Kebakaran di Lahan Rawa/Gambut di Sumatera: Masalah dan Solusi

Prosiding Semiloka
(with English summary)

Palembang, Sumatera Selatan, 10 - 11 Desember 2003

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Kata Pengantar

Makalah, catatan diskusi, dan rekomendasi dalam prosiding ini merupakan hasil dari semiloka yang berjudul "Kebakaran di Lahan Rawa/Gambut di Sumatera: Masalah dan Solusi" bertempat di Palembang, Sumatera Selatan, 10-11 Desember 2003.

Semiloka ini dihadiri oleh sekitar 63 peserta yang berasal dari Pemerintah Daerah, Perusahaan HTI, LSM, Masyarakat, Transmigrasi, Lembaga Penelitian, Perguruan Tinