire Fighters Fire line Activities Monitoring Weather Prescribed Burning
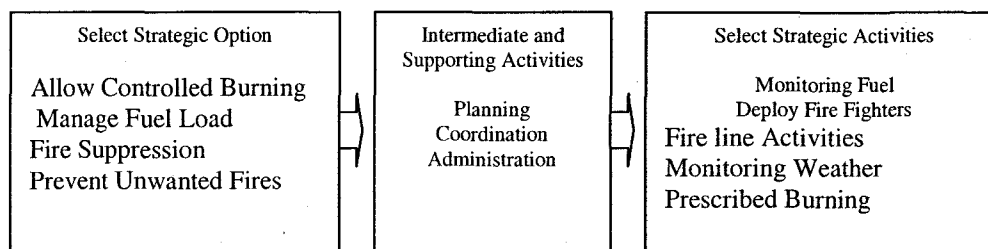
In addition to the activities illustrated in Figure 2.2, operational fire control involves an extensive amount of preparatory work such as establishing systems for fire detection, operational procedures for initial attack; training of fire fighters and other personnel; developing appropriate tactics and acquiring tools; securing funding and emergency planning for communities in fire's path.

Fire management might be conceptualized as a diverse community of individuals involved in a constellation of activities that support the control of wildfires. Although management includes fire suppression and prevention, upon closer examination, these are clusters of activities as well. Fire prevention, for instance, may be construed as the act of

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consciously controlling an ignition source. Likewise, fire suppression includes the act of dousing a fire with water, but following the logic of contiguous causation, that activity is preceded by the actions of picking up a hose or arriving at the fire site. This raises the issue of bounding or framing an event in time and space. The scale at which an activity becomes relevant is linked to the questions under investigation (Vayda 1991). In this study, the organization of fire suppression and prevention at the provincial level is the primary focus.

Consider again the individual extinguishing fire. In most instances, fire suppression is a collective activity involving the coordination of many individuals. In some cases coordination is impromptu as in immediate responses to the encroachment of fire on a village's lands. In other cases however, coordination is formally organized with provisions for logistics, communication and the division of labor. Consider also that fire prevention is not a "natural" response to the risk of fire, and that awareness of fire risk and appropriate precautionary measures are often the result of a long process of public education facilitated by organized campaigns. Thus, the concept of fire management involves such activities as the planning, implementation and administration of fire management organization and infrastructure. It becomes a fire management *system* when the participant organizations and institutions coordinate and integrate their efforts, otherwise the notion of a fire management system is simply a heuristic tag used to describe the near boundless range of activities that influence human use of fire.

Michael Burton and others (1986) argue that discussions of natural resource management should recognize that management activities are not limited to the extraction

site. They offer an analytic framework that characterizes a number of organizational levels in which other management practices (such as fire management) are enacted.

At the base of the system is the biophysical environment, or the physical resource in question, wherein the activities of various agents operate within the structure of ecological systems. Resource extractors constitute the next level. This is the community that lives nearest the resource or environment in question, or has the most direct physical interaction with the environment in question. The third level includes resource managers; those individuals responsible for establishing and administering the rules that guide the actors in the second level. This group includes representatives from local, national and international organizations who are involved in planning and implementing resource management programs as well as those responsible for coordinating logistic support for sustainable resource extraction. The fourth level is conceptualized as decision-making in the wider political economic system; that is, those decision makers who shape the policy environment that facilitates resource management programs by providing funding or legal authority.

Table 2.4. Organizational Levels of Decision Making in Fire Management

Organizational Level		Controlled Burning	Fire Suppression	Fire Prevention
Level 1	Resource Base	Biophysical environment, Fuel sources, weather conditions and ignition sources		
Level 2	Immediate Actors	Farmers, Hunters, Plantation Workers, Fire Fighters	Volunteers and Formal Fire Fighters	Anyone intentionally using fire safety
Level 3	Resource Managers	Plantation Managers and Planners, Fire Fighting Commanders, Park Managers	Plantation Managers, Formal and Informal Fire Fighting Organizations	Fire prevention organizations and their partners
Level 4	Decision Makers in the Wider system	Cabinet Ministers, the President, Fiscal Officers, International Donor Agencies		

Source: Based on Burton et al 1986

In the context of fire management, the first level (see Table 2.4), the fire environment is shaped by the interaction of weather, topography and fuel. The second level involves the direct activities of suppressing and preventing fire. These are the actors whose deeds have the most direct impact on the environment – the land managers who set fires to clear land and the firefighters who suppress uncontrolled fire. Even the public-at-large who may accidentally start fires or consciously act to prevent them are direct actors at this scale.

The third level includes activities of planning, implementing, administering, and monitoring and evaluating fire management programs. Resource managers at this level are responsible for developing the guidelines for fire use and control, they also provide critical support and resources such as technical and financial assistance and information about how, when and where to burn as well as promoting fire awareness more broadly. Field officers or extension workers for instance, issue warnings of fire risk and organize the deployment of fire fighters, securing and directing resources as needed. The fourth level involves activities that support or impede fire management in provincial, national and international policy arenas. Decision makers at this level are responsible for enacting legislation to regulate fire use and for allocating public money fire management initiatives. At this broader political level, decision makers may be influenced by the terms of their constitution as well as through lobbying of special interest groups and, depending on the strength of democratic structures in effect, may be influenced by public opinion.

Throughout, Burton and others suggest that local level analysis is insufficient from both a theoretical and applied perspective. In addition, they advise that analysis of

the regional level and, perhaps even global level systems be integrated within anthropological investigations of resource management. This framework is useful in identifying actors across multiple scalar levels and illustrating the range of functions associated with fire management. Moreover, it draws attention to the complexity of negotiating the allocation of decision-making authority, accountability and resources available to actors at each of the levels.

These levels are scales in that each level represents an order of distance from the fire environment. This is not to say that the level more directly implicated in affected change in the physical environment is necessarily more influential; rather, the levels suggest the various pathways by which change is affected. Little (1999) offers the following about formulation of scales: "each level demonstrates a degree of internal articulation, has a unique set of agents, and operates according to its own dynamic" See also Kottak 1999).

These scalar levels however, are not coterminous with the local – global dichotomies commonly used in social science literature because it is common for a foreign citizen to be directly involved in level three management activities based in an office within the fire environment in question, and at the same time, members of the indigenous community from the fire environment in question may be involved in policy making at level four. The scalar articulation does, however, trace the contours of power as broader decision making authority, where decisions regarding funding and enabling policy environment are made, is generally attributed with the levels more distant from the fire environment itself. International actors such as consultants and donors are embedded

in the local contexts of their own offices and are guided by their organization's rules and mandates

Vulnerability

Assessing vulnerability is the foundation to designing an effective strategy for mitigating future disasters. Vulnerability is not only an indication of the impacts of a hazard but also suggests how those impacts will affect the lives and livelihoods of different populations exposed to the hazard. For a variety of socio-economic, political and geographic reasons, vulnerability is unevenly distributed through society. Thus vulnerability encompasses the broader socio-economic conditions of a population that influence how severely it might be affected by a natural hazard. An early benchmark in understanding vulnerability was Amartya Sen's economic analysis of famine and drought (Sen 1982) which argued that the impacts of drought were not merely a function of the meteorological impacts on crop production, but rather the result of socio-economic systems that shape individual's capacity to access available food supplies. Later, Anderson (1990) set out to investigate why some communities suffered greater impacts than others; she laid the foundation for contemporary disaster management. How well do different community's cope with disaster, how resilient are they? Understanding the distribution of vulnerability is key to designing effective relief and intervention measures.

Building on a tradition in the natural hazards community, Clark and colleagues (2000) offered the following definition of vulnerability as part of a discussion about strengthening the links between environmental assessments and public policy:

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"...a multi-dimensional concept involving *at least*:
exposure—the degree to which a human group or ecosystem
comes into contact with particular stresses;
sensitivity—the degree to which an exposure unit is affected by
exposure to any set of stresses; and
resilience—the ability of the exposure unit to resist or recover
from the damage associated with the convergence of multiple
stresses."

Understanding vulnerability begins with consideration of exposure to a hazard.

Some populations are at greater risk of exposure. In the case of floods for instance;

people living along rivers are more vulnerable to flood. But the geography of risk is

deeply interconnected with social, political, economic and cultural factors that lead

people to knowingly settle in high-risk areas (Hewitt 1997). In some areas, poverty

forces people to the most marginal lands, such as the unstable slopes where many

shantytowns are built, but other factors can be influential as well as illustrated by the

affluent populations choosing to settle along the highly active San Andreas fault in

California.

Sensitivity to hazards may be offset by a number of factors including resilience

and adaptive capacity. Our resilience is related to our ability to bounce back after an

encounter with a hazard, our ability to redress the sensitivity inherent in the system.

Sensitivity can also be offset by adaptive capacity, which is the ability to reduce or

mitigate the negative impacts prior to the occurrence of a disaster. Adaptive capacity can

also affect resilience. For instance, one could adapt in such a way that it enhances our

resilience in the long term. Communities and populations vary widely in their ability to

adapt, to display resilience because they vary in their sensitivity to hazards.

Risk is the probability of harmful consequences, or expected loss (of lives, people injured, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human induced hazards and vulnerable conditions. Conventionally risk is expressed by the equation:

$$Risk = Hazards \; x \; Vulnerability \,/\, Capacity$$

Beyond expressing a probability of physical harm, it is crucial to appreciate that risks are always created or exist within social systems. It is important to consider the social contexts in which risks occur and the fact that people do not necessarily share the same perceptions of risks (see Douglas 1992). Under what circumstances does risk and vulnerability constitute sufficient incentive for mitigation?

Institutional Arrangements

Throughout the 1990's, as anthropologists turned their attention to pressing issues of environmentalism and contemporary development, studies of conservation, development and environmental management institutions increased sharply (Brosius 1999; Escobar 1995; Gezon 1997; Burton et al 1986; Mc Cay and Acheson 1987). In a discussion of anthropological research in resource conservation, John Bennett (1993: 83) asserted that institutions mediate all modern uses of the physical environment. The same holds true for managing fire. The focus on institutions is especially relevant in this discussion of fire management because essential functions such as deploying firefighters to burn sites, designing and implementing prevention campaigns and monitoring the fire environment, all require coordinated and sustained action.

The concept of institutions warrants clarification as the term, although ubiquitous in anthropological literature, conveys various meanings. For Bennett, whose work offers a decidedly real-world theory of human-environmental interactions, institutions refer to "the formal-legal constituents of rules and purposes segregated by function" (Bennett 1993). Fire management institutions purport to mitigate fire-related risks. The various functions include, at one scale of analysis, suppression and prevention or, at another scale, detection and deployment, for instance. Rules guide the practice of fulfilling these functions. Indonesia's incapacity to achieve the objectives of fire management signaled, among other things, the need for new institutions.

Political scientist, Elinor Ostrom (1992) who has written extensively on the subject of institutions defines them as "a set of rules actually used by a set of individuals to organize repetitive activities that produce outcomes affecting those individuals and potentially affecting others" (Ostrom1992: 19). The emphasis on repetitive activities is significant for two reasons. First, from a pragmatic perspective, rule sets can facilitate efficiency by specifying roles and responsibilities thus allowing fire managers, in this case, to focus on the substantive aspects of their work rather than unduly concerning themselves with questions of process. Second, Ostrom's recognition of repetition draws attention to questions of continuity and temporality.

Institutions involve temporal and spatial dimensions. The spatial dimension suggests that the institution can guide the practices of spatially distant and discontinuous communities in the districts that are governed by the legislating authority. Where the legislating authority lacks legitimacy the institution is likely to fail in its stated purpose. The temporal dimension reflects an institution's endurance through time, which allows

for activities to be sustained long beyond the involvement of the original proponents of the arrangements. The temporal dimension of fire management also draws attention to the historicity of institutions – they are dynamic and evolve over time.

Further, Ostrom distinguishes between formal and informal institutions. The latter is based on unwritten rules that, although uncodified, do organize directly observable activities. The distinction between Bennett and Ostrom's formulation is important in that Ostrom draws attention to the significant role of the informal rule systems that govern many traditional land use practices as well as the unwritten codes of conduct guiding practices of corruption or resistance. These informal arrangements are relevant to fire use and management but may not so easily be segregated functionally. This approach emphasizes how things are done. While this may be problematic for investigators, it is nevertheless fair to assume that such structures exist (as evidenced by the standard rates of bribes which are well known in Indonesia) and are influential in guiding practice. In the end, the question of which configuration of rules constitutes an institution is not the key issue. Recognizing this important fact, Bennett urges anthropologists to develop their own formulation of the concept (Bennett 1993: 83).

A final point regarding institutions warrants mention here. In addition to the important role of rules, institutions also rely heavily on resources. The ability to implement the numerous fire management functions requires considerable capacity and the ability to coordinate among varied contributions to the fire management effort. Effective vulnerability reduction relies on investments of intellectual, financial, and social capital. Douglas (1986) asserts that an institution is minimally a convention that arises when all parties have a common interest in there being a rule to insure

coordination, none has a conflicting interest, and no-one will deviate lest the desired coordination is lost. Potential access to decision making authority and resources can confound the explicit purposes of any institution, even those institutions that support popular pursuits; as a result, competition over access to such sources of power can exaggerate conflicting interests and undermine the development of an effective fire management institution.

Contemporary fire management like other environmental management institutions, is clearly purposive; it's missions and objectives are explicitly documented. In practice, however, the functional aspects of these organizations may be subverted by more obscure objectives such as personal ambitions and political agendas as was the case during the 1997-1998 fire events (hereinafter referred to as "the fire crisis"). The tension between explicit functions and obscured intentions ultimately undermined the efficacy of formal legal institutional development in Central Kalimantan.

The case of Indonesia also illustrates the changing nature of fire management. Whereas prior to 1992 there was no capacity beyond those strategies embedded within traditional land use practices and *ad hoc* responses to larger conflagrations; in the period between 1992-1997 there was only rudimentary attention to fire management, mostly limited to the state forestry department and mostly disregarded by fire users as well as by the fire managers within the department. There was no coordinated approach to suppressing or preventing fires. Early fire management efforts were flawed in that their capacities to meet stated objectives were limited. But many were also flawed because of misplaced incentives, lack of accountability and inadequate knowledge of the problems faced by the communities and organizations expected to participate.

In the aftermath of the 1997-1998 fires, several initiatives at the local, national

and international level sought to build formal capacities to prevent future conflagrations

and deploy trained fire fighters when fires do occur. The emphasis on capacity building, a

common theme among development agencies, reflects the changing and changeable

quality of institutions and in turn, the hope that, in the future, fire management

institutions will be able to play a more effective role in improving social and

environmental conditions.

Crafting institutions and organizations to intervene is a strategic act requiring will,

power and resources.   Individuals and populations may choose to actively modify their

behavior in an effort to maintain preferred social or environmental conditions, cope with

hazards, adjust to new conditions or improve upon existing ones. Fire management

activities are playing an increasingly important role in shaping fire regimes and

landscapes.

The study of emerging institutional forms is a window on contemporary

development and illustrates how social factors intercede in the deployment of social,

fiscal and material resources to environmental ends by focusing on the process by which

practices become sedimented in time and space.

Structure and Agency

In his seminal work, *The Constitution of Society* (1984), Anthony Giddens offers

a powerful vocabulary for conceptualizing institutions as the dynamic products of social

life that lie at the intersection of structure and agency.   Structures, in the anthropological

literature, refer to the patterning of social relations.   Giddens refines this definition to

state that structure, in social analysis, refers to the properties that allow the binding of

time-space in social systems. These are the properties that make it possible for "discernibly similar practices to exist across varying spans of time-space and which lend them systemic form" (Giddens, 1984:17).

Giddens thus establishes a framework in which structures are conceptualized as rules and resources recursively implicated in social reproduction. He envisions institutions as a continuum that, at one end, includes those practices with the greatest time-space extension and at the other end includes those activities that are newly organized and have yet to be sedimented in time and space. Further, institutions may be thought of as chronically reproduced rules and resources. Rules imply procedures of social interaction and relate to both the constitution of meaning and the sanctioning of social conduct. Rules, Giddens states, cannot be conceptualized apart from resources. Authoritative resources derive from the capacity to coordinate activities, while allocative resources stem from control of material products or of aspects of the material world.

Institutionalized features of social systems have structural properties in the sense that relationships are stabilized across time and space. Further, social systems do not have structures, but rather exhibit structural properties. Structures exist, as time-space presences, only in the instantiation of such practices and as traces of memory that orient the conduct of knowledgeable human agents (Giddens 1984). Social systems, on the other hand, comprise the situated activities of social agents, reproduced across time and space. Social systems are the reproduced relations between actors or collectivities, organized as regular social practices. These relations are comprised of recognized rights and responsibilities such as economist Daniel Bromely describes in his definition of

property institutions which delineate one person's (or group's) rights to a resource *vis-à-vis* other people (Bromely 1992).

Projects stand at one end of the spectrum of institutional organization wherein rules are not yet sedimented but rather are governed by the structures of existing heterarchically organized rule making institutions. The production of social forms is a process by which actors and agents operate within structures that are used to guide practice. A fire management system is an institution comprised of rules and resources. Moreover, fire management systems exist with varying degrees of formality and varying degrees of time-space extension. In the case of the Indonesia, and Central Kalimantan in particular, the fire management system was in the process of extending its time-space reach.

One of the strengths of Giddens analysis is that individual actors are recognized as agents of change through their responses to the structures to which they are expected to adhere. Because structures may be conceptualized at multiple scalar levels, social actors are guided not only by one set of rules but also by numerous, sometimes conflicting, rule sets. Thus while fire management institutions did exist, though barely, in Indonesia, all individuals did not adhere to the structures, thus giving rise to new structures such as the rules for circumventing the ban of burning. These new structures, in Giddens' terminology have less time- space extension. Similarly there are multiple levels of institutions, including those that guide rule making and institutional development; for instance, national planning procedures and international donor's project funding system. The focus on actors and their role in constituting new institutions, in constituting society,

resonates with the processual approach in ecological anthropology described by Orlove as previously discussed.

At the early stage of development, the socio-political and economic structures that influence fire use behavior and land use patterns also guide fire management. Similar socio-political and economic structures affect the allocation of resources to fire fighting, controlled burning and fire prevention initiatives. Prevailing social conditions can also create space for public dialogue about the costs and benefits of fire. Relations of power such as those that order the relations between sovereign nations and provide the framework for the deployment of international aid shaped initial responses to the fire crisis. Once the decision was made to embark on the process of building Indonesia's fire management capacity, a different set of institutional structures assumed priority – these included the structure of the contemporary planning process.

Planning process

It is through the planning process that modern fire management organizations take shape. Study of the planning process helps to show how social change for vulnerability reduction emerges. Project planning can be a powerful tool for social change, particularly when designed with the longer-term goals of sustaining or institutionalizing new practices.

Institution building, rule making and resource allocation are all well established human enterprises. One thing that characterizes modern environmental management systems is intentional design. Though at the community and grassroots level, a broader diversity of planning paradigms remain in operation; dominant paradigms of planning and development underscore the design and implementation of most internationally

funded projects today.   This is not to say that all aspects of fire management are intentionally planned.   In fact, much that goes on in the actual implementation of contemporary management systems is unintentional.   Still, significant care is taken in the development of institutions, programs and systems such that the social structures involved in environmental governance today are markedly different than those of previous centuries.   What differs is not the element of rationality, which has certainly always been a part of the human endeavor, but rather the scale of the endeavor. Institutional development aspires to establish practices that will endure through time and attain sufficient spatial extension.   Among contemporary management systems, it is not unusual to find those that encompass the activities of the local practitioners, state agencies, donor organizations in the administrative, implementation and enforcement activities

Planning is described as a process of human thought and action based on that thought (Chadwick 1978).   It is the way we think (Roberts 1974).   Planning theorists draw on decision theory, theories of rationality which recognize that decision-makers are constrained by limited knowledge, learning experience, values systems, motives and the decision-making environment.   During the 1960's planning theorists articulated more systematic approaches to the planning process (see Figure 2.3).

Figure 2.3. The planning process

Decision to adopt planning

Monitoring
and review of
state of system

Goal Formulation: Identification of Objectives

Study of possible courses of action (often aided by models)

Evaluation of alternatives by reference to values, costs and benefits

Action through public investment or control over private investment
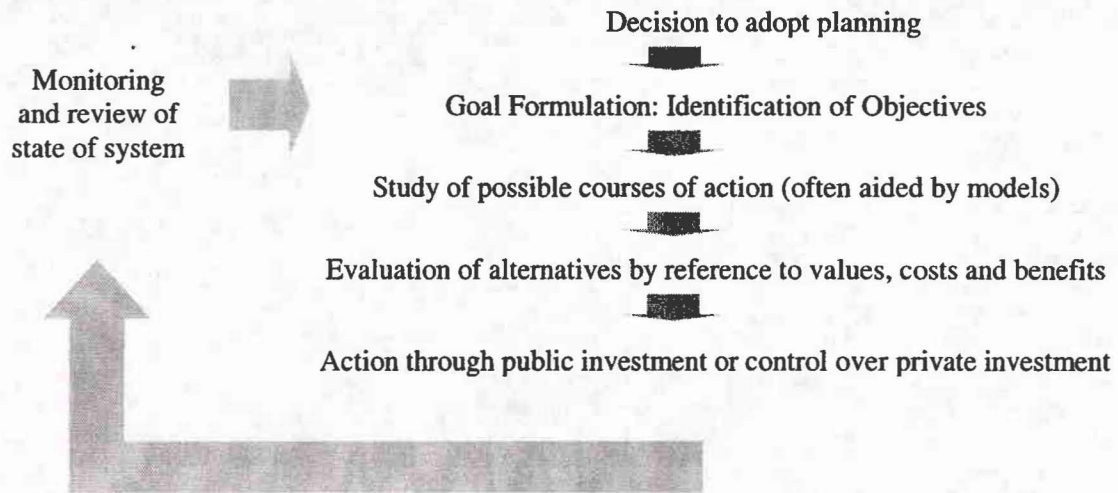
Source: adapted from Chadwick 1973

Over the years, the planning process has become more formalized, institutionalized planning has even emerged as a profession and a discipline resulting from centuries experience in town planning enterprises and in more recent years, developed through business management studies. While both planning and development may proceed organically, there are also planning and development institutions – structures that guide the planning process, structures that are established through entrenched political and economic power relations, often enacted through the efforts of international banks and development institutions.

Planning and development of fire management systems at any scale beyond the local level requires resources. In addition to the people involved in the planning process and the knowledge they bring, the process also requires money for bringing people together to plan, to gather information, and for the administration of the process. Moreover, the planning process is guided by rules and protocols established by the state,

international governing bodies, and donor organizations. These rules structure the allocation of funds, the invitation of participants, the validation of knowledge, the protocols of planning and administering the process, how knowledge is to be gathered and determination of who sets the agenda.

The formation of contemporary fire or resource management in general involves both structure and agency. Planning constitutes a common mechanism through which these institutions emerge. Planning, in this sense is both a mechanism and, at the same time, a structure operating at a more expansive scale than the nascent resource management system. Until recently, fire management in Indonesia hadn't existed at the national or even provincial level; rather it had always been the responsibility of communities and land managers[9]. Once a need was acknowledged, national, international and even grassroots organizations began formal planning initiatives.

Planning theory embodies the procedural aspects of planning which provide cybernetic models of the processes employed to develop strategic programs (Faludi 1973); however, the social context of planning is key as well. This is the domain that guides the decision-making bodies in problem definition and identification of appropriate solutions. Both dimensions are central to understanding the formation of environmental management systems.

Fire management institutions are established through the actions of individual planners. They are able to sustain organized fire management activities through securing financial resources, commitment and cooperation. Their choices can either facilitate or inhibit fire management. The quality of fire management is the measure of

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[9] In the case of urban fires, support was provided through Civil Defense and the military.

their success. The decisions that planners make are guided and constrained by a variety of structures that determine who gets what, who determines who gets what and what determines who determines who gets what (Agrawal and Ribot 1999). In short, it is linked to the political economy of development.

Planning begins with an acknowledgement of a problem or a vision for a future. The scenarios anticipated might entail any number of departures from current conditions ranging from changes in the environment, social system or individual attitudes. From this initial recognition, strategies for achieving the desired future are considered. This process is clearly not linear and to understand how the process unfolds in any individual's mind, through their dreams and musings is beyond the current capacity of science to observe or to understand. However, social sciences are particularly well suited to studying planning as a social and cultural phenomenon in which people come together in an effort to anticipate and develop strategies for achieving possible futures. The process is clearly non-linear and, especially in the early phases of project development, when vague conversations begin to coalesce, it is difficult to map as discrete events. As the program evolves, however, the process may be thought to assume a more formal structure. This structure is characterized by the policies and practices of organizations worldwide that engage in conscious efforts to advance development.

One way to characterize the structures of planning as they come to bear in Indonesia is to begin with the observable planning practices and elaborate the causal chains outward from those specific events. This follows Vayda's assertion that structures or systems are not fixed entities but are only apparent as they are related to the specific activities in question, in this case, the development of a fire fighter research and training

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center in Kalimantan, are structured by other institutional arrangements established at other scalar levels or in other locales.

The process as it unfolded in Indonesia might be conceptually organized into five phases: problem formulation; building partnerships; drawing down resources; strategic planning, which in itself constitutes a scaled down version of the fuller planning process; and finally, reporting and accountability. These stages may not necessarily characterize all of the planning process but they serve as a starting point for examining the activities and structures that ultimately shape the emergence of a fire management system.

Summary

In this chapter we have considered the general contributions of ethnoecology to our understanding of fire use and have noted that further developments in this field might include more explicit attention to other aspects of local knowledge systems that might be applied to strengthening fire management. These include sensitivity to the social-political and tactical knowledge of problem solving. Moreover, extra effort is required in order to bring traditional knowledge into planning processes.

This chapter also considered how the political ecological framework has been applied to the study of fire. Following Pyne, an argument is made that political ecological analyses may provide valuable insights to the study of organized fire management as well. It is especially useful for examining the tensions between various stakeholders involved in planning fire management institutions. Although, as will be discussed in the following chapter, the political ecological framework should be adopted with caution.

Turning to the question of approaches to fire management, Goldlammer's arguments for integrated fire management based on "goal specific practices" were

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recounted. This chapter also illustrated the various functions and activities of fire management, at first by drawing parallels with disaster management which, like fire management is undergoing a paradigmatic shift, and at the same time has entered a phase of rapid institutional development with huge investments in capacity building.

This chapter points out that fire management involves the repetitive activities of preparing for, preventing and responding to fire; as well as planning, evaluating and coordinating programs; all of which are structured within institutional arrangements. We then examined the specific activities in more detail highlighting the range of individuals involved at various scalar levels. Finally, this chapter argued that institutional change broadly parallels the interface between structure and agency outlined by Giddens, but that the relevant structures include contemporary planning institutions. Nevertheless, individual actors, with their myriad interests and constraints are key to the process.

CHAPTER 3
METHODOLOGY

Approaching Investigations

This investigation, which sets out to assess the process of planning a new fire management system, is based on fourteen months of fieldwork begun in Indonesia during the 1997-1998 fires and haze episode and continued throughout the subsequent year. The study follows the pursuits of several organizations engaged in building fire management capacity. This research presented a rare opportunity to witness the seminal events in the establishment of formal disaster management in an increasingly vulnerable region.

In many ways this study resembles traditional ethnographic fieldwork wherein the anthropologist, equipped with notebook (or laptop computer), moves to the study site for an extended stay and observes, through participating in daily life, the practices under investigation; but this research project differs in two important ways. First, the community in question is not a culture group per se, nor is it geographically determined by social or ecological boundaries. Rather, the community in question is defined by participation in the process of developing a sustainable fire management program. These initiatives involved a broad range of individuals from around the globe working in their home countries or traveling to often-distant locales to meet with their colleagues in places such as Central Kalimantan, Jakarta, Brunei Dar es Salaam and Singapore. Accordingly, my investigations took me to these locations as well. Second, this study is applied in that, at the request of several key proponents of the emerging fire management system, I was involved in the planning process, contributed to various proposals and shared my insights in both formal and informal meetings. The approaches of conducting applied investigations at multiple field sites have become accepted practice in anthropology (e.g.

Marcus 1995) and informs the understanding of emerging institutions described in this dissertation.

Multi-scalar ethnography

Contemporary anthropology is beset by a number of methodological challenges; one of the most notable is the apparent dissolution of traditional anthropological objects. The "isolated" culture groups that assumed center stage in the early development of the discipline are now, more than ever before, enmeshed in broader national and global systems. Contemporary globalization not only reinforces the importance of linking local economic and social practices with agents and processes operating in distant locales, but it also complicates traditional anthropological conceptions of culture, as the rapid diffusion of ideas and technologies makes it difficult to isolate distinct cultural norms from the syncretic realities lived throughout the world.

In terms of anthropological field research, the global character of the communities in which we study encourages investigations that are conducted at multiple sites. George Marcus (1995) articulated the urgency and appropriateness of such an approach, which he refers to as multi-scalar ethnography (also see Kottak 1999). This resonates with contemporary anthropological fascination with political economy and political ecology but reminds us that such investigations may still be based on field observations that encourage researchers to live and work in the communities associated with research problem. Pragmatically, I had to live with primarily one community, but I also managed extended and repeated stays in the other key locations where the fire management planning process was taking place.

A key component of the research aimed to identify the key agents and agencies involved in the planning of this particular fire management program including groups and individuals based in Palangkaraya, Jakarta, and various cities abroad. Accordingly, this study is based on investigations conducted in various locales – the offices of Tim Serbu Api (TSA) in Central Kalimantan, the offices of Bapedal (Indonesia's Environmental Impact Management Agency) and ASEAN's secretariat where the Regional Haze Action Plan (RHAP) was being developed (see Table 3.1).

Table 3.1. Field Sites and Activities

Location	*Organization*	*Cultural Context*	*Duration*
Palangkaraya, Central Kalimantan, INDONESIA	Tim Serbu Api (Fire Attack Brigade)	Ngaju Dayak, Provincial University	Twelve months
Jakarta, INDONESIA	Bapedal (Environmental Impact Management Agency)	Civil Service	One month
Jakarta, INDONESIA; Brunei Dar es Salaam, BRUNEI; SINGAPORE	ASEAN Secretariat and Meetings	Consultants/ Policy Makers	One month

However, primary attention is given to TSA. This emphasis has several advantages-- first and foremost because they requested my assistance in developing their proposals. Because TSA's engagement with Bapedal and ASEAN was a learning experience for the team, I had the opportunity to learn along with them. Moreover, the perspective of a local, grassroots organization provided an anchor and starting point for considering the linkages among diverse agencies involved in fire management.

Applied perspective

This study falls within the broad rubric of applied or advocacy anthropology in that my research constitutes a contribution to a specific project undertaken and valued by the community in which I worked in Central Kalimantan. The first and most direct contribution is that the study itself is based on my involvement in supporting the development of a grassroots fire management initiative. The study is also applied in that I offer recommendations for strengthening the planning process.

Applied anthropology has mostly been construed as advocacy (Halstrup, 1992; D'Andrade, 1994) but applied anthropology also reflects the direct participation of anthropologists in the formation of resource management strategies (Burton et al 1986). Through the process of participation, the anthropologist is well positioned to observe and comment on the phenomena of environmental management.

Applied and advocacy anthropology had, by the end of the millennium, established an extensive if not checkered tradition. Early on, applied anthropology earned a bad reputation because research results were often intentionally applied to the pursuit of colonial or imperialist agendas – even supporting egregious military operations. Later, critics of applied anthropology charge that the anthropologists' agenda compromised the scientific objectivity of the study. In more recent years the myth of scientific objectivity in the social sciences has been largely dispelled and a new generation of anthropologists continue to advocate, through their work, for the rights of indigenous and marginalized people (Sponsel 1996) and to bring anthropological perspectives to bear on contemporary problems.

However well intentioned or justified an applied approach may be, such an approach has significant implications for researchers. The applied approach provided me with an inside perspective of the process. I wasn't simply a curious foreigner living in town, but rather, I believe, was accepted as part of a diverse team working towards similar goals. I was able to relate to the team as colleagues rather than as the "anthropological other". This was an important advantage because I was, in the end, able to understand my colleagues better by working with them for over a year much as anyone would come to know their co-workers, perhaps even more so because the rigors of the developing the fire management program demanded long hours and late nights which provided an opportunity to bond with other team members.

At the same time, commitment to working as part of the team circumscribed my activities. The seemingly endless litany of project related deadlines kept us all very busy and I had little additional time for conducting the supporting surveys and research that I had intended.

Framework for Analyses of Contemporary Fire Management

Schmink and Wood map out a methodological agenda for political ecological analyses that begins with identifying a specific environmental or social policy goal for a particular place, noting that the objective may include several different, possibly even contradictory, goals They argue that failure to address the potential conflicts in goal definition has predisposed many costly programs to failure (Schmink and Wood 1992).

> The analysis makes use of economics, history, and the social sciences to investigate the various forms of economic activity in a given region, to identify the social groups involved in each activity, and understand how these groups appropriate different aspects of the natural environment. The political economy

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perspective further draws attention to the relationships between different social groups and to the potential for conflicts, which, in turn, have important consequences for the natural environment (Schmink and Wood 1992).

The next step is to examine the existing system of resource exploitation in the area to be affected by the proposed policy. The third step is to analyze the content of project goals in relation to what is known about existing systems. Which elements of the system seemed to be compatible with the goal defined at the outset, and which would have to be changed? The policy changes might be expected to affect the material interests of the social groups associated with the existing organization of production. The fourth step, therefore, it is to map the social political structure, identifying who is likely to benefit and who is likely to pay for the changes.

If competing or conflicting policy objectives are to be addressed, institutional mechanisms must be found to support the claims of less powerful constituencies, such as peasants and native groups. The final step in formulating an intervention strategy can be thought of as a bargaining process. They conclude, "by avoiding the abstractions of ideal or optimum goals, such a pragmatic view of the evaluation of policy scenarios provides the basis for the tough choices and creative thinking required to improve development policy" (Schmink and Wood 1992).

Following Schmink and Wood's framework, the relevant policy goal in the present study is the establishment of a fire fighter research and training program and operational fire brigades in Central Kalimantan, Indonesia. The next step would be to examine existing systems of resource exploitation. This might logically include land use

or fire use practices in the region. However, such an a priori assertion of causal factors has been sharply criticized.

Vayda asserts that ecological anthropology is not so much about formulating general theories about human behavior in a particular region, society or type of society, but rather anthropology is about empirically answering questions about why things have occurred (Vayda 1986). To this end, he recommends that we make concrete behaviors and their concrete environmental consequences the primary objects. Causal connections can then be traced outward in both time and space (Vayda 1996). This reflects an epistemological stance that orients the investigator in his or her search for answers and explanations.

Vayda's investigation of human behaviors and their consequences is premised on the principle of continuous causation which posits that causes can act on what is contiguous to them in time and space (Vayda 1991). This implies that remote causes of events are only possible if intermediate and contiguous causes and effects link them to the events. While adherence to these strictures can increase the explanatory power of a thesis, it is an ideal rarely achieved given the psychological, spiritual, social and ecological complexity of the human experience. Elster (1993) suggests that the explanatory ideal of identifying contiguous changes of causes and effects may be approached more closely when analysis and explanation focus on less, rather than more, aggregated levels of phenomena. Nobel prize winning economist, Amartya Sen, for instance, redefined famine in Africa (Sen 1995). Rather than conceptualizing famine as severe food shortages for society as a whole, Sen suggested that famine was the starvation of individuals and then asked who was starving and what changes had occurred

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in their situation to make them starve while others in the same society still had enough to eat.

Vayda concurs that this approach helps to overcome the common confusion between correlation and causation. To this end, he promotes a conceptual version of methodological individualism and asserts the importance of analyzing of specific events or activities and their consequences for nature. In his study of deforestation in Kalimantan, investigated the felling of trees by individuals and thus offered insight into the causes of specific tree-felling events (Vayda 1996). This approach to ecological anthropology focuses on behaviors that have immediate environmental consequences but has yet (to my knowledge) to be applied to understanding influential activities in the political and economic sphere. Institutions for environmental governance, resource management or even hazard mitigation all establish important contexts for a diverse suite of activities that have direct impact on landscape structure and environmental quality.

As this dissertation is concerned with the formation of new social organizations, namely fire management systems, an "events approach" or variation of progressive contextualization may be used to gain a better understanding of the factors contributing the development of institutions that aim to manage the environment. As a point of departure, we might consider the contextual understanding of various actors as they promote their notion of appropriate solutions and negotiate with other stakeholders.

Planning as Event

An approach to investigating the factors and mechanisms that drive the development of fire management might begin with a description of the organizations and individuals involved in the planning process. Within each of these organizations we can

investigate the concerns of policy objectives of the organization and its representatives. When considering these concerns we must recognize the scalar incongruities and consider the scale of jurisdiction in relating the parameters of environmental impact and stake holding communities. For instance, we may ask whom these organizations represent and what are the concerns of that group. We may also investigate the interests of individuals within each of these organizations and how their decisions impact both the organization and the populations that the organization is meant to represent or govern and study the historical relationships between these groups. We also need to consider decision-making strategies employed at each of these levels. What is the planning process, how are problems framed and what are the strategic options for problem resolution?

Planning paradigms incorporate culturally specific notions of problem solving epistemologies though cultural unity is complicated by the diverse experience of individuals and their exposure to foreign ideas and practices. For instance western science differs from indigenous approaches to problem identification and solution. Further, the planning process chosen stipulates the participation or exclusion of various voices. These choices are a function of culture and also of political power. Also it should be recognized that the choices to involve various stakeholders in the planning process is an economic issue as well. Consider that the planning process bears certain transaction costs and that both time and geographical distance impose constraints on the process.

Interactions among various stake-holding groups are also of key importance, including the exchange of ideas about the nature of the problem and possible solutions,

the sharing of information among stakeholders, and the sharing of technology. Particularly in the case of interventions in Indonesia, we must also consider the significance of the sharing of financial resources. This includes the politics of funding, and without funding from various agencies many environmental management initiatives would not be possible. This is also a function of scale. International actors are reluctant to rely solely on indigenous management solutions, although these may be less expensive in terms of transaction costs. Likewise, national governments have budgetary constraints and certain environmental problems may be of less priority for national agendas. Also consider the interests and motivations of organizations and individuals within organizations as they pursue their own financial goals. We must consider the resources available; these include technology and infrastructure as well as funds.

A conceptual model of the planning practice might begin with some of the key activities involved in the practice of planning. Planning begins with an acknowledgement of a problem or a vision for a future. The scenarios anticipated might entail any number of departures from current conditions ranging from changes in the environment, social system or individual attitudes. From this initial recognition, strategies for achieving the desired future are considered. This process is clearly not linear and to understand how the process unfolds in any individuals mind. However, social sciences are particularly well suited to studying planning as a social and cultural phenomenon in which people come together in an effort to anticipate and develop strategies for achieving possible futures. The process begins with conversations between individuals but as the program evolves the process may be thought to assume a more formal structure. This structure is

characterized by the policies and practices of organizations worldwide that engage in conscious efforts of social change and development. These structures are the subject of the following section.

One way to characterize the structures of planning as they come to bear in Indonesia is to begin with the observed practices and elaborate the causal chains outward from those specific events. This follows Vayda's assumption that the structures or systems described may not be fixed entities, but rather directly related to the specific activities, in this case, the development of a fire fighter research and training center in Kalimantan, that are structured by institutional arrangements at other scalar levels.

The day-to-day work of project design and funding mechanisms may seem mundane; but these activities also constitute the nuts and bolts of contemporary development. These are the mechanisms guiding not only the allocation of funds, but also how we frame problems and validate potential solutions. It is through these processes that much of contemporary resource management systems come into being.

What are the structures through which TSA must operate in order to institutionalize their program? In order to better understand the organizations involved in planning a fire management regime, my plan was to read the organizational documents for the various agencies involved in order to better understand their stated mission, strategies, internal procedures and relations. This encompassed reading the terms of reference and memoranda of understanding that outline the relationships between organizations and agents and detail the rights and responsibilities of the involved parties.

Further, my research relied on substantial observations of the planning process, including attending meetings and following negotiations via the telephone and email.

Structures herein constitute empirically observed rule sets -- both the written rules for behavior and the unwritten rules of practice. With regard to the latter, which constitute a significant element of the planning process, particularly in Indonesia where many deals are negotiated under the table, I relied heavily on very frank and candid discussions with colleagues in a number of organizations.

Considerable time was committed to examining the planning structures within Bapedal and the arrangements that link its activities with the other state agencies, such as forestry and the national disaster management coordination agency. Similar attention was given to the relationship between Bapedal and the World Bank and other partner organizations.

Table 3.2. Research Objectives and Strategies

Framework	Research Objective	Research Strategy
Organization	Organizational history	Informal interviews; review constitutional documents
	Authority & accountability	Review documented mandate; informal interviews
	Structure	Review organograms; interviews with members/staff
	Function	Review mandate and program activities
	Individuals	Interviews and Observation
	Decisions	Interviews and Observation
	Decision Making process	Interviews and Observation
Planning	Problem Formulation	Participation and Observation
	Building Partnerships	Participation and Observation
	Strategic planning	Participation and Observation
	Drawing Down Resources	Participation and Observation
	Monitoring and Evaluation	Participation and Observation
Interactions	Historical	Informal interviews
	Points of Contact	Observation

While political economic structures may also be influential in the planning process, this investigation focuses primarily on the explicit and observed structures. It is expected that the relations of power will be evidenced by the practices of the various

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individuals and organizations and explicit statements by individuals concerning the constraints and opportunities posed by their position in the political milieu will be taken as evidence. This is because individual perceptions of power relations constitute part of the set of rules guiding their practices.

The analysis will review each of the elements namely; problem formulation, building partnerships, strategic planning, and drawing down resources and monitoring and evaluation and the interplay between authority structures will be considered. The next chapter, however, will introduce the various organizations involved in planning a fire management program in Central Kalimantan.

CHAPTER 4
EARTH AND SKY

The temperature rises. Peat, the accumulation of organic debris, absorbs heat and dehydrates. When heat triggers pyrolysis, the thermal degradation of the organic fuel begins and molecular structures are broken down to form gas, tar and char. The most volatile substances condense to form an aerosol and are released into the air. Combustion -- once ignited, the heat generated by combustion brings nearby fuel to ignition and the pilot source of heat is no longer required. Thus a fire begins in the peat forests of Central Kalimantan in Indonesian Borneo.

Fire is a physio-chemical process that relies on fuel, oxygen and a source of ignition. Evidence of fire in nature extends as far as the geological record but humankind has come to rival, even exceed, nature in its capacity to both ignite and suppress fire. This dissertation explores the complex social and environmental factors that shape the spatial and temporal patterns of fire in Borneo. Particular emphasis is given to recent transformations in the fire management regimes that aim to control the spread of fire in the region.

Throughout this dissertation I suggest that in order to better understand contemporary risk management we need to investigate it as a system. This system should comprise the biophysical aspects (peat lands and air sheds), as well as the "fire-using community" (agriculturists, foresters and the general public living in proximity to fire prone areas). The investigation should also consider the community of fire managers and decisions makers at the economic and legal policy levels.

This chapter examines biophysical aspects of fire and haze as physical changes related to burning are implicated in myriad ecological processes. The conditions thus created present risks and opportunities for human communities and should provide the basis for social policy regarding fire. Throughout this chapter special attention is given to fire as it manifests across a mixture of spatial and temporal scales. These scalar dimensions of fire are particularly relevant as risks presented at different scales pose different challenges and opportunities for a range of social aggregates. This dissertation is based on the events associated with the 1997-1998 fire and haze crisis in Indonesia, accordingly the biophysical aspects of fire will be illustrated by descriptions of tropical peat fires that devastated much of Central Kalimantan, the province in which research was conducted.

Fire Regimes: Between the Biophysical and the Social

The occurrence of fire in a given landscape over time might be thought of as a socio-natural system in which social and biophysical processes intersect. The concept of a socio-natural system was first introduced by John Bennett (1976) who describes it as "an empirical generalization consisting of any ongoing relationship between human activities and environmental phenomenon in which humans provide the goals and means and the environment provides the wherewithal". More recently, the concept is reborn in the guise of historical ecology, a field of inquiry that investigates changing landscapes (Crumley 1996, Balée 1994). While the concept of the landscape has a long, even politicized history, the spatial elements of the landscape depict the material imprint of interacting social and biophysical-ecological processes (Hirsch 1995). The landscape is neither presumed to be the product of social forces nor of biophysical forces a priori. It is

the task of the historian, or the interested observer to ask what forces and processes could have created the landscape.

A comparable concept, the fire regime, emerges from the natural sciences. Because fire's presence and absence in the landscape changes over time, students of fire pay close attention to fire history and the spatial and temporal patterns that emerge. The concept of a fire regime characterizes the frequency, size and intensity of historic natural fires typical for a particular ecosystem or set of ecosystem (Pyne 1996). This classificatory system allows land managers to ascribe processual attributes to units of landscape. While most fire scientists, generally limit the concept of fire regime to a description of natural ecosystems as a means of characterizing that ecology in terms of fire frequency and intensity, strong scientific evidence indicates that there are few ecosystems that have not been affected by human activities (Sponsel 1996). Some fire scientists, such as Stephen Pyne, recognize the significance of anthropogenic fire and social forces in general in shaping a fire regime.

Elementally, fire is a biochemical process requiring fuel, oxygen and an ignition source. The regime may be thought of as the juncture of human-environmental relations because factors such as fuel abundance, ignition sources and even the availability of oxygen can be established either through natural forces or though human agency.

Though lightning fires can and do spread, humans have become the dominant ignition source in most parts of the globe. The human causes are complex, sometimes incendiary, and other times accidental. Attributing specific fires to responsible individuals is exceedingly difficult. But investigators are able to determine a great deal about the time and mode of ignition and even attribute burns sites to specific activities

such as campfires, smoking, agriculture or arson[10]. More recent investigations may attribute contemporary fire patterns to political economic factors including issues of land tenure and access to resources. Other explanations feature environmental factors, such as protracted drought, in combination with anthropogenic ignition sources. While discovering causal agents in the spread of fire is critical to understanding human involvement in fire regimes and criminal prosecution, our involvement is not limited to ignition sources.

Fuel abundance is related to the accumulation of sufficiently dry organic matter. In the case of wildland as opposed to urban fires, wet seasons can provide the organic matter, the cellulose, and dry seasons prepare the vegetation for burning. Wet and dry seasons recurring on annual, decadal or even longer cycles generate sufficient fuel for significant fire events, whether ignited by humans or lightning. Human activity affects the patterns with which fuel accumulates, sometimes intentionally to facilitate burning for land clearance, more often though, the accumulation of fuel is an unintended side effect of other human activities. Poor forestry practices, for instance, leave abundant litter, which dries rapidly in the light gaps created by logging.

Fire requires oxygen as well. Over the millennia, humans have devised ingenious and innovative ways to deprive a fire of oxygen – from water, sand and beating sticks to fire retardant chemicals. Fire suppression and fire management are intentional actions that require substantial organization and commitment of social resources, even more so as the organization is extended to the service of national and international goals.

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[10] This problem is accentuated in Indonesia where investigatory and judicial institutions are, in general, weak.

In addition to outright suppression, fire management is achieved by regulating the timing of ignition and the distribution of fuel. Fire may be excluded through prescribed burning to clear the underbrush and reduce the possibility of unintended wildfire. At other times fire is excluded through bans and prohibitions that limit human use of fires to specific times and places.

Through human agency, contemporary fire regimes represent yet another instance of the ecological transition described by Bennett (1976) as a transition in the complex matrix of human behavior which includes its social manifestations, and the objects and processes created by humans to deal with the physical world. The transition reflects shifting parameters of technology and values. Stephen Pyne (1986) describes the transformation:

> Removing anthropogenic fire from ecosystems, even those managed as preserved does not preserve a prelapsarian nature, but has probably created an environment that has never before existed and is in fact an artifact of human judgment, however ignorant, and of human will, however incomplete…we must acknowledge that humans are, for better or worse, the keepers of the earth's flame.

This transition stems only from the new and many ways that human use and abuse fire, but also from the ways in which human communities organize in response to fire – the institutions, projects and various initiatives targeting fire management. The transition, however, is incomplete, fire suppression and fire management is not universal, especially for wildland fires. Its emergence is a response to social and environmental conditions (locally and beyond).

Fire cannot be viewed in isolation from the social processes and human agency involved in providing fuel and ignition or even oxygen deprivation. Though some may

see fire as an environmental problem, it is only environmental in so far as it is the product of human-environmental interactions and in that fire affects change in the physical environment. Fire use and management is related to human response to a range of social, political and economic conditions, some of which are described in the following sections.

Tropical Peat Swamp Forests of Central Kalimantan

Peatlands are wetland ecosystems. They are involved in critical ecological processes at local, regional and even global levels. Like other wetland systems, peatlands can be described as either togenous mires that are fed by rivers and other freshwater sources, or as ombrogenous, which receive most of their nutrients from the aerial deposition of rain, dust and aerosols. Tropical peat is formed by partially decomposed organic matter (trunks, branches and roots of former trees) within a matrix of almost structure-less, amorphous organic material (Rieley 1998). Peat is characteristically low in ash and mineral content but highly acidic. The properties of individual peatlands result from attributes such as wood content, degree of decomposition, mineral content, stratification and compaction. These attributes determine the bulk, density, hydraulic conductivity and water holding capacity of the peatland (Esterle and Ferm 1994). Tropical peat swamps represent a highly specialized yet poorly understood ecological system. Peatlands are greenhouse active; they sequester carbon and produce methane. These are intricately related to catchment, hydrological and climatalogical systems. Worldwide, peatlands cover 400 million hectares, of which Indonesia is home to 20-30 million hectares. This is roughly equivalent to 60% of the global tropical peat.

Kalimantan has over 6.8 million hectares of peatland, which are directly implicated in global biogeochemical cycles[11].

Central Kalimantan

The Indonesian province of Central Kalimantan spans an area of 153,800 km^2, an area roughly the size of Oahu. The Mueller and Schwaner mountains separate Central Kalimantan from East Kalimantan in the East and West Kalimantan to the North and West. The wide plains between these ranges are bisected by three major river systems that run from the interior to the coast: the Seruyan, Kahayan and Barito. The Barito River runs a course of over 900 miles and is the second longest river in Indonesia. The region is cloaked in tropical moist forest growing from a range of soil types including tropical peatlands.

Peatlands constitute over 13% of the land area in Central Kalimantan and extend from the coastal zone deep into the island's interior. During the last ice age, this region of Central Kalimantan was part of a vast savannah that was intersected by rivers and connected the islands of Borneo, Java and Sumatra (MacKinnon 1996). While most ombrogenous peat deposits are formed in topological depressions, the peatlands of Central Kalimantan are believed to have been established over freshwater swamps.

The peat swamps are rich in biodiversity. Orangutans, birds, rats, fish and insects are among the most familiar inhabitants. Flora occurs across a catena of peatland zones, which are typically arranged in concentric circles emanating from the central dome-like structure where the initial peat deposit began.

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[11] This fact will become part of a larger debate over emissions trading as peat forests have substantial potential for carbon sequestration.

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Figure 4.1. Peatlands of Central Kalimantan
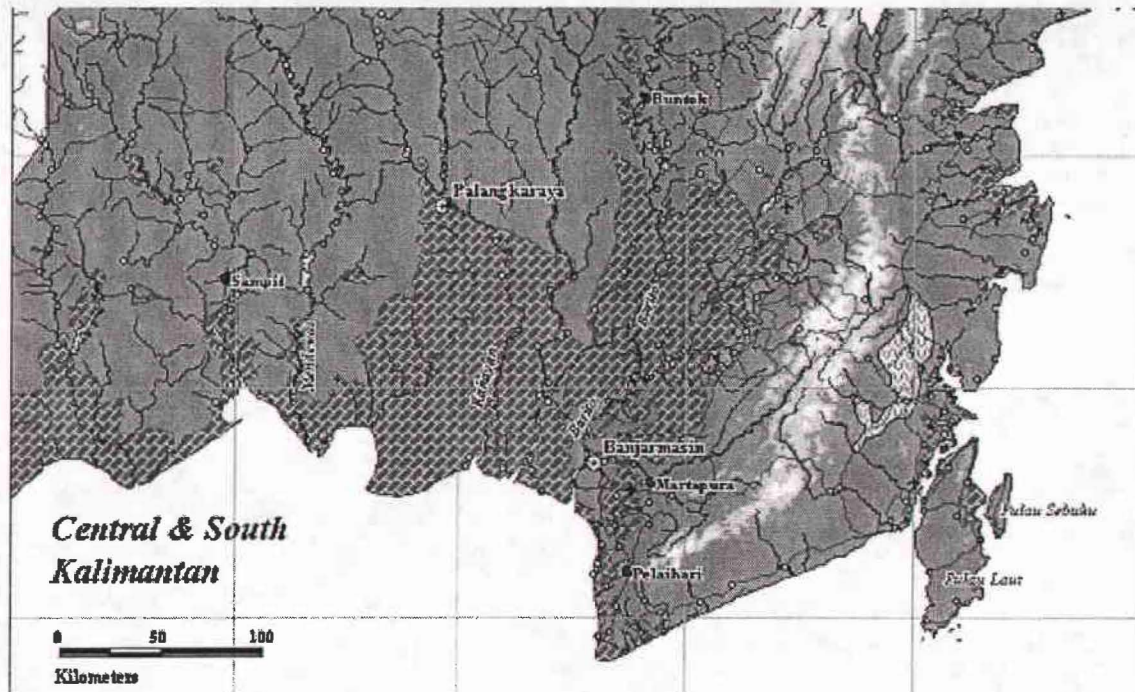
Source: Reprinted with kind permission of Peter Loud.

Climate

The development of peatlands is intricately linked with climate. Peatland growth

is associated with high water levels whereas drought conditions reduce existing peat to

dust. Conversely, the hydrology of peatland ecosystems is implicated in local and

regional climate and weather. Central Kalimantan lies within the equatorial tropics and

thus enjoys relatively constant temperatures ranging between 25-35 degrees Celsius.

Average annual rainfall at the Palangkaraya Station is 2,088 – 3,114 mm/year with

average of 2,690 mm. The combination of high temperatures and moisture establishes

ideal conditions for the growth of moist evergreen forests that cover the region. Like

most of Southeast Asia, Central Kalimantan's climate is affected by monsoon cycles --

one from the Southeast, the other from the Northwest. These provide some seasonal

variations in rainfall.

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Between the months of October and May, when the sun is south of the equator, high pressure builds up over Central Asia. As winds blowing from the Northwest meet with Easterlies from the Indian Ocean, heavy rains fall on Borneo. In Central Kalimantan rainfall is greater inland than near the coast. Between May and October, when the sun is north of the equator, high-pressure systems in Australia send rain-bearing winds toward lower pressure areas in Central Asia. Moderate rains fall as the currents rise over hills and mountains. As Central Kalimantan lies in the rain shadow of the Meratus Mountains on the eastern borders, it experiences a slight dry season between the months of July and September. Thus monsoon cycles produce wetter and drier seasons in the region.

These annual cycles however are interrupted by longer decadal cycles related to the El Niño Southern Oscillation (ENSO). ENSO is a climatalogical phenomenon that has come to be recognized as a significant aspect of global weather patterns that affect local environments in complex ways. The intensity and magnitude of ENSO cycles are less consistent and recent studies suggest that changes in the frequency and amplitude of ENSO may be related to global warming patterns. Simply stated, shifting temperature and pressure gradients in the South Pacific generates ENSO. When temperatures rise in Darwin, Australia, pressure drops and thus affects the cycling of monsoon winds throughout the Pacific. ENSO events lead to periods of protracted drought throughout Borneo and the rest of Indonesia.

Peat forests are particularly susceptible to climatic perturbations. When water levels drop, peat dries and blows away as dust. Because peat swamps serve as catchments for water in the region, fluctuations in rainfall yield corresponding fluctuations in the water table. In Central Kalimantan, seasonal variations in rainfall are

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substantial, but the El Niño Southern Oscillation presents even more dramatic variability. During an El Niño year, drought is both persistent and pervasive across the province. The combination of reduced surface water and increased evapo-transpiration associated with increased sunlight result in a precipitous decline in precipitation. This in turn affects local weather patterns and hydrology. Such conditions are ideal for the spread of fire.

Fire

This section aims to explain the biophysical properties of fire that are fundamental to understanding fire management options. Recall that photosynthesis is the interaction of CO_2, H_2O and solar energy that produces cellulose, lignin and other chemical components. Fire is the physical manifestation of a chemical reaction between those organic compounds heated to the point of ignition in the presence of oxygen. It is the interaction of oxygen, heat and fuel. The intrinsic properties of fuel are organic properties of the source plant material. These properties include fuel chemistry, heat content and density, and thermal conductivity. These intrinsic qualities are key to understanding the processes of combustion and emission. The chemical diversity of cellulose, hemicelluloses, lignins and extractives found in plant materials affect the rate of burning and amount and type of emissions produced.

Pyne explains the processes of heat transfer that occurs during the stages of pre-ignition, ignition, combustion and extinction processes of the chemical reaction known as fire. Products of combustions are particularly relevant and include a complex mixture of particles and gasses.

Fire behavior

Fire behavior is inextricably tied to the environment, more specifically; the fire environment consists of fuel, weather and topography. In this context it is the extrinsic qualities of fuel that are of interest, properties such as mixture of live and dead fuel, arrangement and size of fuel particles and fuel moisture. All these elements affect on the ground and in the treetops. Topographic elements such as slope steepness, aspect and configuration can affect the fire's progress across a terrain. Weather plays a significant role as well. Temperature, relative humidity and precipitation all affect fuel moisture. Wind speed and direction are profoundly important in the spread of fire, not only affecting the direction of the fire, but also bringing fresh oxygen into dying fires. The wind elements are much harder to predict. These features shape the spread and intensity of fire at any given location.

Fire Regimes

It should be remembered that fire is only one among many processes of decomposition, but it is such a dominant process that fire can determine the composition, structure and dynamics of many ecosystems. The notion of fire regime helps to characterize the features of historic natural fires that may have been typical for a particular ecosystem of set of ecosystems. The history of fire's frequency (or return interval) is combined with information regarding the size and intensity of fires in that region. Several classificatory systems have been devised to distinguish between fire regimes.

Often the regime is coincident with ecological communities comprised of native species that have adapted to *fire regimes* (as opposed to "adapting to fire"). The adaptations reflect the timing, intensity and relative distribution of fire, not just adapting

to fire exposure. Documenting fire history is no easy task, especially in the absence of

historic records or photographs. Still historians may have access to tree ring records and

fire-scar samples from standing trees, for example. Archaeological evidence such as

charcoal found in lake sediments or palynological data offer further insights and are

becoming more widely available as interest in paleo-environments and environmental

histories continues to grow. Still, interpretation of fire data is confounded by climate

change and changing patterns of human activity.

Fire Functions and Effect

The return of fire can have long-term evolutionary effect and is a powerful force

for adaptation. Plant adaptations include: germination, rate of growth and development,

fire resistant foliage and bark, adventitious or latent axillary buds, lignotubers and

serotinous tubers. For example, fire has near term effect on vegetation, direct and

indirect impact on wildlife, soil -water repellency, erosion, soil nutrients and soil micro-

organisms and water. Fire can also affect ecosystem dynamics, some may call it

disturbance or stress. Although it is difficult to define the function of fire in ecosystems,

we can discuss the effects of fire and comment on its influence on critical ecosystem

process. Goldlammer and Siebert (1990) suggest that lowland rain forest development

might be explained by disturbances such as drought and fire because these create gaps

which speed the process of regeneration and prevents takeover by a few dominant species

that would lead to a diversity -poor forest community.

Peatland fires

It was once believed that tropical rainforest ecosystems were fire-free because of

the fuel characteristics and moisture. But, recent studies indicate that climatic changes in

the Pleistocene favored the occurrence of both natural and anthropogenic fires. Further it

has also been demonstrated that fuel characteristics and the influence of drought on microclimate and flammability may create conditions suitable for the occurrence of long-return interval wildfires (Kaufman and Uhl 1990). Morely (1981) suggests that climatic changes from a more continental to a less seasonal climate during the mid-Holocene initiated the development of ombrogenous peat deposits in the Sebangau River of Central Kalimantan. In addition to the flammability of cover vegetation (especially during drought), peat soils are themselves a type of fuel. As precipitation falls and the water table lowers, the organic layers of peat dry out. During the 1982-83 ENSO event, observation in East Kalimantan confirmed a desiccation of more that 1-2 meters (Johnson 1984). While the spread of ground fires is not severely rapid, deep burning of organic matter leads to the toppling of trees and complete removal of biomass. Further, smoldering organic fires can re-establish themselves during subsequent dry spells (Goldlammer and Siebert 1990).

Studies in the middle Mahakam River of East Kalimantan show that significant disturbance occurred between 80 to 100 years before present. This period correlates with severe droughts recorded in Java between 1877-78. In 1914-15, in Sabah, over 80,000 hectares of rainforest and its superficial peat soil layer were desiccated and lost to the wind (Cockburn 1974). In his assessment of fire's impact on different rainforest types, Goldlammer states that where peat forests were affected by fire, the damage was total because the structure of the underlying organic underground broke down. These areas are lost to forestry for the foreseeable future.

Smoke and Haze

Biomass burning releases gases and particulates into the atmosphere. A great many of these particles are carried through the troposphere, the lowest region of the atmosphere that extends from the earth's surface to the tropoause. The troposphere is characterized by stress and turbulence and receives much of its heat from the ground rather than from direct solar radiation. Aersols are produced through a variety of factors such as condensation and (subduction) of vapor and formation of smoke, chemical reaction of trace gases in the atmosphere, disruption and dispersal of matter, coagulation of fine particles to large composite particles and even the influx of extra terrestrial particles.

Fire plays a role in cloud formation. Of the condensation nuclei of atmospheric clouds, 10 % are salt and the rest are nuclei and products of combustion, both man-made and natural (Cadle, 1966). Hobbs and McCormick (1988) say that biomass burning is one of the largest sources of particulates injected into the atmosphere and also a large source of trace gases. Radke and others (1978) investigate particle emission factors (or the mass of particles emitted into air per unit mass of fuel burned), particle size distribution, and trace gas concentration in smoke and optical properties of smoke. They find that increasing intensity (not frequency) of fire generally correlates with decreasing emission factors, while increased size of fire yield higher emission factors.

Robock (1978) states that the elevated smoke plume clouds over Canada reduced temperature by 1.5 - 4 ° C (compared to forecasted temperatures). Atmospheric changes need to be understood in the context of natural biogeochemical cycles which themselves include a history of perturbations over periods of varying duration. Biomass is

recognized as a source of important trace gases (CO_2, NO_2, CO, CH_4) and aerosol particles. These, coupled with the trace gasses and elements emitted from the soil itself, can contribute to large perturbations in atmospheric chemistry, particularly in the tropics.

Pyrogenic emissions affect regional ozone concentrations and the oxidative characteristics of the tropical atmosphere. Particulates affect regional-global radiative budgets as well, which have light scattering affects and influence cloud microphysical processes.

Large-scale transport is also influenced by interactions with clouds, passage through coastal fronts, and wet and dry deposition. The pathways of emissions are calculated using atmospheric trajectory models but the value of these are limited because the input data is an extremely coarse resolution, 400 km and 12 hrs. increments.

Summary

Thus the implications of fire spread far beyond the site of combustion and can alter regional bio-geo-chemical processes and even climate patterns. The effects of reduced visibility affect human communities directly while the impact on fundamental atmosphere-terrestrial interactions that control plant growth. When considered at the global scale which includes the cumulative effects of massive burning occuring throughout the world. It is difficult not to be impressed by the role of fire as a fundamental part of the natural experience. Similarly, the potential role of managing fire situates human communities as a profoundly influential component of the natural experience at local, regional and global scales.

CHAPTER 5
THE PEOPLE IN BETWEEN

Introduction

By September, the skies in Palangkaraya, provincial capital of Central

Kalimantan, had been dark for three months. Fires were erupting not only in the

surrounding forests, but also along the roadsides and within the town itself. Drought

conditions had turned even the University of Palangkaraya campus into a tinderbox.

While the Forestry Department in conjunction with civil defense had organized military

and civilian personnel to fight the fires, it was only a self-organized fire brigade from the

University who met with any measurable success.

This chapter reviews a number of the many organizations involved in fighting the

fires and planning more enduring responses to fire risk. The efforts to establish a fire

fighter training program in Central Kalimantan brought together several prominent

organizations as well as the newly formed Central Kalimantan Fire Brigade (TSA)

described above. This chapter emphasizes the key organizations involved in the process;

namely TSA, Bapedal and ASEAN. As outlined in earlier chapters, description of these

organizations will highlight the organization's history, structure, function and approach to

planning.

Fire Management and Underdevelopment in Central Kalimantan

The rivers of Central Kalimantan have been home to the Ngaju Dayak for

centuries. Though their "true tribal region" (Shärer 1963) is the Kahayan River, the

Ngaju Dayak live along the banks of the Lower and Middle Barito, Kapuas and

Mentayan rivers. The word Dayak literally means "uplander" and carries a derogatory

connotation -- though it is generally true that the Ngaju don't live at the river's mouth or

at its headwaters – people generally refer to themselves as the "people of this river" or the

people of that river". Still, common language, history and traditions unite the Dayak of

Central Kalimantan such that they constitute the largest group in Borneo. Official figures

are hard to come by because the Indonesian Census doesn't record ethnicity. However,

in 1994, an estimated 35-50% of the Central Kalimantan's population of 1.5 million used

the Ngaju Dayak language (Schiller 1997).

Dayak religious beliefs, *Kaharingan*, are very much alive and robust, having

survived several eras of dramatic change. In 1894, the Dutch called Ngaju Dayak leaders

to the village of Tumbang Anoi where it was agreed that slavery, headhunting and human

sacrifice would be abolished. The Indonesian government in 1975 officially recognized

Kaharingan as a legitimate religion and is still widely practiced despite the prominence

of Christianity in the province. The first evangelical mission arrived in 1836, the first

Bible (and dictionary) in the local language was published in 1859 and the Dayak Church

was founded in 1935. Dayak Christians and *Kaharingan* continue to recognize their

unity as a people, while the few Ngaju communities that converted to Islam identify more

closely with the predominately Muslim Melayu people in the coastal areas.

Owing in part to the strong Christian influence, many Ngaju Dayak were recruited

into civil service by the Dutch. As extended families came to join the civil servants, large

colonies of Ngaju Dayak were formed apart from their upriver villages. Shärer (1963)

calls them the most influential group in the region – politically, economically and

culturally. Today, this is not so much the case. Years of government transmigration

schemes and waves of voluntary migrants seeking livelihood in the region's rich forests

have wrested the balance of power and influence. Today, Javanese head the civil

services, and outsiders control most of the resource concessions (and trade in general). Plantations continually encroach on customary lands. Migrants come to work the unfamiliar soil and, after clearing the forest, find only unproductive ground, which is readily abandoned as families move on to open new sites. This is in stark contrast to the traditional Ngaju Dayak economy and relationship with the land.

In pre-colonial Borneo there was no record of organized fire brigades that were responsible for traveling to distant fires in the forest and extinguishing them. But, fire management has been a part of local land clearance activities for centuries as Dayak swidden cultivators used fire to open small plots of land for growing cassava, sweet potatoes, rice, and vegetables. Prior to the burn, offerings would be made to propitiate the land and fire spirits believed to assume the form of dragons. Both physical fire-breaks and ritual water rings were used to prevent the spread of the fire. There was little that was wild about these fires, though certainly some may have occasionally gotten out of hand.

Villagers often contributed to labor-intensive activities, such as fire control; but many now lament that this spirit of community service has all but vanished as traditional communities dissolve or migrate towards urban centers and are infiltrated by outsiders who have different beliefs about the nature of communities. The new Dayak community structure or urban community is organized on more individual terms, there is less spatial homogeneity and the communities are rife with religious and ethnic factionalism, neither of which promotes a spirit of cooperation.

The scale of contemporary fires is beyond the scale of the small seasonal burns characteristic of swidden cultivation. Now the fire using community also includes plantation owners, loggers, and land developers who do not answer to the village

headman and local pressure. Fire management is no longer the sole responsibility of the fire users and now government agencies have come to play a more significant role in reducing fire risk.

Organized Fire Management

Organized fire management in Indonesia in 1997-1998 was still in its infancy. What limited capacity that did exist had only begun after the 1982-1983 "Great Fires of Borneo" in which 3.5 million hectares of mostly logged over forest burned (Dennis 1999). The Ministry of Environment was among first state agency to react, highlighting the association of fire with environmental degradation and atmospheric pollution rather than other potential risks associated with great conflagrations (such as loss of lives, timber or property). As in most other countries, the Forestry Department took the lead in organizing fire suppression activities. A number of international aid programs had been established in the most affected districts with only limited support for developing national level capacities. After the fires had escalated to disastrous proportions, a number of other organizations joined the firefight. The national disaster management agency took a keen interest in emergency response. Also, international governmental and non-governmental agencies responded by framing the fire problem within the context of their mandate and missions. ASEAN, for instance, was concerned with the transboundary haze, international environmental organizations were concerned with global environmental change and international aid organizations were concerned with the development implications.

Forestry Agencies

At the national level, almost all matters pertaining to forest lands fall within the purview of the Ministries of Forestry (MF). The MF is responsible for reclassification of forests to other use zones. Forest conversion permits, for instance, are used to establish limited production forests, plantations or transmigration sites. The Ministry of Agriculture is generally reliant on the Ministry of Forestry to release land to their control. This relationship and the underlying policy orientation are based on the early agrarian laws of 1960 that stipulate the terms of land and forest tenure as well as designate jurisdiction. Once a forest conversion permit has been issued, special permits (IPK) are granted to contractors for actual land clearance. As fire is the predominate tool for land clearance, national land use policy plays a key role in the spread of fire[12].

The first national law with specific reference to fire management [13], a government regulation issued in 1985 (PP no.28/1985) stipulated that no one is allowed to burn forests without a legal authority. Further, communities living around the forest must participate in the prevention and control of forest fire. Prevention and control of forest fires is regulated by provincial regulations based on directives from the MF. The law also stipulates criminal sanctions on parties that cause forest fires due to their negligence. Violator may be jailed for a maximum of one year or fined a maximum of 1 million rupiah (roughly US$100).

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[12] Although the Minister of Agriculture also has authority to issue permits to plantation owners (for all areas over 25 hectares permits require the agreement of the governor and district-level officials as well), the Department of Agriculture has no special organization to manage land fires.
[13] Earlier legislation makes general reference to environmental degradation including fire (LH/UNDP 1998).

Figure 5.1 Ministry of Forestry Organizational Structure
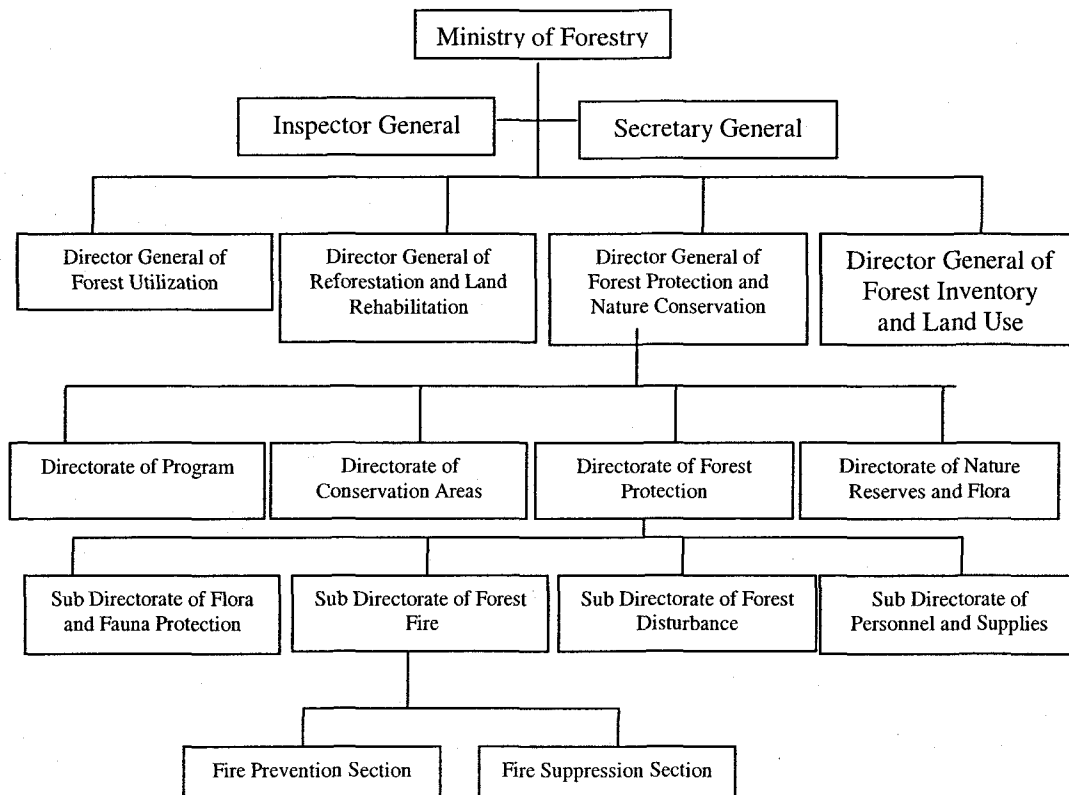
Following this law, the forestry department issued directives in 1986 that

provided guidelines for formulating local regulations. These guidelines were amended

in 1995. Technical guidelines for the PHPA were introduced in 1994 by the newly

established sub-directorate for forest fire, which sat beneath the Director General for

Forest Protection and Nature Conservation (PHPA). The sub-directorate, responsible for

preventing and managing forest fires, produced a series of technical guidelines that

included fixed procedures on the use of forest fire fighting equipment on forest

concessions, directives on production and installment of fire signs and the standardization

of forest and land fire prevention and management (PPKHL) facilities.

In 1995, the Ministry of Forestry established a national forest fire control center, PUSDALKARHUTNAS. This center is mandated to formulate operational policies and to provide guidelines and directives for forest fire prevention and management, to coordinate integrated forest fire prevention and management nationally, to control the implementation of forest fire prevention and management programs, and to plan facilities and infrastructure required for fire management. These functions overlap significantly with the TKNPKLH. In practical terms PUSDARKARHUTNAS coordinates the operational fire fighting activities carried out at the provincial and district levels. However, the actual fire brigades are organized and administered independently by the plantation owners and timber concessionaires.

Despite the growing concern for fire management, the Ministry of Forestry officially legalized "controlled burning" for the first time (LH/UNDP 1998) in 1997 (Decree of the Directorate General of PHPA No. 47/Kpts/DJ-VI/ 1997). This decree stipulates the conditions under which burning is allowed; namely, if the fuel moisture content is between 5-10%, the lowest daily temperature 15-20 ° C and humidity between 35 - 60% (UNDP 1998). The decree was revoked in October 1997 after the season's fires had escalated to a national disaster.

Bapedal: Indonesian Department of Environmental Degradation

In another Ministry, environmental managers were also responding to fires.

Bapedal was created in 1990 by presidential decree (Keppres no.23: 1990) to fulfill the

intentions of a 1982 law regarding the conservation and management of natural resources

(UU no. 4: 1982) When the Ministry of the Environment was separated from the

Ministry of Population and Environment and constituted as an independent entity in

1993, Bapedal's charter was renewed with a mandate to assist the President in the

management of environmental impacts including prevention of environmental damage

and rehabilitation of environmental quality in accordance with prevailing legislation.

With this mandate, Bapedal assumed the functions of stipulating technical policy on

prevention of and control over pollution and environmental damage, and rehabilitation of

environmental quality; developing institutions and improving environmental impact

management capacity; controlling technical policy on prevention of and control over

pollution which may arise from any particular activity plan; managing analyses of

environmental impacts and developing the technical ability to control environmental

impacts.

The emergence of the Ministry of Environment in Indonesia reflected the growing

concern over environmental degradation. The agency's mandate, however, overlapped

substantially with the mandates of other state agencies, most notably the politically and

economically powerful department of forestry. In the end, The Ministry of Environment

and it's lead operational agency, Bapedal, had insufficient resources or authority to

enforce environmental protection. This dynamic was also evident in Bapedal's

involvement in fire management.

Figure 5.2 Bapedal Organizational Structure
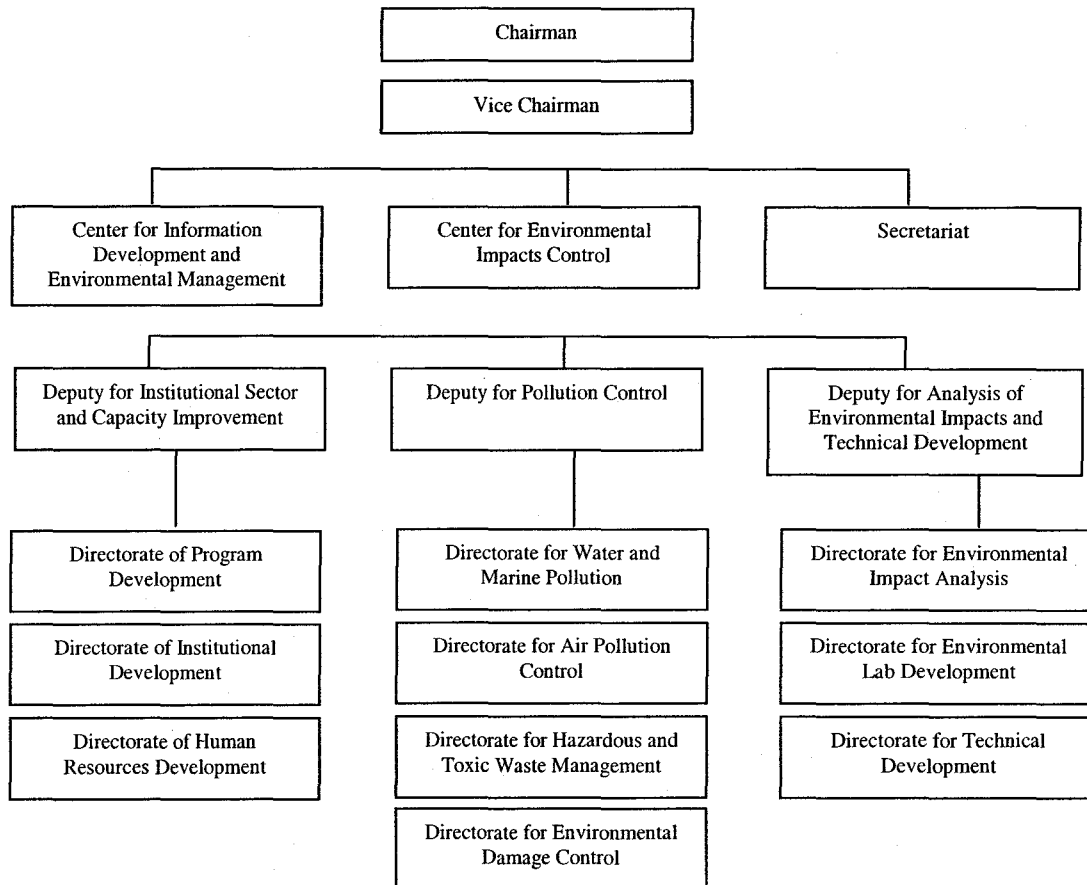
Bapedal and the Ministry of Environment were directly involved in the fire

episodes both before and after the declaration of disaster.   In 1994, the Ministry of

Environment called a meeting with Ministries of Forestry, Agriculture, Transmigration

and other state agencies in an effort to align their position on the causes of dry land fires

and to propose steps for coordinating an integrated response to future fire events. The

following year, the Ministries of Environment and Forestry established a non-structural

team to guide policy for fire prevention and land clearance. The national coordinating

team for the prevention of forest and land fires (TKNPKLH) was seated in Bapedal but

was chaired by the Department of Forestry. This first coordinating body focused

exclusively on dry land fires in designated land use zones. The mandate was later

expanded to encompass forest fires, a move that represents the first official

acknowledgement of illegal fires in restricted forested lands.

Figure 5.3 Organization of Land and Fire Control
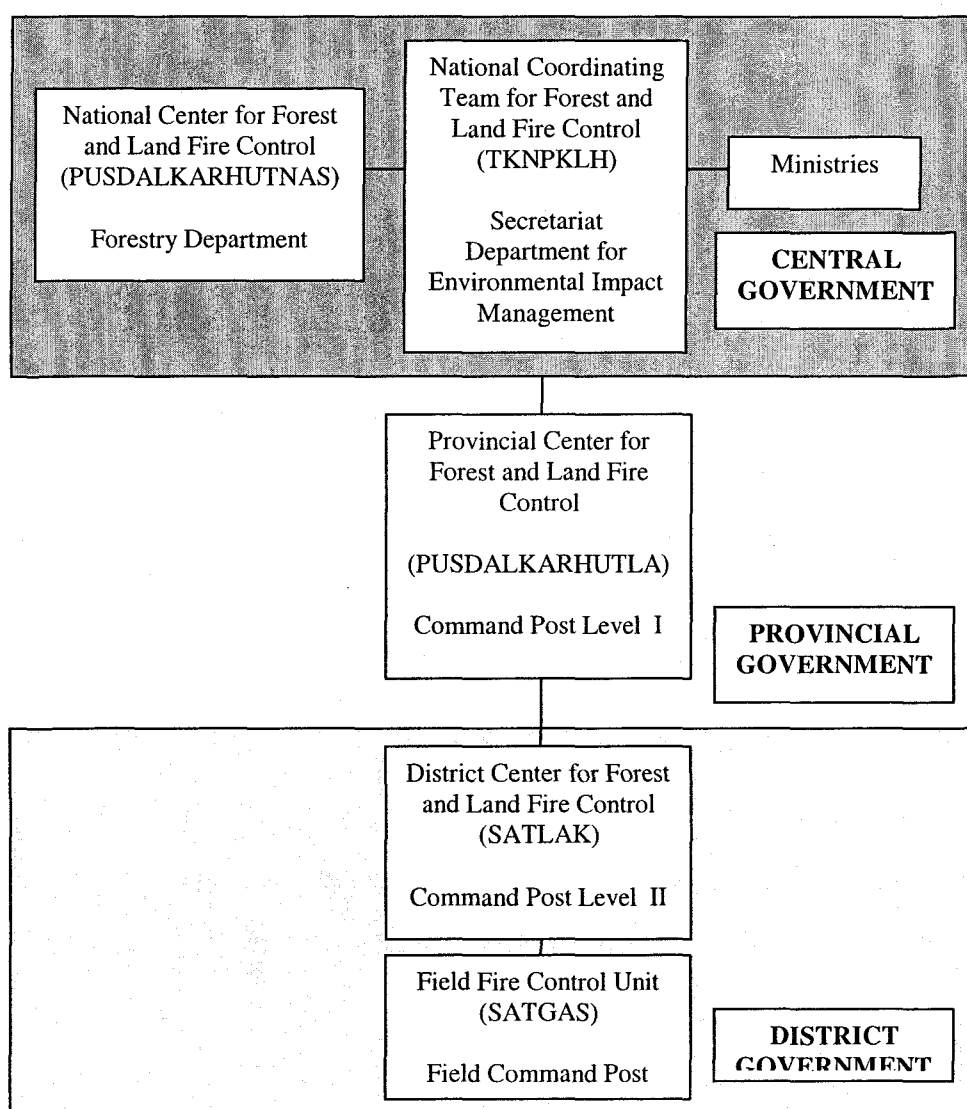
While TKNPKLH was responsible for coordinating and setting policy and operational guidelines, much of the operational responsibility was assumed by PUSDALKARHUTNAS. A special command post (Posko KHL) was later established by Bapedal's Directorate of Environmental Degradation Management, within the sub-directorate of Land Degradation Management to serve as the formal secretariat for TKNPKLH (see Figure 5.3).

In 1998, the Posko was given a formal structural position within Bapedal. The command post aimed to serve as an information hub for early detection of fire. Information from space-based satellites was shared directly with provincial level coordinating teams who in turn would confirm the veracity of the report after ground check.

Provincial Efforts

In a review of fire management capacity in South and Central Kalimantan (Laxdal et al 1997), a Canadian assessment team remarked at the highly decentralized nature of fire management and noted that it was often unclear to the assessment team which government department was ultimately responsible for fire management. In 1997, HANSIP, the provincial civil defense department, reported that personnel and equipment for initial attack and sustain fire suppression activities were recruited from numerous agencies, such as:

- Cabang Dinas Kehutanan (Department of Forestry)
- Cabang Dinas Perkebunan (Department of Plantation Crops)
- Dinas Perkebunan Umum (Department of Public Plantations)
- Departmen Sosial
- HANSIP (Civil Defense)
- PEMDA (Local Government Office)
- Private Water Companies

- Concessionaires
- Airport Authorities
- Volunteers and the community at large

While the broad participation demonstrates some capacity, the lines of authority

and responsibility were not clear and very few had training, equipment or even basic

familiarity with fire behavior in peatland environments. Fire information was

sporadically received and often of questionable veracity. Fire fighting efforts were

restricted to areas accessible by road. These constraints help to explain why at the local

level, fire detection and suppression efforts met with very limited success.

Attempts and Failures

Beginning in February 1997, the government began to strengthen existing fire

control programs. They elevated the status of fire to disaster thus bringing more attention

both nationally and internationally to bear on the problem. The National Disaster

Management Agency (BAKORNAS) established a command post as well. National

media sources were requested to allocate space for fire information and warnings on a

daily basis. TKNPKLH began monitoring and analyzing fire information in February

1997. Thanks to support of volunteers from NGO's, the coordinating team was able

develop a Geographic Information System (GIS) to monitor and track forest fire locations

and to identify land owners in fire areas. Several departments such as the Forestry,

Agriculture, the Space Agency and the Meteorology Department contributed to the

information management system. Reports were communicated to local government

agencies and local military commands for investigation and control. The TKNPKLH

deployed several teams directly to the field to investigate fire reports as well.

In September, at the request of the Minister of Environment, the President issued

a moratorium on all land clearing and burning. Companies engaged in illegal burning

were named publicly. Some licenses were revoked and some have been prosecuted. Concession owners were ordered to submit weekly reports of land clearing and burning in areas adjacent to their concessions. While these measures were welcome, they were too little, too late.

Over the past decade, various studies have evaluated the strengths and weaknesses of Indonesia's fire management infrastructure. The findings of the UNDP (1998) and Canadian Forest Service (Goodman et al 1997) reflect a common understanding of the problems. Broadly speaking, responsibility for fire management is distributed widely throughout the national and provincial government and little integration and coordination actually occurs. First, the mandate of each organization is inadequate to fulfill the functions of fire management. Second, there is a duplication of functions across agencies and departments. Third, lines of responsibility and authority are unclear. Fourth, there is a significant overlap of human resources and, finally there is a lack of foreign aid accountability.

Other criticisms are that permit systems do not serve to evaluate compliance with existing regulations; fire prevention goals are defined in sectoral terms with no mechanism for harmonization between the objectives of the various sectors, regulations do not stipulate sufficient number of firefighters for the amount of land at risk and; regulations are unclear as to who is legally responsible for carrying out fire management and who is legally accountable for fire use violations.

Regarding responsibility for fire management, the Canadian Assessment concluded:

The management of all land and forest fires should be vested in the Ministry of Forestry with the appropriate legislation, policy and funding. The Ministry has a decentralized structure and existing fire management skills. A single line agency for fire management is a proven structure for effective fire agencies around the world. Accountability for program results should be firmly established with one single government Ministry (Goodman et al 1997).

Regarding the role of Bapedal, the same assessment concluded that, "the agency should function as the lead in developing standards, monitoring day-to-day fire conditions and reporting results on behalf of the national government. The role should be one of policy, standards and reporting and not operational. Bapedal should expand efforts to communicate fire information to the public" (Goodman et al 1997).

International Assistance

Over the years, various foreign governments have introduced aid projects targeting the fire problem. The 1982-83 fires brought the issue to world attention, after an estimated 3.2 million hectares of land were scorched by fire. In the following decade fact finding missions, technical aid, equipment and training were offered by the Food and Agricultural Organization (FAO), the European Community, the International Trade and Timber Organization, various branches of the United Nations and the Japanese, German, US and Australian Aid Agencies, to name some of the most active.

These programs began in earnest after 1991, another heavy fire year, when several longer-term projects were initiated. In 1994, the German Technical Assistance Agency, in association with the Indonesian Department of Forestry initiated the Integrated Forest Fire Management project (IFFM) to establish local and provincial fire centers in East Kalimantan. The project provided equipment and training to local communities and developed a community-based approach to fire management. In addition, the program

began an innovative public awareness campaign featuring *Si Pongi*, a cartoon caricature of a fire fighting orangutan. The IIFM also supported a fire information system, policy recommendations and scholarship programs for Indonesian fire managers. However, efforts to contain the 1997-1998 fires were admittedly unsuccessful because " someone wanted those fires to burn" (IFFM n.d.).

Table 5.1. International Fire Programs

	Policy/ Organization	Prevention/ Awareness	Prediction/ Detection	Planning, HRD, Communication	Suppression	Assessing Causes/Impacts
UNDP Forest Fire Crisis: Socio-Environmental Consequences and Policy Response	S				P	S
WWF Analysis of the Causes and Impacts of Forest Fires and Haze	S					P
European Union Fire Response Group (EUFREG)				S		P
ADB Regional Technical Assistance: Strengthening ASEAN's Capacity to mitigate transboundary Atmospheric Pollution	P	S				P
ADB Technical Assistance for Fire prevention and Drought management and Mitigation of the their impacts for Indonesia						P
IUCN Climatological and Ecological Fire Causes			S			P
IBRD World Bank Bapedal Technical Assistance Project	S		S	P		P
CIFOR Underlying Causes of land and Forest Fires-UNESCO	S	S				P
IPB ITTO National forest Fire Management Guidelines	S	S	S	P	P	
CIDA-Bapedal Fire Management	P		S	S		S
CIDA Southeast Asia Regional Fire Danger Rating System Project (BBPT)			P	S		
USAID Fire Response Activities			S	S		P
JICA Forest Fire Prevention Management project		S	P	P		
ASEAN Sub Regional Fire Fighting Arrangements for Sumatra and Kalimantan	S			P	S	

Source: Adapted from unpublished Bapedal Report
(S= Secondary Focus; P= Primary Focus)

The following year, 1995, the European Union initiated a technical assistance project in Indonesia, also with the Ministry of Forestry. This program, based in the fire prone island of Sumatra, aimed to develop an integrated system of forest fire prevention and control involving local government, community and commercial interests. JICA's Forest Fire Prevention and Management Project was carried out between 1996 and 2001 in Bogor, Jambi and West Kalimantan while the Indonesia-UK Tropical Forest Management program started in 1992 addressed fire in the context of wise forest management practices. The United States Forestry Department also began several small-scale training programs, but at the time of the 1997 fire crisis, government agencies had already lost track of those who had been trained.

Following President Suharto's formal apology to ASEAN in September 1997 and subsequent declaration of the fires as a disaster, several other international projects were pursued though there was no coordination and little cooperation between the different initiatives, each of which worked with different agencies or branches within agencies. These included the projects listed in Table 5.1 above.

ASEAN

The Association of South East Asian Nations (ASEAN) also came to play an important role in Indonesia's and more specifically, Central Kalimantan's fire management initiatives. ASEAN was founded in Bangkok in 1967 to provide a framework and mechanism for regional cooperation. ASEAN's aims and purposes are:

1. To accelerate the economic growth, social progress and cultural development in the region through joint endeavors in the spirit of equality and partnership in order to strengthen the foundation for a prosperous and peaceful community of South-East Asian Nations;

2. To promote regional peace and stability through abiding respect for justice and the rule of law in the relationship among countries of the region and adherence to the principles of the United Nations Charter;

3. To promote active collaboration and mutual assistance on matters of common interest in the economic, social, cultural, technical, scientific and administrative fields.

Over the years, ASEAN has developed a number of instruments for addressing the region's environmental concerns including various Centers of Excellence, the ASEAN Environmental Program, the Program on Trade and the Environment, ASEAN Sub-Regional Environmental Trust (ASSET) and the production of an in-depth report, "State of the Environment". In addition, ASEAN hosts several high level meetings organized around environmental issues such as the ASEAN Ministerial Meeting on the Environment (AMME) and the ASEAN Senior Officials on Environment (ASOEN).

Throughout its history, ASEAN has adhered to a strict policy of non-intervention in the domestic affairs of their sovereign neighbors. The fire and haze episode, however, heralded the first radical departure from that principle. In the seventh annual AMME meeting held in Jakarta in September 1997, where President Suharto issued the apology, Malaysia and Singapore reinforced the seriousness of the haze which had by then reached critical levels citing impacts on international and national air travel, disruption to telephone communications and specifically noting that transportation delays in Sarawak had caused considerable financial losses. It was made clear that Indonesia risked the possibility of international protest and sanctions.

Indonesia outlined measures taken in response to the fires such as elevating status of fire to a national disaster, issuing a moratorium on land clearing and burning, using

GIS to identify and coordinate fire control activities, publicizing the names of companies

using fire to clear land, requesting weekly reports from governors, demanding that the

business sector show initiative to control the fires, assess and implement air based and

ground based suppression and, of course, to strengthening international dialogue and

cooperation.

Nevertheless, the meeting minutes noted that, "the low level of concern among

institutions and the public has limited the effectiveness of any response". The lack of

concern and awareness also affects other constraints including technical management and

human resource capabilities. The report also admitted that much of the burning occurred

in fallow lands that are cleared for the late-September growing season and in areas where

forest has been felled and burned for plantation development. Hot spots appeared in

logged over forests and in peat as well. These admissions represent a declarative

departure from previous explanations wherein indigenous people were solely blamed for

the fires (UNDP 1998).

After this meeting the ASOEN convened several meetings of its Haze Technical

Task Force (HTTF), which was established in 1995 with the aim of developing strategic

responses to the regional haze problem, is comprised of senior level management in

environmental ministries throughout the region. After the Fourth HTTF meeting, the

ASEAN Environmental Ministers reconvened for a special meeting on haze. This

meeting was held in Singapore on December 22-23, 1997. By this time, the HTTF had

drafted a Regional Haze Action Plan (RHAP) that identified a concrete co-operative

program to address smoke haze problems arising from forest and land fires. The action

plan calls for specific measures to prevent forest fires through better management policies

and enforcement and intensified public education programs led by Malaysia; establish operational mechanisms to monitor land and forest fires led by Singapore and strengthen regional land and forest fighting capability. Indonesian agreed to spearhead and co-ordinate the fire fighting components.

The fifth and sixth meetings of the HTTF and the subsequent meeting of the ASEAN Environment Ministers on Haze Issues were held in February 1998 when progress towards the RHAP was discussed. Singapore had made progress on the monitoring aspects. For instance, they established an Intranet[14] network and they convened a meeting of the ASEAN Special Meteorological Center (ASMC) for a workshop on climate prediction earlier that month. At that meeting, meteorological forecasts were issued indicating conditions would revert to normal between May and October 1998.

Indonesia proceeded with its initiatives to improve fire-fighting capacity throughout ASEAN. This included a region-wide inventory of fire-fighting equipment. At this meting, the ministers also endorsed the proposition that Indonesia host a site for a Fire Fighting Research and Training Center. The meeting also agreed that current fires in Kalimantan be used as an opportunity to test the components of the RHAP, especially in relation to fire fighting. Indonesia accepted responsibility for identifying priority locations and potential sources of national and international financial support for the activities.

The Asian Development Bank had agreed to fund the RHAP through a regional technical assistance (RETA) project. The proposed scope of the technical assistance

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[14] Intranet is an Internet tool that electronically links a geographic dispersed organization.

outlined measures to be completed in the short term (three months) and the medium term (one year). Short term goals included an analysis of ongoing national and regional fire and haze prevention programs; and inventory of existing fire management suppression capabilities, strengthening the capacity of the ASEAN secretariat, ASOEN, HTTF and the Working Group on Transboundary Pollution; improving information management and dissemination within the secretariat, compiling and analyzing impact assessments, and existing policies. The medium term goals include strengthening the capacity of the Singapore-based ASEAN Specialized Meteorological Center (ASMC), compiling information on marketing of biomass and logging residues, evaluating existing and proposed systems of fire danger rating, fire detection and monitoring systems to create fire hazard maps and promote standardization across the nations. Developing training programs, studying the impact of transboundary atmospheric haze, conducting impact assessment of all major economic, social and environmental sectors, developing technical assistance programs and partnerships to undertake scientific study to improve monitoring and prediction of transboundary pollution. In support of these many goals, they agreed to develop a comprehensive time-bound plan for preventing, monitoring and mitigating fires. The plan would also identify the investments required to strengthen institutional capacity at national and regional levels.

Summary

While some formal and informal institutional arrangements were in place at the beginning of 1997, they were ill equipped to face the scale of the fire crisis later that year. Traditional systems, which were organized along highly local land clearance activities,

had already lost much of their cohesion as changes in the Ngaju Dayak led to new settlement patterns and new patterns of land use throughout the province.

Provincial civil defense and the national agencies that might have built capacity and established appropriate policy support all failed to effectively prepare for and respond to the 1997-1998 fire crisis. These failures however created an important window of opportunity for new organizational forms to emerge. The coincidence of these shortcomings and fire crisis with national political crisis further opened a window in which criticism of governance structures was not only permissible but encouraged.

At the same time ASEAN, rather unexpectedly perhaps, became a significant catalyst for reform in fire management. The establishment of the Haze Technical Task Force and the Regional Haze Action Plan generated new opportunities for the national environmental ministries throughout the region but also created opportunities specifically for a small group of fire fighters from the University of Palangka Raya in Central Kalimantan.

CHAPTER 6
CRAFTING REGIMES

Central Kalimantan's Fire Brigade: *Tim Serbu Api*

By late August, the Forestry Department in conjunction and Civil Defense in Central Kalimantan had organized military and civilian personnel to stamp out the nearest blazes but to little avail. The University of Palangkaraya Environmental Studies Program had formed a small command post and sought ways to assist in the fire relief efforts. Pak Tanjung, senior faculty member at the University, head of several international environmental projects at the University and influential member of the Dayak community was also member of this organization but he was disappointed with the group's uncritical approach to their own shortcomings.

Pak Tanjung was unconvinced of response team's capacity to suppress roadside fires, let alone confront the larger conflagrations in less accessible forest areas. He called them "fire chasers", because rather than fire fighters because they would ride along the road in a truck spraying water but never confront the blaze head on. Pak Tanjung never had training in fire fighting but it seemed common sense that the fires had to be flanked to stop them from spreading. He was very vocal in his criticism of the civil defense teams and felt he was honor bound to offer some solution rather than to simply criticize.

After a day or so of brainstorming, he and some of his colleagues devised a strategy for surrounding the fires by building firebreaks much as he had done in his youth as a swidden horticulturalist. The problem was that the fires were erupting in peat lands. Since peat is an excellent fuel source, the fires burned underground so that firebreaks alone were insufficient. They planned to saturate the peat, but water was a scarce resource because of the drought. Pak Tanjung, however, recognized what none of the

other fire brigades had -- that water was available beneath the surface. Drawing water up was common practice and most every family in town owned simple pump rigging, called *katir*. This water source was augmented by a simple but innovative strategy he referred to as *bomtik*. Pak Tanjung recalled his youth when water bombs were made of sugar bags. Within a day or so a thousand water bombs filled with gray water were donated by the community and were carted to the fire site by motorcycle.

The team tried to register with the authorities, but the team was denied unless they abandoned the katir and bomtik methods and adhered to standard procedure. Pak Tanjung severed ties with the state endorsed fire fighters and was soon at odds with the Environmental Center's leadership. Nevertheless, the team put out over 55 hectares of burning forest and land.

United Nations Disaster Assistance

In late November 1997, Tim Serbu Api (TSA) received a fax. The UN Humanitarian Assistance program offered support and invited them to submit a formal proposal for funding. The team was very enthusiastic because this marked the first serious, formal offer of support and suggested hope for building long-term fire fighting capacity in Central Kalimantan. The specifications for the short proposal included a statement of the problem, proposed solution, funding requested and duration of the project. The deadline however, was close at hand. Two of Pak Tanjung 's lieutenants, both junior faculty from the University, and I were asked to help him prepare the document. We worked closely together over the next few days, staying up at least until 3 a.m. every night until the proposal was finished.

The problem seemed simple to state. The risk of fire was increasing particularly in Central Kalimantan where plantation agriculture and other land clearance activities were expanding rapidly. The remarkable peat swamp forests were especially vulnerable to climatic perturbations, which established ideal conditions for the spread of fire. While recognizing the importance of prevention, the proposal argued that regardless of preventative measures, there would always be a need for fire suppression capacity. Pak Tanjung argued the need for a fully equipped fire brigade to combat wildfires. He proposed to train more fire fighters and secure funds for operational and logistical costs of fire fighting. It was a short-term project with obvious long-term implications and the team was ready to begin training immediately.

The team's unique approach to organizing and mobilizing community support and the team's innovative techniques of *katir* and bomtik were central to the proposal. A curriculum was developed based on their experiences in previous months and primary emphasis was given to the twofold strategy of immediate training and deployment wherein the teams would learn through practical experience at "safe" fire sites.

Pak Tanjung's training program was simple in its structure. It provided for six field units and a central coordinating fire brigade that would send trainers out to the local communities. The entire project cost was less than $300,000. Of this, $124,000 was committed to actual fire suppression, that is, 140 team days of fire fighting.

The team was disappointed to learn that the United Nations Office of Humanitarian Assistance decided to commit its funds to the province of East Kalimantan where fires were still burning and established programs had already been initiated through German technical assistance and the Worldwide Fund for Nature.

Bapedal's Offer

In February, Pak Tanjung received a phone call from Bapedal. They wanted to know if TSA was still interested in submitting a proposal to establish a fire fighter training program in Palangkaraya. At first the team was opposed to working with the state agency, even the agency headed by the Minister who they respected. Through the discussions however, Bapedal's offer was seen as a rare opportunity to build the needed fire response capacity and an even more rare opportunity to develop human resources and institutional capacities in Central Kalimantan generally. Pak Tanjung, two of his lieutenants and I sat down together for another week of all-niters and prepared a proposal that included research and training.

Money for this project was already available from the World Bank because an earlier technical assistance project had a $300,000 surplus as a result of currency devaluation. The World Bank agreed that Bapedal could use this surplus to initiate fire management programs. The University of Pradjajaran in Java used the first half of the money to develop a fire information system. Palangkaraya, we were told, could use the rest, a total of about $150,000.

In this proposal the problem was defined more broadly, as a *national* problem: Indonesia needed to develop a fire management system that encompasses local, provincial, and national scale activities. Palangkaraya could be a vital component of that system. The argument was supported by recommendations made by the Canadian evaluation team of fire fighting experts who stressed the importance of coordination among agencies at the local, national and regional (i.e., Southeast Asia) levels. They also suggested that while prevention should be a priority, preparedness was also essential.

Preparedness included both trained fire brigades and fire information that was both timely and reliable.

The resultant proposal called for the establishment of a national research and training center. The Center was structured around the training program described in the previous proposal but added a substantial research component. Through both sets of activities, information management was critical.

Pak Tanjung and the team made it clear that the program must maintain the provincial focus that had given birth to it. Fire brigades would be established in Central Kalimantan. Training courses would be available to anyone interested. Training staff would be mobile and could train even in remote communities. Research, in particular, action-oriented research, which was already nested within an existing agricultural extension program at the university, would be developed in concert with an information management system that could serve the wider Indonesian and even regional community by sharing reports of fire events, fire risks and detailing the availability of fire fighting resources. The project was designed for immediate implementation and results – that is immediate training and deployment of firefighters to fire sites at the boundary of wildlands and human settlements. Some of the initial projects conceived of included: research to support initial attack preparedness such as baseline maps, priority zone maps, early detection systems; research to support sustained fire-fighting action such as monitoring changing conditions, fire intensity ranking systems and technical updates on fire suppression strategies; research to support prevention and management such as descriptions of land use and fire use patterns and impacts, feasibility studies of informal fire detection strategies and the establishment of fire danger rating systems.

The proposal prepared for Bapedal already reflected new thinking about organizational structure. The team was especially concerned about the allocation of authority and resources. A steering committee would guide both training and research programs. This committee would include local representatives from the University of Palangkaraya, national representatives from Bapedal and international consultants and advisors. The Dayak place great value on men of action and integrity. A special seat on the committee was reserved for the Minister of Environment, whose vision and collaboration represented the guidance of honest governance.

Actual fire fighting operations were left out of this proposal, as Pak Tanjung and his team wanted that organization to remain autonomous of the Center and held by local people. They were still hoping that this segment of the project would find support elsewhere. The proposal also requested support for equipment and infrastructure development. The needs list included trained instructors, instructional facilities, training equipment, public outreach capacity, desktop publishing, video cameras for media campaigns, GIS systems and technicians, survey teams, staff for documenting fires, monitoring satellite images, internet access was also key. The needs also included a NOAA receiving station and statistical programs capable of modeling fire indices. At Bapedal's request no budget was elaborated and the team was instructed to "think big". Unfortunately, conceptual expansion ultimately undermined the grassroots initiative that had inspired the project in the first place.

With this proposal written in the eleventh hour, the team was ready to meet with representatives from Jakarta. The meeting included a deputy director, his assistant and the head of an NGO based in Bogor. At the meeting several vision sessions were held

and key differences became obvious, including the relative emphasis on regional and national issues and the inclusion of Bapedal's chosen personnel on the project team.

The team was in disbelief because it seemed they were being asked to think of budget that would total somewhere in the vicinity of $80,000 to cover the costs of writing a proposal that they had already agreed to do for free and in large part already done. Even more disturbing was the fact that they felt that the money would be much better spent on actually formalizing the curriculum and training more brigades but no money was available for such direct action. By this point he fire season subsided but more fires were erupting in a neighboring province and could start again in Central Kalimantan at any time. The additional proposal writing process meant more delays in the initiation of the TSA activities and the training itself. The final decision to devise the proposal for a broader regional and national research and training center for Bapedal was based on an agreement in which TSA could be given the maximum allowable salary, which the team could use to pursue TSA's original vision.

Proposing to the World Bank

While in Jakarta, I was assigned the task of working with Bapedal's appointed NGO representative to finish the proposal before the impending deadline. We worked again until 4 a.m. at his NGO's office outside of Bogor. The project, as rephrased in the new draft, responded to the problem of a presumed lack of information about the inputs needed to initiate a Center. The project team proposed to provide detailed recommendations for the material, infrastructural and human resource requirements.

Based on recommendations of the Canadian Expert team that had assessed the fire situation (Goodman et al 1997, Laxdal et al 1997), the project was justified by the urgent

need for a coordinated Fire Management Strategy in Indonesia at the national scale. . Possible linkages with ASEAN objectives were also mentioned.

The outputs were described as follows: recommendations for an information management system and recommendations for coordinating protocols; curriculum for the training programs; list of participants for training (including participants from government agencies, business, community groups); designs for an extension service; and recommendations for research priorities.

The scope of the project included assessing existing curricula and alternative information management systems. The scope was extended to include activities such as the investigation of local fire management strategies as this would put fire and fire management in both local and historical context and would ensure that traditional or local approaches were not only considered but also viewed as indispensable to the process of establishing a fire management center. I had arranged with the team to carry out this part of the investigation as part of my dissertation research at no cost to the project. The scope also included substantial dialogue with stakeholders and interest groups.

TSA was asked to elaborate on its approach to the project. In considering this, it seemed that there were several implicit assumptions within the proposal, such as the importance of information management in the broadest sense of information being made available for exchange. The related framework embodied in the participatory approaches to development supported this. The participatory approach had a double meaning in that one objective of the team was to include local people not only in the dialogue for planning a center but, more broadly, to use the Center as a vehicle for local development, to provide opportunities for local people to be employed as fire managers and to

participate more fully in national and international discussions of development in Central Kalimantan.

Our strategy emphasized dialogue with local communities and with international experts but also on educating the project team whom it was assumed would also eventually staff the Center (at least in part), being that this project was in no small part a result of TSA's own initiative and their own approach to fire management.

The draft was submitted to the World Bank and comments were received within a day or so. Their comments reflect some of the implicit rules of institutions that govern the development of environmental management initiatives. The World Bank wanted more concrete and detailed recommendations, not processes reflecting the dominant paradigm that viewed dialogue not as a product but a process. Processes were not valued unless the end result could be encapsulated into a concrete product. Ironically, the team had already proposed an action-oriented project, but World Bank would only fund the planning process. Actual fire fighting or training, even on a demonstration scale was prohibited by the terms of the original technical assistance loan.

The World Bank representative also pointed out the importance of remembering throughout the proposal and planning process that the main client, as he saw it, was the forestry department, provincial government, army and police, all of whom, it was assumed would be the trained fire fighters equipped to protect Central Kalimantan and the nation. However, recall the fact that the national fire management strategy had yet to be adopted. The UNDP program offered some recommendations as did other projects, but no decisions had been made as to the structure of Indonesia's future fire management system.

There were administrative difficulties as well. The original loan for technical assistance was scheduled for completion by June 30, 1998, so Bapedal would have to formally request an extension to continue activities through December 1998, which, they had not. As the firm deadline for formal requests for extension came and went, the urgency within the Bapedal office remained absent. The representative responsible for the project was away at training and no one else had all the necessary files. While in Jakarta, I tried to shepherd the paperwork through the process and soon discovered to complexities of Indonesia's administrative bureaucracy.

Budgets

By July the loan had been extended and the TSA proposal had been approved. The next step however proved to be more challenging than securing funding or even producing the specified outputs. Most of the summer months were spent in contract negotiations. Based on the original project proposal we aimed to complete the project within three months and would use the allotted $80,000 as recommended by Bapedal to support TSA activities. Unfortunately, the first obstacle came when we were informed that the staff could not be paid the wages originally agreed to. Having used the $2000 per month salary described as World Bank's low end, we hadn't realized that this figure was the low end only for expatriate consultants. Indonesian nationals could only earn a total of $700 per month; this was a maximum wage for someone with 25 years experience. This information upset the entire budget because now the directive of spending $80,000 was made more difficult as salaries were the only real anticipated costs associated with project. One obvious solution was to extend the project period from three months to nine months on paper only, but even then the amount still fell short of the initial salaries.

The payments were timed so that the first payment would provide the initial money to begin the project and would be dispersed after the contract was signed. The second payment would follow receipt of a draft report acceptable to Bapedal, scheduled for six weeks after the first payment, and then the last payment would be received after the final products were delivered to Bapedal.

A row between Bapedal and TSA came about after disagreement over the inception report. Bapedal refused to release money until after the inception report was prepared and presented at a workshop. They insisted that the inception report include substantive findings to date (although no work had yet begun) and they expected TSA to use their own money to fly to Jakarta for the presentation. This debate raged for weeks until eventually Pak Tanjung and I flew to Jakarta and presented TSA's "preliminary findings" to a small gathering of Bapedal staff. Eventually, the first payment was received by the end of September.

There was no written outline of procedures for pursuing projects or designating responsible parties in terms of structural positions within the Indonesian Government. Given the complexity of the system and our familiarity with Bapedal administration, we offered to hire Bapedal representatives legitimately to assist with the administrative work, but could not under the terms of the World Bank contract.

Project management, from the maintenance of contracts, terms of reference, reporting requirements and budgets represent a fairly specialized field of knowledge. Few grassroots organizations can be expected to have mastered these skills, let alone the challenge of preparing the proposal in accordance with donor specifications and written to the standards of international project reviewers. There is a wide gap between the

administrative culture of state bureaucrats and that of Dayak culture of TSA and TSA

was clear that it did not esteem the values of government officials.

Crisis of Faith

By August the entire team was feeling the frustration of dealing with government

bureaucracy. About that time, Pak Tanjung received word that the Borneo Research

Council would convene its bi-annual meeting in Palangkaraya in August. Though

meeting was a scant week away, the university administration was eager to be

represented. Pak Tanjung agreed to write a paper and selected as his topic the "crisis of

faith" (*krisis kepercayaan*). In addition to TSA's recent encounters with the bureaucracy,

wider national political changes were underway and the spirit of reformation (*reformasi*)

prevailed. The "crisis of faith" had become a popular theme among the many fledgling

social critics in Indonesia that year.

The Indonesian word "*kepercayaan*" refers to belief, faith and trust. The crisis at

heart, Pak Tanjung believed, stemmed from the breakdown of traditional systems. He

illustrated with examples from his own childhood. His father was a schoolteacher; and,

although Pak Tanjung never lived in a long house, "long house rules" had governed his

life as a child. Tanjung felt deeply that family, long house and village were preserved on

the basis of faith in shared values and trust in general.

Pak Tanjung insisted that something fundamental had changed in Indonesia

society. The corruption that was pervasive across Indonesia was also witnessed in Central

Kalimantan. For, example, in the aftermath of the devastating fire in the city limits, civil

servants stole most of relief aid. The equipment donated by the Canadian for fire fighting

(pumps and hoses) were missing within months and when a major fire erupted in the

riverside market, no one could find the equipment. Eventually, after many homes were destroyed, three out of five pumps were located and fire fighting could begin.

Tanjung also lamented that intentional burning was rampant despite awareness of the risks to the health of the land and people. Economic pressures, economic patterns and power relations all influence the spread of fire (UNDP 1998). Through creating incentives for opening land quickly, lack of economic alternatives and even power conflicts resulting in incidents of arson. Pak Tanjung suggested that changing beliefs about fire use and breakdown in community cohesion or unwillingness to help neighbors, also contributed the fire crisis. Also, the growing sense of betrayal by enforcement agencies promoted a sense of futility and inaction.

Pak Tanjung argued that people needed to get "back to basics", that is, basic values and lifestyles. A revitalization of the traditional respect for fire and fire-use and more importantly, respect for neighbors and acknowledgment of responsibility for their well-being was urgently needed and should be reflected in laws, policies, projects and practice.

Formulating the Center

Organizational structure was a priority issue. The formulation of the organization allocated the decision-making authority and specified the relationship between national, local and international personnel in the visioning and planning of the center's activities. Issues surrounding the organizational structure included legal as well as operational issues.

In the first draft of the report, the director of the Center stood at the helm of all operational matters. Three advisory panels supported decisions about the planning and

implementation of the program. One international, another national-- these panels were presumed to support political posturing and advise on donor relations and international expertise. A third panel was envisioned as a panel of scientific and technical advisors who might assist with the research program itself thus providing peer review. Beneath the director was an administrator, responsible for the paper work and program managers for the training, research and extension programs. Each of these managers would work with a team of respective trainers, researchers and extension agents.

The inclusion of the donor agencies in the panels was part of Pak Tanjung's attempt to minimize the tendency toward state corruption and to provide oversight with enforceability, one of TSA's overriding concerns. Also throughout the structure Pak Tanjung and the team sought to pit international representatives against state agencies whom he distrusted. Explicit references were made to structural policies on financial management so as to subvert attempted corruption.

The curriculum designed by Pak Tanjung and his lieutenants sought to reflect a local understanding of the environment and locally available technology but at the same time strive to meet national and international standards of safety. It focused heavily on TSA's *katir* and *bomtik* methods and strategic operations, chain of command and field organization. The supporting curriculum, as it was called, included the basics of fire behavior, fire fighting equipment and the alternative methods of suppression. Issues arose around the protection of the core *katir* and *bomtik* terminology and the centrality of these approaches. Training modules were designed to address transportation issues (such as reaching the fire site), equipment care and maintenance, strategic operations and basic team safety. Tanjung also included modules on observing forest conditions that would

encourage team members to become familiar with fire behavior in the environments in which they were working. Finally, there was an overview of fire impacts and causes.

At the core to the training program were the mechanisms and methods of instruction, on which Pak Tanjung stood firmly. This included 30-40% of the time devoted to lectures and class discussion with 60-70% emphasizing practical field experience.

Likewise, the research project was conceived as both action oriented and locally based. The university, or more specifically, Pak Tanjung and his team, had been conducting research on the ecological aspects of tropical peat swamp forests with the assistance of individuals from the University of Nottingham and the University of Hokkaido. Accordingly, the team identified the three main research priorities as, technology, ecology, and social aspects of fire. The following research was determined to be necessary for the strengthening fire management capacity in the region: mapping ecological features; mapping fire risk areas; identifying water sources and depths; developing pipes and bores appropriate for various soil types; modifying water pumps; experiments with safe burning techniques; and development of locally adapted fire fighting equipment.

The center was conceived of as an umbrella for research activities related to forest and land fire management. The researchers could come from anywhere and the information generated would be made available to anyone. This was much like the existing structure in Pak Tanjung's project office where the facilities were available for research to be conducted in the region by both local and visiting investigators. Further,

following the principle of grassroots development, the research could also be conducted by "non-scientists" i.e., local lay people who might have some specialized knowledge.

The proposed extension program aimed to link the Center with those communities, organizations, corporations and agencies associated with fire use and management. The goal was to provide information that was useful to fire users and fire managers. These included both public awareness programs and actual prevention programs. Both of these were intended to be designed with the participation of stakeholders (i.e., those fire managers and users, and even the public).

Planning the prevention program was seen as not only critical to the design of the center, but to the success of fire management in the region. Through the design of the prevention program, it was hoped, the process of planning would begin important dialogue within the fire using community. This was seen as an extraordinary opportunity for social learning wherein we could canvass the community at large to learn more about the causes of fire and possible response options as well as building consensus on shared values regarding how to approach the fire problem.

We had planned to have a series of group discussions and to adopt a participatory approach to planning. Though Pak Tanjung agreed in principle with the approach, he had become preoccupied with other issues and other projects and could not focus on the fire management project and would not call the community meetings that had been proposed. By this time the team was also becoming frustrated with Pak Tanjung's management style, which was "command and control" rather than consultative. For my own part I still looked forward to conducting the interviews, surveys, focus groups, and workshops that were going to inform the prevention plan and at the same time provide the data for my

own fieldwork and dissertation. At the same time, the office and students were busy with other projects.

Further tensions about the general political conditions and social momentum for reformation impacted the project over the next few weeks. At that time there was still considerable discontent among the project team regarding managerial issues and payment. Students felt that Pak Tanjung did not value their contributions and they felt powerless at a time when students of their own age in other parts of Indonesia, even in other parts of Kalimantan, were standing up to government corruption and helping *reformasi.* There were also issues of female participation in the projects. Pak Tanjung did try to compensate by hiring some women. Project positions were considered a gift and reciprocal support was hoped for if not expected.

Final Workshop

With only a few weeks before the project was scheduled for completion and still no substantive work finished, the team had to scramble to prepare for the workshop before the Christmas and Lebaran holidays when government officials few participants would be available to attend workshops. For the final draft we developed a strategy for one year of program activities. Each of the programs needed to be elaborated but our methods of investigation were forced to change from wide ranging inquiries in communities up river and international agencies to a more immediate discussion among the team about a strategy. We did hope, however, that the team would have time and money to continue developing the programs after the formal project ended. We had a few reviews; one of the clearest criticisms was from the USFS that said that the TSA program was too parochial and provincial in scope.

A few final changes in the proposal were made. Within each program we included an explicit focus for capacity building for local staff, which included training and an annual assessment of program progress and success. The training program developed considerably in this time. We planned a range of basic training workshops scheduled throughout the year. Sixty percent of these trainings would operate within Central Kalimantan (at least for the first few years) and the other 40% were reserved for the wider Indonesian community. Here we offered courses in training the trainers and actual fire fighting strategies. We also suggested a series of occasional senior seminars throughout the year designed for high-level fire management officials throughout the ASEAN region.

Ultimately 35 people were invited but given only a week to prepare. Very few people attended. Most participants were junior delegates sent by their seniors. They were silent. The representatives from Bapedal were the only vocal participants. The only meaningful discussion came from a Bapedal representative who appreciated the community-based context and recognized that, given the push towards decentralization in Indonesia, proposals such as this will be more acceptable in the future.

ASEAN

The team received word that ASEAN was interested in the proposed research and training center in Palangkaraya. While in Jakarta for a few days, I went to the ASEAN Secretariat to meet with the program manager for ADB's Regional Technical Assistance project about the center while Pak Tanjung met with Indonesia's representative in one the key ASEAN committees. He was enthusiastic and invited us to present the TSA proposal at the upcoming HTTF meeting in Hanoi. Because of visa difficulties we could not

attend but were later invited to present in December at the next meeting, which was held

in Jakarta. The ASEAN invitation was an opportunity to actually begin negotiations for

funding.

Table 6.1. History of the Palangkaraya Project from an ASEAN perspective

25 February 1998	AMMH 2 Kuching Malaysia	• Supported the establishment of a regional forest fire research and training center in the Indonesia • Suggested that a study be included in the ADB funded project being coordinated by the ASEAN Secretariat
3 April 1998	HTTF 7 Bandar Seri Begawan Brunei_	• Noted Indonesia's concept paper for the development of an ASEAN Research and Training Center for Land and Forest Fire Management, to be based at the University of Palangkaraya, Kalimantan. • Agreed to submit the paper for the consideration of the 3rd AMMH.
4 April 1998	AMMH 3 Bandar Seri Begawan Brunei	• Endorsed Indonesia's concept paper for the development of an ASEAN Research and Training Center for Land and Forest Fire Management. The center will directly respond to the need for trained and knowledgeable fire fighters in Indonesia and as a resource for ASEAN countries.
18 June 1998	HTTF 8 Singapore	• Informed that Indonesia has trained an average of approximately 60 fire fighters each from 15 provinces, and that Malaysia has also conducted similar training of trainers for land and forest fire fighters. • Noted the lack of progress in soliciting financial support toward the establishment of the regional center at the University of Palangkaraya, Central Kalimantan. • Requested RETA to assist in preparing a study proposal for consideration by the HTTF, which would incorporate a financial sustainability plan and in ascertaining support by potential donors.
29 July 1998	HTTF 9 Kuala Lumpur	• Informed that Indonesia is in the final stages of securing funds from the World Bank to prepare the design study for a Fire Fighting Research and Training Center at the University of Palangkaraya The Study will outline the structure, functions and outputs of the Center. The study will consider possible funding sources to develop and operate the Center. Long-term assistance will likely be sought.
3 September 1998	HTTF 10 Manila	• Informed Australia's' A$660,000contribution to combating the ASEAN fire and Haze problem. This is to be used for the following purposes: support the refinement and finalization of the NHAPs, provision of short term forest fire management consultant input with expertise in analysis of adequacy of the communications infrastructure for fire suppression, and support the formulation of an ASEAN wide fire-fighting training program which would integrate the activities of the proposed fire-fighting training and Resource Center at the University of Palangkaraya in Indonesia with other fire-fighting training initiatives both within and beyond the region.

At the 12th HTTF meeting, held in Jakarta, we presented the inception report,

highlighting the regional focus of the center as a place where firefighters could be trained

while allied local initiatives worked towards reducing fire and haze risks. The meeting

recommended that we link the proposal to the regional haze action plan, especially those elements relating to fire fighting training and public awareness. The group also suggested that curriculum be designed with inputs from ASEAN member countries and that national and international mitigation experts be involved in the development of research and training programs. They also recommended that ASEAN countries be represented on the advisory board. Finally, RETA informed the meeting that Australia and the United States might be possible funding sources and the meeting suggested that the RETA assist in coordinating possible donor assistance in this regard.

After the presentation the director pulled me aside and whispered to me that the ASEAN ministers had included the development of the a regional research and training center as a goal to be achieved by the year 2004. The center thus ranked among the top environmental priorities for ASEAN.

Over the Christmas holidays of 2000 I received a note from RETA regarding possible funding sources and a note from the USFS representative who came to Palangkaraya in November. Pak Tanjung and I soon received invitations to the upcoming second joint meeting of the SRFA to be held in Singapore late in February. I flew directly from the States and met Pak Tanjung at the hotel in Singapore. By this time, Pak Tanjung was somewhat frustrated with the process and was not willing to invest much time or energy in repackaging what had already been said many times.

I had also received a letter from the director of the HTTF requesting a detailed strategic plan of action for implementation of the Hanoi Plan of Action from the ASEAN Summit. After the Singapore meetings I met with the RETA project manager in Jakarta.

I was invited to help prepare the implementation plan for Palangkaraya for the ASEAN

plan. The plan assumed funding would be available. Action items included:

Establishment of an International Advisory Committee with specific dates for

drafting the terms of reference, review and endorsement by the HTTF

- Signing of a memorandum of understanding,

- Establishment of administrative facilities divided into two phases,

- Establishment of operational protocols for planning and evaluation,

- Develop syllabus for an advanced training seminar,

- Conducting a pilot training seminar,

- Holding a workshop for planning workshop for research program

- Implement pilot research projects.

These activities all resembled the activities planned for under the World Bank

project, but here they also included implementation strategies. Some significant

differences to this plan were specific references to synergistic activities such as the

hosting a vendor demonstration and establishing protocols for equipment ownership and

management. Also, a study of the feasibility of the TSA agro-forestry and sustainability

plan was included. The second phase emphasized long-term implementation and finance

plans. We also included controlled-burning experiments and some zero-burn

experiments in conjunction with the Max Plank Institute in Freiburg, Germany where the

world's most sophisticated fire research is conducted. All of this would result in an

operational center by the end of 2000 with a series of research and training programs

already completed.

RETA arranged a special meeting on TSA training curriculum. At this meeting the Australian experts provided comments on the TSA proposal. Their criticisms were pointed and brought into question the need for such a center. The comments challenged that the very "political decision" to establish the center had preceded a real needs analysis. This criticism was not so much against the content of the TSA proposal but rather opposed to the notion of another ASEAN "Center". Centers have a dubious history within ASEAN. Official policy was to discontinue their establishment, because with few exceptions, centers dissolve after international donors withdrew and ASEAN member nations were expected to maintain and sustain the facilities and programs.

Apart from the questioning the need for another center, the Australians recommended that the training level focus on fire incident management training for senior level personnel. They also questioned whether Palangkaraya had sufficient facilities, building, infrastructure, and human resources. More simply, the questioned the feasibility of choosing allocation with difficult road access and an airport that closes during the fire season.

Through the auspices of RETA we also held another meeting. It was an informal meeting of potential donor agencies to ascertain their interest. We hoped to determine feasibility from their perspective, to identify the steps for their support to move towards program implementation and to further development of an implementation plan for presentation at the April HTTF meetings in Brunei. A technical meeting on the implementation of the training center was held on 23 March, 1999. Several fire mitigation experts were invited to this meeting where TSA presented the Implementation

Plan and an outline for administration and accountability. Here the objectives of the center were clearly stated:

- to provide training for senior level fire management personnel throughout the AEAN region as needed;

- to train sustainable fire brigades throughout Central Kalimantan;

- to support public awareness and fire prevention program in Central Kalimantan; and

- to serve as an open institution for conducting fire and haze related research.

The strategic plan followed each of these objectives closely. The Canadian representatives echo our grassroots approach to the problem and commented on the CIDA approach of finding partners that are "marriageable" for project synergy. We were also invited to the sixth meeting of the ASEAN Ministerial meeting on Haze. Held in conjunction with the twelfth meeting of the HTTF in Brunei. This included updates on progress of regional monitoring mechanisms by Singapore, progress reports on the SRFA for Borneo and Sumatra and the much-anticipated report of the RHAP.

RETA provided an update of the training center by stating that it hosted and paid for two consecutive mini-workshops as directed by the HTTF. I was hoping that this was an opportunity for the HTTF to agree to serve as an interim advisory committee. Unfortunately, the meeting was so busy that RETA only had two minutes to present all aspects including our own. In the end, the RHAP was adopted and the HTTF agreed to support the successor of RETA, the Coordination Support Unit (CSA).

The ensuing meeting of the ASEAN ministers was educational in a number of ways. As the Singaporean delegate greeted the assembly he pointed out that the timing of this meeting was most appropriate because, when he left Singapore in the morning, he

was unable to see out the window. The haze had returned once again. The minister contacted the monitoring branch of the HTTF and obtained satellite images of the fire sites and wind trajectories, which illustrated clearly that there were numerous fires burning along the roadside in Sumatra. He asked that the committee use this as an opportunity to practice the coordinated activities discussed by the HTTF over the past year and a half.

The Indonesian delegation immediately adopted the posture that the satellite imagery was questionable. The meeting room was diplomatically silent until a new topic was introduced. Sadly, each member of the retinue had hand phones, no one even tried to call the office in Sumatra to verify the fires or get a status report. When asked on the smoking lounge, the representative said that Forestry was out of the jurisdiction of the Environmental Ministry and he complained about the complexity of coordinating missions in Indonesia where departments didn't want to lose jurisdictional ground over their territories.

Summary

Between August 1998 and May 1999, Pak Tanjung led a small group of students and faculty through series of odysseys. From their earlier triumphs as fire fighters, the team became bogged down in bureaucratic obligations. They made significant compromises to their original vision for a local center but eventually the interests of national and regional organizations came dominate. The team's noble vision for local development became blurred with the visions of their new partners. These differences were never fully reconciled but rather the TSA team persisted in explicitly or implicitly carving out a space for their initial project within what had become other people's

programs. Moreover, the team's success at fighting fires was greater than their success at fighting bureaucracy. The ways of state administrator's, fiscal officers, donor agencies appeared foreign to the action-oriented values of the Dayak team and especially challenging for the charismatic leader.

CHAPTER 7
ANALYSIS

This dissertation sought to understand how various organizations endeavored to build fire management capacity in Indonesia in 1997-1998. Over the course of the year, response to urgent fire risk was eventually displaced by the urgency of responding to new opportunities for local development. Once Tim Serbu Api had successfully established local fire brigades they began forwarding proposals for a Forest Fire Research and Training Center in Central Kalimantan. In the process of planning the new initiative, underlying tensions between the local proponents and representatives of state agencies were revealed, as were the different aspirations of individuals and organizations involved. This chapter looks at the shifting priorities and strategies involved in building fire management capacity during a unique period of risk and opportunity in Indonesia.

Risks of Fire and Haze

Many social, cultural, economic and political factors influence perceptions of risk in Central Kalimantan. Any collective action designed to manage fire related risk presumes key actors have recognized some critical threshold of acceptable risk levels have been exceeded and that intervention is required. Although social and cultural norms may have established some critical thresholds, other thresholds are set by individual aspirations, perceptions of risk and opportunities. Among the issues that shaped perceptions and responses to the 1997-1998 fires, the following warrant special consideration:

- Fire is as recognized as a tool
- Risk of fire not as urgent as other concerns
- Limited appreciation of the implications of fire and haze impacts
- Effects of the fire were experienced abroad

Fire as tool

As discussed in earlier chapters, the assumption that wildland fires are a public hazard is a western cultural notion. For many fire starters in Kalimantan, fire is a tool, and when wildland fires escape control more land is cleared and opened for a range of economic activities. In Central Kalimantan indigenous Dayak population and migrants regularly clear land for household production. On a larger scale, government sponsored transmigration programs involved conversion of vast tracts of land. One controversial transmigration project in the province aimed to convert one million hectares. In addition, plantations of various sizes were being carved from the landscape as Indonesia sought to become the world's leading exporter of palm oil (Wakker 1999). All of these pursuits utilized fire. The desire to prevent fire should not be presumed. Moreover, despite the unpleasant side effects, even townsfolk who do not use fire recognize it as a common seasonal land clearing technique.

Fire risk and human security

The people of Central Kalimantan are vulnerable to many hazards. As in other forested areas where land is cleared seasonally, smoke and haze are often treated as a fact of life. While schools and offices were closed in Malaysia and Singapore, in Central Kalimantan, where the haze was densest, schools remained open, even when visibility was less than one meter. Doctors from rural clinics throughout Central Kalimantan reported that despite heightened respiratory infections, the health risks to rural communities came more from persistent gastrointestinal problems associated with sanitation and water supply, and that these concerns more than any other preoccupied local health care workers, even at the height of the haze.

Such lack of concern over fire and haze issues among the people of Central

Kalimantan should not be surprising considering that Central Kalimantan was, in 1997-

1998, among the poorest provinces in Indonesia per capita. Encroachments on traditional

lands by government sponsored transmigrants and illegal loggers from the Banjarmasin

in South Kalimantan are exacerbated by a long history of mining, forest and agricultural

concessions being granted to foreign or Javanese interests. Public health and educational

infrastructure are likewise impoverished. Economic opportunities for people in the

provincial capital and port towns are scant.

Despite the social and political obstacles, the people of Central Kalimantan are

remarkably resilient, resourceful and capable. They were instrumental in the Indonesian

liberation from the Dutch and they waged a successful bid for secession from the

predominately Muslim province of South Kalimantan in the early 1960's. Participation in

development, through fire management or otherwise, is an important part of the local

Dayak agenda. So vehement are local Dayak that in recent conflicts with Madurese, who

had usurped local lands and flagrantly disregard local values and codes of conduct, ended

in a brutal massacre in which Dayak warriors claimed 100's of Madurese heads in

Palangkaraya. Similar massacres erupted in the other towns throughout the province, the

largest of which occurred in Pangkalanbun and Sampit.

The threats that preoccupy many local residents are not necessarily the

conventional disaster risks but, rather, are associated with the challenges of making a

living in increasingly complex political and economic environments where both

environmental degradation and social change restrict livelihood opportunities.

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Cost Accounting

The damages caused by the 1997-98 conflagrations were extensive and costly, perhaps more costly than fully realized. Estimates of primary damages only partially capture the extent of impacts. Schweithelm and Glover's calculations draw attention to intangible losses such as the direct and indirect benefits of forests and biodiversity. These figures, however, still fail to account for the impacts on livelihoods and human security.

The multitude of other intervening factors makes measuring the magnitude of secondary impacts immensely complex. Nevertheless, it is fair to assume that the known damages were not simply absorbed by these larger systems without effect. This is perhaps most apparent when the distribution of primary impacts is examined more closely. Consider, for instance, the effects on rural households whose income is already marginal. Even a relatively minor shock to income generation can affect purchasing power that, in turn, impacts local traders and merchants as well. During the 1997-98 fire and haze episode, many people looked to new sources for income generation, leading to an increase in illegal gold mining with its attendant environmental and economic costs in the short term and the long run.

The damages resulting from fire and haze may be more extensive than realized and despite the challenges to full assessment of the consequences of fire hazards, researchers, development aid workers and disaster managers continue to refine assessment instruments. Inadequate accounting or imperfect knowledge of full costs distorts perceptions of risk and critical thresholds for social action. Similarly, limited

appreciation of the costs and benefits risk management also affects the critical thresholds at which individuals and organizations choose to intervene.

Risk and humanitarian action

Risk is unevenly distributed through society, so reaction to it or to the actual impacts of fire, for instance, is highly variable between communities. This is in part a function of geography and in part a function of humanitarian values. In general, the poor are more vulnerable to hazards. Some 97 per cent of deaths and 99 per cent of people affected by natural disasters between 1971 and 1995 were in developing countries (Twigg 2004). While humanitarian assistance in the aftermath of a crisis may be generous, sustained concern with the welfare of the poor and careful consideration of how "our" actions affect their conditions is limited. Conversely, it's difficult to imagine shifting cultivators expressing concern with the substantial property losses in wealthier neighboring countries. Surveying the gap between who is at risk and who responds is illustrative of the values placed on protecting the welfare of anonymous "others". While the poor may "care", changing lifestyles and supporting humanitarian causes remains a luxury, unless alternative behaviors also yield more secure livelihoods.

Critical Thresholds

Despite the many social and cultural factors that affect individual and collective perceptions of risk, there are certain critical thresholds at which society chooses to intervene. National governments have some criteria for declaring a disaster or state of emergency. The threshold may be based on the magnitude of a hazard, the increased likelihood it will affect more communities or the value of potential losses, to name a few.

Formally, national declarations of disaster signal the critical threshold for international aid to begin, although concern may have peaked much earlier.

Individuals also have unique thresholds at which they are driven to action. As fires grow more intense, spread more rapidly or smaller fires converge into a larger conflagration, the level of public attention grows as well. As fires encroach on villages and urban settlements, new thresholds of concern are reached. Likewise as the immediate threat subsides, public attention often does as well.

Understanding of the social and cultural factors that shape perceptions of risk and identification of criticsal thresholds help to explain differential levels of commitment to fire management. However, other factors can effectively lower critical thresholds for individual and collective action. As Indonesia's fires escalated to the scale of disaster, responses from the international community introduced a range of new opportunities to access resources and participate in the development process and made the promise of risk reduction even more appealing.

Opportunities Created

One of the remarkable features of natural disasters is that the heightened sense of urgency creates a window of opportunity for social change. Moreover, it was recognized that the opportunity would be short-lived which added pressure to exploit it to its fullest. The 1997-1998 fires attracted widespread media attention at home and abroad. The combined effect of economic impacts on neighboring countries and international concern with the negative effects on the environmental, public health and development led many bilateral and multilateral aid agencies to respond to the emergency and support plans for improving capacity for emergency preparedness in Indonesia. The infusion of aid money

and the need to identify and assess feasible solutions created new opportunities for certain individuals to gain access to additional financial resources and decision-making authority. These opportunities, however, were constrained in scope and subject to the agreement of international and national partners in the emerging programs.

As a management system, fire is similar to many development initiatives, which promote present day changes in anticipation of future social benefit. In the case of Indonesia, managing fire is ostensibly premised on a preference for enduring forestland and clear skies. Fire management protects property and preserves biodiversity. But in the process, stricter fire management regulations may be contested, as are many development schemes, because they affect land use practices. Regulations could restrict the use of fire for inexpensive clearance of land, thus forcing plantation managers and foresters to turn to more costly technologies. The public at large is affected as well; though it has yet to be enforced in Indonesia, the legal structures would hold individual fire starters responsible for fire-related damages. In Kalimantan, where most indigenous communities continue to rely on swidden agriculture, such laws could further alienate an already marginalized population.

A fire management organization such as the one proposed by Tim Serbu Api could create a range of jobs for local residents. As a research institute, local academics would have valuable opportunities to study and write about their own lands and to collaborate with investigators from around the world. The center would also introduce high-tech equipment for monitoring fire conditions and as well as a sophisticated information management system. Even the planning process could have been a form of

development if marginalized stakeholders were engaged in a process of joint problem solving.

The TSA plan, however, saw even greater potential for development. The TSA program included plans to train community members throughout the province to fight and prevent fires in and around their villages. Fire fighters would be paid for the time on the fire lines. Other community members who provided logistic support would be compensated as well. Moreover, the TSA plan initially conceived by the team (but excluded from the latter proposals) recognized the importance of self-sufficiency. The plan was to gradually wean the local fire brigades from donor assistance. These local brigades would be self-financing. Though the details had yet to be worked out, initial thoughts included securing a plot of land for small-scale agribusiness. There were many opportunities for establishing synergistic linkages between fire management with local development planning.

Fire management could meet the some local needs by providing jobs and access to decision-making authority for local people. While the declaration of disaster created unusual opportunities in this regard, a research and training center for fire management in Central Kalimantan would also establish formal relations between the local staff and administrators and decision makers in Jakarta, within ASEAN, and beyond. The team believed that these international contacts would not only afford certain legitimacy, but also serve to ward off corrupt officials who might be interested in the Center's resources.

Mechanisms for realizing opportunities

To bear fruit, however, these opportunities needed to be actively pursued. Certain formal mechanisms were in place through which proposals could be advanced and hence

opportunities realized. Using the general planning framework outlined earlier, the following sections look at key events in the process.

Hearing Alarms: Recognizing Problems

Problem formulation is the cornerstone of strategic action, it delimits the scope of activities and frames the solution set. Nevertheless, problem formulation does not comprise a single discreet activity in itself; rather, it is an ongoing process of assessing and interpreting conditions in the surrounding environments. The astute observer is critically aware of changes in the social and environmental settings that might have bearing on his own condition. When individuals collaborate in joint problem solving ventures, the problem in question is articulated more formally and serves to establish common ground for social action. In short, problem formulation is an ongoing process of individual and collective reflection on an issue of concern.

Problems may be framed in terms of the "big picture" or as smaller components of a larger problem set. Causal primacy may be measured in terms of spatial or temporal distance from the effect in question. In the case of fire, the immediate cause of the problem might be one person dropping a match but at broader scalar levels the problem may be defined as arson resulting from an unresolved land dispute caused by unscrupulous officials granting concessions in forests traditionally held by indigenous people, and so on.

The decision makers involved in everyday activities of recognizing and responding to problems are certainly not so systematic. Knowledge of all causal factors is limited and often, ideology or belief systems cloud the logic of critical analyses.

In the 1997-98 fires, the first order of business was to attack the fires, both physical and political ones, but soon after it was also realized that the declaration of disaster generated new opportunities for social change. Risk and opportunity need not be dichotomized as each represents a change in circumstances that, if responded to effectively, can enhance security or improve personal or collective welfare. However, pursuing opportunities can, at times, create new challenges.

As the fires encroached on the town, the sense of urgency heightened and addressing the causes of the fires was less of a concern than the immediate problem of putting out the fires burning along roads between settlements.

After several weeks of limited success, it became clear that even the roadside fires were beyond the capacity of the Provincial Office of Civil Defense. Pak Tanjung urged a new strategy based on his knowledge of peatlands but Civil Defense insisted on following procedures. For Pak Tanjung, the problem was no longer simply how to put out the fires, but how to do so independently of the established civil defense teams. Not only had the institutions failed, but they also refused to consider new and possibly more effective strategies. He turned his attention to organizing volunteers and preparing logistics for getting water and fire fighters to the fires and, within days, people were organized to dig trenches, pump water and hurl water bombs.

Recognizing that the problem of fire was only symptomatic of the broader failure of the government to protect the people and, in starting an independent brigade; the leader of TSA was explicitly setting out to develop an alternative system in opposition to the status quo. Convinced that with modest support, he and his team could build an

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enduring program for training and deploying firefighters throughout the province, Pak Tanjung turned his energy to developing a clear outline of his proposed project.

When Bapedal first contacted the team in Palangka Raya, Pak Tanjung was led to believe that they wanted to support TSA's training program. Once representatives arrived in Palangkaraya, it was clear that they had envisioned a very different training program -- one that sought to build capacity of fire fighters nationwide and offer training to firefighters from neighboring nations in ASEAN.

With money from the World Bank, the initial problem of securing funds seemed to be resolved. Pak Tanjung faced a new dilemma designing a long-term strategy that met TSA's objectives, as well as satisfying national and regional interests.

Over the course of the project, administrative responsibilities had become so burdensome that these more mundane problems soon eclipsed the primary problem of reducing risk and building local capacity. These challenges were so frustrating that the team came to doubt whether any real program would emerge from their effort at designing a Center with Bapedal for ASEAN. Pak Tanjung eventually turned his attention to more productive projects that would more likely bear fruit. They directed their attention instead to other strategic efforts to protect forest, stop the million-hectare project and regain control of local development.

Bapedal, on the other hand, faced less dire circumstances. They needed to find a project eligible for funding under the World Bank's criteria for spending the money left over from the exchange rate surplus. This minor administrative problem provided an opportunity to make headway on another, more pervasive problem facing the organization. Bapedal, having in many ways been marginalized in it's ability to enforce

environmental legislation, was keen to secure a role the department in what looked to be an emerging national fire management system. Bapedal, as the national environmental agency was under pressure to demonstrate their commitment to addressing the fire problem to ASEAN's environmental ministers. Pursuit of the Central Kalimantan initiative would help to demonstrate their commitment quickly.

ASEAN ministers faced problems of a different magnitude. First and foremost, the haze problem was a genuine burden to the regional economy and the ministers had every reason to believe that the problem in Indonesia would recur. However, while the causes of the fire were clearly the result of Indonesian domestic policy. ASEAN's mandate clearly stipulated non-intervention in domestic affairs. Moreover, because of the general reluctance to openly address forest conversion policies common throughout the region, ASEAN ministers needed to be very diplomatic about applying pressure on Indonesia.

Having framed the crisis in terms of regional haze, the Haze Technical Task Force was established and the Regional Haze Action Plan was developed. The emphasis was on regional cooperation through sharing resources for emergency response and expertise on a broader range of fire-related issues. The concept of a regional training center in Palangkaraya was appealing. Nevertheless, the decision to endorse Palangkaraya as a Fire Fighting Training Center was more motivated by the politics of ASEAN ministerial meetings than by a clear sense of the feasibility of such a center or the role of such a center in whatever fire management system was being developed.

So, although ASEAN endorsed the center, they were not in a position to pursue it aggressively, unless the center had a well-defined sustainability plan. Throughout the

process of designing the Central Kalimantan Fire Program, problem formulation did not constitute a distinct phase but rather it was in a multifaceted and ongoing process of interpreting and responding to changing circumstances. None of the proponents targeted the causes of the fires as the primary problem. Their formulation of the problem reflected the narrow question of how to organize a training program, and more narrowly, how to administer the process of designing a program.

For TSA, alarm bells had been sounding before the fires. The Research and Training Center was only the latest in suite of initiatives in which Pak Tanjung sought to build local capacity and stop environmental degradation. Local articulation of the problem used the rhetoric of development and, more specifically, they wanted to raise the issue of power in process of making development decisions.

Building Partnerships

The rules or operating procedures established by fire management institutions are intended to guide many people, from fire fighters and administrators to the public at large, perhaps for generations to come. Establishing such broad reaching influence does not happen through the effort to any single individual; institutions developed through participatory process are likely to gain legitimacy and have better prospects for enduring. Legitimizing an institution is especially important if the proponent intends that the practices persist beyond the time of their involvement. Accordingly, building partnerships in the early stages of institutional development is essential.

Partnerships are often built on political alliances. International environmental organizations, for instance, are often strong allies for indigenous people in safeguarding against state sponsored resource extraction (Wakker 1999, Brosius 1999). Likewise, in a

corrupt regime, private industry may work hand-in-hand with government agencies to gain more control over resources. Aside from political expediency, partnerships are critical because they bring additional labor, insights, resources and expertise to bear on a problem.

Building a fire management regime requires technical insights, experience and organizational design, financial resources to host meetings between planning partners and social capital that may be used to lobby for creating a favorable policy environment. In Palangkaraya, Pak Tanjung relied, at first, on people already within his sphere of influence, junior faculty members and students at the university. This group provided the labor as well as a small cadre with whom he could brainstorm a fire management strategy. These partnerships were critical to the success of TSA's operations, but they were not partnerships premised on equality. Pak Tanjung's team had been built over the years and comprised people who admired his integrity and his ability to carry through with plans, but who had also benefited from his endeavors by the opportunities he created and offered.

Pak Tanjung began to engage local citizens. Though very few actually joined in the fire line, even when the fires were within a few meters from their homes, they did provide critical material support by lending backyard pumps and hoses and collecting wastewater for firefighting.

Pak Tanjung also built an alliance with the Minister of Environment. At first Pak Tanjung had only sought a small grant but he found he had much in common with the Minister of Environment and rapidly came to respect the minister's integrity. The minister also came to respect Pak Tanjung and the partnership appeared to be enduring.

Although each had motives or at least common interest in maintaining their working relationship, the relationship was built on a common respect. The minister introduced Pak Tanjung and his team to kindred spirits who were interested in both fire protection and political reform.

Pak Tanjung was eager to find such kindred spirits, people who shared similar values and principles. It was, in some ways, the antidote to the crisis of faith that Pak Tanjung frequently referred to. He sought people who held similar principles, men of action who agreed that local people should have more influence in deciding how Kalimantan's resources should be used and how the province should develop. He found kindred spirits in a handful of Jakarta activists, the Minister of Environment and some international project workers. He sought partners that would support but not intervene without invitation. He had limited trust in some of his fellow Dayak leaders who had, he felt, been corrupted by the system.

In addition to building partnerships with kindred spirits, Pak Tanjung sought alliances with the international community for both pragmatic and political reasons. The international community offered the possibility of financial support through the European Union, Canada and the United States. But he also hoped that the international community would keep corrupt government officials in check. At first he sought direct linkages that would bypass the government altogether but when they recognized this was impractical they instead aimed to design oversight committees that would also audit financial systems. Though the likelihood of success in this regard was limited, still, it demonstrated the lack of faith in partnering with the government and an interest in

strengthening the position of the Central Kalimantan based group through strategic partnerships.

Although Pak Tanjung did not trust Bapedal, most international donors required official state sponsors and he believed that Bapedal to be easier to work with than the Forestry Department with its deeply entrenched power base. The partnership with Bapedal helped to raise the profile of the TSA's initiative. Through their liaison with the state and with funding from the World Bank, Pak Tanjung and the team were invited to a participate in meetings of the Haze Technical Task Force, meetings which were also attended by various development banks and international aid organizations. They were also invited to participate in a UNDP sponsored study with Bapedal to assess the causes of the fires and to propose recommendations for a national fire management strategy (UNDP 1998). Perhaps TSA's would have been invited to participate even without their involvement with Bapedal, but the project certainly gave Pak Tanjung the spotlight in an audience of potentially influential people.

In the end, the collaboration with ASEAN proved fruitful. Although ASEAN had no money to support the center, they did endorse it and included it as a component of the RHAP. As part of the process of implementing the action plan, ASEAN committed to calling together a meeting of potential donors. In this meeting, the Canadian International Development Agency indicated that it was not interested in the regional center, but that it did like the original idea for community-based fire management. They later came to Palangkaraya to explore the prospects and see if TSA was, in their words, "a marriageable partner".

Finally, in preparing the proposal for the World Bank, it was pointed out that to propose a center associated with the university would require formal approval from the university senate and a memorandum of understanding would need to be signed. Up to this point, although the administration was aware of the project, it had not been formally involved. Pak Tanjung wanted very much to see the university develop, but he was not optimistic about prospects with the current administration. The team considered establishing an independent NGO, but that process would take time and an association with the university seemed more appropriate to host a training center. The University however was not engaged in the process of developing the center.

While partnerships were critical to both project development and institution building, this fire management program was largely unsuccessful in cultivating long-term rapport with potential colleagues. As one critic pointed out, the project was too parochial. While TSA had intended to be provincial in scope, it failed to explore and identify sufficient common ground for working with others. The failure of the program was, in part, the result of a failed strategy in building partnerships.

Partnerships were built on convenience and political expediency rather than shared values or commitment. In the planning process, more pragmatic partnerships with individuals having the skills and insights to help design an effective resolution could have been sought. It may also have been wise for TSA to build trusting and enduring relationships for long-term collaboration.

Planning Costs

Managing fire requires resources for training and equipping personnel, for enforcement and delivering outreach programs. Even basic administrative costs can add

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up. Finding money for program development is a challenge for many organizations the world over. Systematic exploration of alternatives requires labor and means to bring the experts and stakeholders together in a joint problem-solving environment.

During the fires, TSA needed equipment, hoses, shovels, and the simple water pump for reaching the aquifer beneath the peat surface. They relied on their own resources and borrowed from their neighbors and local shopkeepers. The most precious resource, water, was supplied by the community and delivered in recycled plastic sacks. The inputs were minimal; in fact the most difficult resource was the labor, finding people willing to spend long days and nights on the fire line. The volunteers, most of whom viewed Pak Tanjung as a patron, donated their time at no cost.

Although these resources were available during the immediate crisis, such donations were not sustainable even through the current fire season. With modest support from the Minister of Environment, Pak Tanjung was able to continue fighting fires for several more weeks. But with their hope of continuing during the next fire season and their plans to train brigades in neighboring districts, the team would need financial support. They set out to find funds to train, equip and pay fire fighters for the dangerous and demanding work.

The most obvious source of money was the international community -- aid agencies, development banks, the United Nations and international NGO's. With the media attention to the fires and the U.N.'s continued attention on disaster management, there were several sources of funding. Pak Tanjung's strategy for seeking support, however, was more opportunistic than systematic. If circumstance led him to a specific donor he would make a proposal. What the team hadn't fully acknowledged in their

enthusiasm was that each of the potential donors had its own mission and mandate. The team had jumped too eagerly and found itself working with the wrong partner. Because the World Bank funds were part of an ongoing technical assistance project with Bapedal, the terms were too constraining and would not allow TSA to meet their immediate objectives.

This highlights the importance of being familiar with the donor environment. Donor agencies are complex and often each of the different programs within an organization has its own objectives, criteria for selecting project partners, and modes of engaging with partner organizations. For many, project activities are government-to-government, or require an official government sponsor.

Each agency also has guidelines that govern the allocation of budgets and stipulate auditing requirements. Some will pay for salaries while others have a salary cap; and some allow for overhead costs and others for equipment. For those unfamiliar with the process, the details can be daunting and frustrating, as the TSA's team learned. TSA was compelled to work within the budget framework of the World Bank's original contract to the government and hence also had to meet the guidelines of the national auditing agency.

Development agencies, whether in offering grants or loans, have considerable influence in shaping both present and future activities in countries such as Indonesia. At present, would be recipients must conform to the processes stipulated by the donor organization. In most cases this entails not only meeting standards of validation of justification for the program planning and feasibility, but also requires a supporting administrative system to govern the disbursement and accounting of funds. Likewise, the

project personnel must meet the organization's standards. Often this implies academic credentials and thus narrows the pool of potential proponents. Perhaps most influential is the power to decide which projects or programs will be funded. Donor agencies provide the allocative resources for establishing new institutions.

Decision-making authority may lie in donor agency program managers or with their review committees, which are sometimes comprised of experts, and other times comprised of bureaucrats who are expected to consider the technical merits of proposed programs, feasibility, and contribution to the organization's mission. However, funding priorities are in turn, set by the organization in response not only to the mission but also to their financial supporters. They must justify their investments to national budget appropriations committees and the general public. Research and development priorities are guided by complex political negotiations and can be easily rescinded, such as when United States Agency for International Development (USAID) funding was withdrawn after the September 11th terrorist attacks. Similarly, lobbyists succeeded in ending USAID's support of certain family planning initiatives.

Sustainable development requires investment. Development programs are caught in a difficult position wherein they hope to see long-range progress, but need to demonstrate short-term results. The burden was on TSA to demonstrate how they could achieve this with modest investment. Indeed this is a challenge faced with many groups wishing to pursue disaster preparedness rather than emergency response options.

TSA's efforts to draw down resources suggest not only their interest in pursuing fire management, but also their interest in attracting investments in their province and in local people. TSA did not want to adhere to the regulations of the government or the

donors but wanted discretion over budget allocations to ensure results for local people more than earlier projects had.

Objectives and Options

Having defined the problem, the assembled team was poised to articulate their mission, vision, objectives and goals. The mission is a statement of the common problem that has brought the group together. The vision is an expression of a possible future; it is an anticipated scenario in which the problem has been resolved. Objectives are the concrete changes that the group hopes to achieve in pursuit of the vision. Goals, at the most narrow scale, are associated with specific tasks or activities that support the objectives. Conventionally the terminology of objectives and goals are interchangeable. Regardless of the terminology used, planners recognize the importance of distinguishing levels of cause and effect in organizing their actions.

This is an idealized model of the logical progression of planning. While planning may proceed organically, in some cases, particularly in formally organized planning endeavors, the articulation of mission, vision, goals and objectives, is a structured activity in which the group is led through a series of exercises designed to clarify a strategy and approach to addressing the problem at hand. This is a central component to the planning process in which problems are restated with more critical analysis of causal factors and a suite of strategic response options is developed, as are measures for evaluating the relative merits of alternate courses of action.

While this logical framework of the planning process outlined a long time ago remains valid, in recent decades the process has become progressively more sophisticated in the techniques used to elicit and evaluate strategic options as seen in the proliferation

of facilitated focus group meetings. Many of the developments are designed to enhance participation, most notably the participation of stakeholders who, for a variety of reasons, have not been given voice. In addition to the overall strength derived from building broad based agreement in the possible futures, it is widely held that participation enriches the perspectives, experiences, knowledge brought to bear on the problem.

TSA and colleagues had an opportunity to embark on such a systematic exploration of the challenges and opportunities that they faced. Winning the proposal meant that Pak Tanjung and his staff would have the time and resources available to critically examine the linkages between fire management and development. Further they had the opportunity to engage in substantive dialogue about the underlying problems of development gone awry and also to formulate culturally and ecologically appropriate positions on the role of fire in the region. They had the resources to host public meetings with invited experts from Jakarta and abroad as well as key government agencies.

This is perhaps where the team failed most tragically. Historic tensions, power imbalances and personal ambition undermined the opportunity. The most immediate tension was over issues of project management. Who had control over how and when various aspects of the project would be completed -- TSA or Bapedal? From TSA's perspective, Bapedal had already hijacked the broader mission of the local brigades, and backpedaled in its agreement that the team could base the proposal study on field activities (such as running and evaluating the training of another brigade). They also delayed the disbursement of funds and posed a number of administrative obstacles.

By this time, Pak Tanjung and the team were losing interest in the project, feeling that it would never achieve the purposes that they had originally intended. He had

decided to redirect the team's efforts to more effective projects and would only provide the minimum basic requirements to complete the proposal. He would say what he hoped to achieve in meeting national and regional needs while incorporating the key local elements regardless of Bapedal's position on the focus of the project.

Pak Tanjung had not been familiar with the many facilitation tools that might have been employed in designing an effective program and when it came time to design the program he resisted any form of stakeholder participation. In fact, for several weeks he even refused to call a meeting of the team to discuss the proposal. It became clear that his strategy was to delegate one section to each team member and ask him to write independently.

Eventually, the document was reviewed by the team of consultants working on the Regional Haze Action Plan who questioned both the feasibility of establishing a center in an area as remote as Palangkaraya (especially given the fact that the airport was closed during haze episodes, and they questioned the need for regional training center given the high costs and the poor history of ASEAN Centers. Nevertheless they recommended some additions to the curriculum, mostly targeting training for senior level administrators. They also indicated that the provincial scale emphasis was, too parochial. The criticism was not based on appreciation of the strategic advantages of developing fire management capacity at all scales, but rather on their narrower mission and vision of responding to the Regional Haze problem and formulating a regional plan.

Back in Palangkaraya, Pak Tanjung and the team incorporated some of the comments. They introduced a rotating program of advanced lectures. Pak Tanjung conceptualized a sustainability plan, which for the regional scale programs was based on

a fee structure. But, he also envisioned a plan for sustaining the local fire brigades at the community level in which fire fighters would form a cooperative and would cultivate cash crops such as chili, the proceeds of which would cover firefighting expenses and salary for the fire fighters. The sustainability plan was, however, hastily conceived and presumed the community's willingness to participate. Moreover, no serious study of the chili market was conducted. However, the sustainability plan was a perfect venue to link to fire management and development. The team missed this opportunity.

TSA, still committed to promoting local capacity, spent considerable time elaborating the basic training program in which 50% of annual instruction time was allocated to training local brigades and 30% each to national courses and regional participants. Advanced training would invite international experts for targeted workshops that would be developed as specific needs in the region were identified. Likewise, the training curriculum was based on building knowledge of local environment through observation; that is, training in how to note distinguishing features of the physical landscape that might prove to be a fire hazard or indicate how best to suppress fire. Pak Tanjung also held tight to the KATIR and BOMTIK strategies as the core of the training program for peatlands. Also, to build local capacity, and presuming that local people would be employed the trainers; the proposal included an annual break for staff training.

Finally, in designing the research program, the revised proposal was action oriented and based on locally identified research priorities. Moreover, the researchers would include local people and would be based on their knowledge and problem solving skills.

There was no joint problem solving per se, no interest in seeking out "good practices" in fire management. No integration with the social causes of fire, prevention or critical thresholds for deploying fire fighters. The incident command structure was narrowly defined and very provincial. There was no monitoring and evaluation component – no means of determining whether training fire fighters was going to significantly reduce the threat of haze or improved local environmental quality.

In drafting the new proposal, the team assumed that firefighting was necessary without asking how much and what kind of fire-fighting capacity was needed to maintain optimal fire balance in the environment. Rather, they concerned themselves with how to ensure that local people would be trained and that they remained in control of the design and resources of the center.

Central to their concerns was the distribution of allocative and authoritative resources within the planned training center. For both, access to the financial resources for pursuing program objectives was a high priority. In terms of the authority to direct program activities, both were concerned with decision-making authority. However, TSA was also concerned that the content of the program highlight local knowledge, skills and approaches; they wanted to design the center in such a way that historically marginalized people would be privileged. ASEAN, on the other hand, was aware of the broader issues of fire and, although they could not articulate them for political reasons, their action plan reflected a more subtle understanding of fire management. Still, they stopped short of opening a dialogue about how much fire and what policy would enable enforcement of the optimal levels.

Accountability

Accountability in allocating resources, both in short term projects and in long

standing institutions, has been a major concern, particularly in Indonesia during Suharto's

regime when graft and corruption were rampant. In many ways corruption was at the root

of TSA's lack of faith in fire management and governance structures. It is not only a

matter of accountability in fiscal transactions, but also in successfully achieving program

objectives and, perhaps more importantly, accountability to the public- the intended

beneficiaries of fire management. A complexly ineffective system for auditing

expenditures had itself become a costly and largely corrupt enterprise.

Measuring the success of projects is not an easy task although considerable

attention has been directed towards the challenge in recent years. In part, the challenge is

related to the difficulty of quantifying project benefits. The number of people trained

does not necessarily indicate enhanced capacity. The problem is even more daunting in

disaster or fire management. How you quantify risks averted? Is it even possible to

establish causal connections between preparedness, prevention, and reduced impacts?

Houses standing, immediacy of response, fewer incidents of fire under similar conditions

-- each is a possible indicator. Many granting agencies now require that a monitoring and

evaluation system be built into the project budget, but the monitoring and evaluation is

often superficial and perfunctory.

During the 97-98 fires, Pak Tanjung and his team succeeded in controlling fires

that had all but surrounded a mosque and university buildings. They tried to estimate the

amount of land that would have been destroyed had they not intervened, but did not

include an estimation of lost environmental quality. Nor did they estimate the costs of

mobilizing the community, or the benefits of empowering a group of faculty and students.

In the case of proposal writing, however, TSA was accountable to Bapedal, the national auditing agency and the World Bank. Accountability was measured not in program success, but properly filled out line items, inception reports delivered and receipts collected. The development of a financial auditing system has not been paralleled by a complementary system for monitoring and evaluating program success. This task is left to implementing organizations themselves, should they choose to do so.

Both fire and fire exclusion bear some costs to communities. To what extent should those communities be involved in developing acceptable response options? If the communities chose not to participate in Pak Tanjung's scheme, however thoughtfully designed, the project would face greater risk of failure and the investment will have been wasted. When adopted by government agencies in a democratic regime, some degree of accountability in fire management is built in. Monitoring and evaluation does not concern the public unless a problem is apparent. In 1997-1998, a problem was apparent and Pak Tanjung responded.

In a sense, Pak Tanjung and TSA were monitoring and evaluating the government's efforts and found them inadequate. Moreover, they did not have the capacity, or time, to seek change through democratic processes. To whom should a firefighting program existing outside the government structure be accountable? As a research and training center, the issue was less a concern because the course curriculum and quality of instruction could be evaluated according to international standards, perhaps using a locally adjusted metric. Although monitoring and evaluation was minimal in the

proposal writing process, the center that TSA designed did have several such components, such as observing committees to provide technical oversight and safeguard fiscal responsibility. Moreover, the team allocated time for annual peer review to strengthen the curriculum and complementary programs.

Summary

This chapter examined how perceptions of risk and opportunity shaped the development of the Central Kalimantan fire management initiative at various stages in the planning process. Perceptions of risk and vulnerability varied widely as the citizens of Palangkaraya, national agencies and foreign organizations each maintained different critical thresholds at which concerns move people to action. In rural communities, where fire was recognized as a tool for seasonal land clearing, the smoke and haze was inconvenient but, clearly, the effects of the concurrent drought were presenting more immediate challenges for securing livelihoods. In the provincial capital, once the fires began encroaching on the town, civil defense swung into action.

By this time the international community had already initiated investments in relief, suppression and capacity building and was creating new opportunities for Bapedal and TSA, opportunities that, it was hoped, could be leveraged to address a range of concerns. Thus, the combination of risk and opportunity were pivotal factors moving people to action. Similarly, strategic response reflected the individual and organizational pre-occupations of the proponents.

The process of developing a fire management program presented its own challenges and led the team in Palangkaraya to consider the problems they faced differently. Over the course of the year, they articulated and responded to problems at a

range of scales – at some times they focused their energy on extinguishing fires, at other times strategizing longer term solutions and, remarkably often, they focused on problems of administering the planning process.

The planning process is strengthened by the participation of stakeholders that can help to identify acceptable solutions and provide insights from diverse fields of expertise that support the development of technically feasible and socially acceptable strategies. In planning the Research and Training Center, the engagement of partners was politically motivated upwards to ensure funding and legitimacy. Communities were not consulted. Nor was there ample representation of specialists familiar with the range of approaches available to fire managers.

From a financial perspective, the team in Palangkaraya was challenged. While they succeeded in securing funds for a feasibility study, they could not use the funds for actual fire management activities. The team in Palangkaraya and the donor community had different opinions about where to invest the technical assistance. The donors saw investment in ensuring a sustainable program as a strategy for avoiding risk of failure whereas the TSA believed they should use the money to demonstrate the feasibility of their vision by actually training more fire fighters. In determining how and where investments will be made, the international donor community has considerable influence. Although in principle they are guided by the national governments, donors may still shape the course of development by stipulating various requirements for monitoring and evaluation. Loans, aid and program funding each come with their own criteria for spending.

Participation in the planning process is key as joint problem solving helps to bring together the technical expertise and social legitimacy; however, the team failed to recognize the value of systematically exploring alternative solutions and building critical partnerships. In the end, a very narrow interpretation of the problem and solution was forwarded. Ironically, although the team was clearly interested in promoting development, they did not recognize how a joint problem solving exercise could have enhanced the feasibility of achieving their development objectives over the long term.

CHAPTER 8.
CONCLUSIONS

Throughout 1997 and 1998, efforts by local, national and international organizations to establish a fire-fighter research and training center in Central Kalimantan were influenced by diverse and changing perceptions of risk. This dissertation began with a discussion that set fire management in the theoretical framework of institutional evolution and political economic relations. This chapter revisits these approaches in light of the evidence presented and concludes with an examination of the relevance of this research for the practice of disaster risk management.

Institutional Evolution

The Research and Training Center proposed for Palangkaraya was well suited to institutional analysis. Although it was a modest initiative, Tim Serbu Api's vision embodied the most basic attributes of an institution. They wanted to introduce new fire management practices throughout the province. In seeking to guide practice, the team tried to marshal sufficient authoritative and allocative resources to initiate a program that would endure and would be embraced by communities across the region. Although the proposed center scarcely compares with the more deeply entrenched institutions described by Giddens, the small team in Palangkaraya strove purposefully to similar ends.

The purposive nature of the initiative facilitated a more straightforward analysis because, like many contemporary resource management systems, the central objectives and mandate of the implementing organizations are fairly explicit. The development of a new fire management initiative, thus, lies at the intersection of the antecedent

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management structures and the agency of specific individuals who advanced or proposed changes – that is at the junction of structure and agency.

At the same time, it was evident that the proponents of change were responding to and operating within multiple structures simultaneously. Most directly, they reacted to flawed, failed or non-existent fire management strategies; but the team in Palangkaraya was also responding to other, less clearly defined, structures of power that have marginalized the Dayak community. The local team's reaction to historic disenfranchisement from the development process was explicit and, therefore, justifiably cited as a motivating factor.

Another common feature of contemporary fire management (as well as disaster management and environmental management systems) is that a fairly well established process for developing such institutions is in place. Initiating a new formal management system in Indonesia and other developing countries commonly involves affiliation with some government agency and a process of attracting donor support through proposals and feasibility studies. Although other avenues exist, this is among the most common. Informal institutions for resource management generally follow a different path that emphasizes seeking active engagement of community members using locally available resources (such as labor) and relying on traditional patterns of legitimating decision-making authority. In Central Kalimantan both paths were available but international interest had created rare opportunities that would rapidly disappear as public attention waned.

Broadly speaking, theoretical models of institutional evolution describe the subjects and objects of institutional change, but offer few insights into the actual

mechanisms by which change is realized in practice. The real mechanisms are not only the rules of planning development initiatives but also the act of finding common ground among diverse stake holding groups necessary to sustain commitment especially during the critical early stages of an organization's development. The need for negotiation in the planning process reinforces the underlying reality that individual or organizational commitment to social action are likely motivated by diverse causes.

Similarly, theories of institutional change say little about the critical thresholds that move people to initiate or participate in social action. This study of fire management in Kalimantan shed some light on these issues by drawing attention to the interplay of perceived risks and opportunities. For TSA, the combination of risk of fire and the opportunities to challenge failed institutions were sufficient to move at least one charismatic leader to action.

Doubtless some may ask how relevant a study that focuses so heavily on one individual could possibly be generalized. I would suggest that it is precisely at this individual level that social scientists should focus more attention. I am not referring to the disaggregated individuals and processes central to Orlove's third paradigmatic shift but to those referred to by Douglas as individuals that may be using institutions as a tool in their own life's projects.

The case of Central Kalimantan exemplifies this possibility. Tanjung, as a visionary and leader was instrumental to the process of institutional change. The visionary leader who recognizes alternate futures and communicates these effectively enough to persuade others to join in his or her project is a necessary first step. In this sense, social movements may be the product of individual's initiatives. Eventually a

critical mass of individuals with common cause can turn a vision into reality. As this research illustrates, the capacity of the proponents of change to build partnerships is critical to the process whether this is through trust, coercion, bribery or inspiration, institutions are an outcome of collective action.

While, Pak Tanjung was the primary motivation behind TSA, many students and a handful of junior faculty members were also involved (about 40 during the fire fighting and between 15-20 students living in Tanjung's offices). The students were enthusiastic and described a sense of purpose in addressing the fire problems but they were considerably less politicized than their leader. None of the students, for instance, were active in the ongoing student led reforms sweeping the country in the wake of Suharto's demise.

The engagement of other team members involved a personal calculus of risk and opportunity. No members of the TSA team was likely to lose their homes in the immediate fire crisis but collaboration with Tanjung promised future opportunities. Working with TSA provided an opportunity to contribute to valued social and environmental goals while at the same time, taking steps to ensure more secure personal livelihoods.

It is also remarkable that TSA shifted from its grassroots origins. Had the team, or its leader, not pursued the opportunity to formalize their venture, then the course of institutional evolution would have taken a dramatically different course. Of course we cannot say that this alternate course of informal institutional development would have been more or less successful than the formal path, but we can say the informal process would have led the TSA team to build different kinds of partnerships in which local

community members were inspired or otherwise convinced to sustain a focused effort against fires, haze and the failure of existing institutions.

While this investigation offered new insights into the mechanisms and process of institutional evolution, future investigations could be strengthened by the development of more systematic approaches to discovering the perceptions of risk, opportunities and the personal calculus involved in determining the critical thresholds that move people from inertia to social action. In addition, more clarity is needed to generate a better understanding of the social, cultural and individual attitudes towards and practices of building the partnerships necessary for success. Moreover, the individual and organizational disposition towards planning, finding common ground and negotiating strategic priorities need to be systematically addressed as well.

The investigation of formal institutions provides fertile ground for research but the challenges of identifying incentives, interests and motivations are considerable. The framework of examining risks and opportunities at individual and organizational levels aims to move our understanding in this direction.

Political Economy

The evidence suggests that historic balances of power and present political ambitions played a significant role throughout the process of planning the research and training center in Palangkaraya. Politics did influence perceptions of risk and were a factor in the pursuit of new opportunities.

The proposal for this particular fire management program was shaped by the historic relationships between the nations of Southeast Asia, between ethnic groups in Indonesia, between government offices and the people of Indonesia and between rival

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factions in Palangkaraya itself. Tim Serbu Api was aware of the forces that had marginalized Dayak people in their own lands. This imbalance was recognized as a part of the problem. At the same time the fire management center became a political act in itself as Tim Serbu Api tried to leverage international pressure and resources to create an initiative that could belong to the Dayaks and be protected from a corrupt and oppressive state system.

Politics or, at least, political history undoubtedly colored Pak Tanjung's approach to the new center and to the process of building partnerships and he was very vocal about his political ambitions. Protecting Dayak lands from degradation and promoting Dayak engagement in provincial development was high on his agenda. As a province, Central Kalimantan has a strong Dayak identity. The Ngaju Dayak had achieved some status under the Dutch administration but were also heroic participants in the push for Indonesian independence from the Dutch. Ngaju leaders later succeeded in carving a new province out of the predominantly Muslim province of South Kalimantan. However, under President Suharto, the Ngaju became increasingly marginalized from decision-making and were quickly losing their traditional lands. He acknowledged the reaction to the marginalization in his proposals to the World Bank, the UN, Bapedal and ASEAN. Moreover, Pak Tanjung saw action as a path to leadership in the Dayak community. Through the year he was gaining a following and his political ambitions became very public when he made a bid for governorship the following year.

ASEAN's involvement was also strongly influenced by politics. Of course this should not be surprising given ASEAN's role as a forum for intergovernmental consultations. The decision to establish a research and training center was a political

decision, but not in the sense of marginality and power imbalances that characterize political economic analyses, in this case the politics were in the realm of diplomatic protocols. When at the meeting of environmental ministers the name of the TSA was forwarded prior to consideration of the feasibility, it was listed among the millennium environmental goals without challenge. The ASEAN Secretariat was then obliged to pursue the establishment of a research and training center in Central Kalimantan.

International consultants were quick to point out that the Palangkaraya Center was a political decision rather than a decision based on a needs assessment. The decision disregarded the wider emerging fire management system in Indonesia, which was likely to focus on building capacity forestry department. Even in ASEAN, however, the interest in fire management was not *only* a political decision. Neighboring countries throughout the region suffered effects of the haze on transportation, economy and public health and were legitimate stakeholders. Ironically, because of ASEAN's policy of non-intervention in the affairs of sovereign member states, the organization was forced to organize it's efforts around the issue of haze which was the transboundary issue, and was less straightforward in it's treatment of fire prevention which would have led the group to address the more politically sensitive issue of domestic land use policies.

While Bapedal did have some minor political interests associated with staking a claim apart from the forestry department, political gain was not the overriding factor for their involvement. The tension between these two departments was a long-standing issue and this relatively small initiative would not likely precipitate any profound transformation in their relationship or in Bapedal's capacity to effectively protect the environment. Involvement in this particular initiative was inspired by genuine concerns

for the environmental impacts of the fires, however, it is also true that the project

provided opportunities for certain individuals in a number of allied government agencies

to pad their pensions.

Political economic analyses are criticized for attributing causal primacy to the

pursuit of power (Vayda 1999). To avoid these assumptions, this study adopted a

modified version of progressive contextualization that begins with an examination of

individual actions and sets these in increasingly broader contexts. Ideally, this would

have included a systematic investigation of the numerous proponents of fire management

initiatives across the country and then attempt to aggregate the observed behaviors.

Pragmatically, this research could only focus on one such initiative and looked at this

primarily from the perspective of one organization. In part this was because of the

accidental nature of this study and the opportunity to work closely with Tim Serbu Api.

While formal surveys of the diverse staff at Bapedal and the senior officials at ASEAN

were impractical during my fieldwork these might be incorporated into the design of

future investigations of the subject.

The progressive contextualization approach was useful in looking at the process

of planning in terms of broadly characterized events (although some events lasted over a

period of months and some events ran concurrently). By disaggregating the planning

events, we were able to see some of the dynamics, issues and motivations shaping the

planning process and the design of the research and training center.

In the end, although I wasn't looking for power relations and not presuming their

causal primacy, I found power and politics, both explicit and implicit, in all facets of the

efforts to establish fire management in Central Kalimantan although it was influential, it was not the only factor.

Relevance to disaster management

Generally speaking, disaster management in Asia is in an adolescent stage of development. New disaster management organizations are being formed at national, provincial and even local levels and older disaster management organizations are being restructured. In part this restructuring reflects the new understandings of risk and vulnerability that accompany significant paradigmatic shifts in the field. The upswing in interest in fire management in Indonesia, however, was rooted in more traditional approaches to disaster risk that emphasized emergency response and humanitarian relief.

In disaster management the emphasis on response and recovery is now being strengthened by more subtle understandings of the causes and the costs of vulnerability. Investments in disaster preparedness and risk management are becoming more common throughout the region as early warning systems are put in place, homes and critical infrastructure are being flood proofed and communities are educated about what to do in case disaster strikes. Traditional disaster management organizations have needed to be re-organized to accommodate these new roles and mandates. Similarly, the vision for fire management in Central Kalimantan might have been more robust if it had encompassed this more holistic approach.

The recognition of the multiple factors that affect risk and vulnerability has lead some disaster managers to incorporate programmatic components that resonate with sustainable development and environmental management. For instance, improved public health infrastructure can dramatically reduce fatal disease in the aftermath of floods.

Likewise improved planning of roads, critical infrastructure and housing and protection of the environmental systems that provide natural buffers can reduce the losses incurred by disaster. Similarly, practitioners in the fields of development, environmental management and even climate change adaptation have come to appreciate the impacts that disasters have on their project's success and are coming to see how the outcomes of their work can affect risk and vulnerability in the communities they serve. Approaches that integrate across sectors or in the case of NGO's and donors, across issues, are growing in popularity.

This study highlighted some key lessons about planning and institution building that could help the disaster management community in their efforts. Integration across scales and across sectors is a ideal that works well in theory, in practice however, there are numerous challenges to bringing diverse groups together in a joint problem solving exercise and winning the sustained commitment of the diverse participants.

Among the first challenges is engaging the right mix of people in the process. Clearly, engaging all stakeholders is impractical but the planning team should aim for representation of the diversity of stakeholders' perspectives and different knowledge bases. An appropriate mix might include representatives from a range of different organizations such as community groups, the scientific community and experts with local knowledge are relevant and all can have some role to play. Partnerships should build on trusting relationships, perhaps demonstrated through a sincere commitment to the outcomes as well as the "project". The ultimate goal of fire management (or any disaster management scheme) is to make peoples lives and livelihoods more secure. Inevitably there will still be differences in strategy and approach; but the process should include

some mechanism for reconciling different strategies and tactical approaches. A system of evaluating the relative merits of several possible approaches should be designed and the criteria for weighting the options should be openly negotiated.

While finding common ground for political commitment, public commitment, donor and other stakeholder commitment, key differences of opinion need to be acknowledged and addressed in a productive manner as well. Some of theses differences were highlighted throughout this dissertation. Diverse motivations, perceptions of risk, approaches to problem solving, expertise and concerns all shaped the manner in which the proponents designed the center and interacted with partner organizations. Recognizing differences, however, does not preclude cooperation.

In addition to pointing out how safer, more secure communities do in fact promote development and protect investment in development otherwise at risk from extreme events, it is also useful to point out that many disaster risk management strategies such as the development of early warning systems, evacuation plans, public health schemes and community based planning all may serve dual functions, meaning that other development sectors might be able to take advantage of the same tools. For instance, early warning systems can also be used by the hydropower sector or to improve crop yield by anticipating the optimal conditions for planting or harvesting, for example. In the context of fire management, fire danger rating systems (a variation of the early warning system) might be combined with drought monitoring systems. Recognition of these linkages encourages investment in and utilization of the tools by other sectors and helps to establish common ground despite diverse interests and motivations.

Improved communication tools could help to convince donor agencies, budget committees and potential partners that convey the value of integrated risk management. These improved communication tools might include more compelling facts, stories of good practices that succeeded elsewhere, maps, other graphic images and cost-benefit analyses tailored to the decision-makers field of interest.

Near term economic benefit or political gains may be the motivation for participation in new initiatives but while these may bring people to the table, they don't provide the necessary incentive for sustained commitment. Fire management programs, unlike other disaster management ventures, bring opportunities for employment. Beyond the financial incentives, authoritative resources that allow for improved engagement in decision-making processes and perhaps even discretion over some aspects of the budget (with appropriate reporting for accountability) can be an important incentive for participation. Designers of new fire management or disaster management systems should recognize that these additional incentives might secure more sustained commitment on the part of local people.

Capacity to fight fires will continue to be an integral part of any fire management strategy, but training fire fighters in Central Kalimantan would not likely have been sustainable without parallel development of more comprehensive national fire management program. More holistic solutions would recognize the broad range of mitigation options that are available and might seek to create synergies between local, national and international initiatives. Interest of donors and sectoral agencies need to consider the value of at least exploring the costs and benefits of more holistic approaches.

To be integrated does not imply a centralized or comprehensive program but is, in practice, more likely to resemble enhanced communication between diverse organizations involved in the issue and perhaps some decision support tools or meeting venues (mechanisms for meetings) so that decision makers in one organization can consider the implications of activities in an other sector on their own outcomes and the impact that their outcomes are likely to have on other sectors.

The sustainability of fire management, like disaster management and most environmental management initiatives relies on recognition of shared risks. Yet despite the apparently obvious hazard risk, the various individuals and agencies involved in shaping would-be fire management may very well be reacting to less obvious risks that range from threats to personal interest to even less intangible threats to organizational, community or national security. These diverse perceptions and motivations need to be negotiated or at least navigated to find the common ground from which an effective and sustainable fire management institution might emerge.

In the case of establishing a new fire management program in Central Kalimantan, the range of competing concerns were not explicitly acknowledged and in the end various individuals and organizations tried to shape the proposed initiative to suit their own aims.

Similarly, differing approaches to designing appropriate solutions can lead to further misunderstandings among planning partners. Agreement on basic principles of participation, assessment and accountability, for instance, can strengthen working relationships and facilitate the delivery of mutually agreeable program plans and

ultimately demonstrate a robust and viable investment opportunity to potential donors

and lead to more effective systems for promoting safer, more sustainable communities.

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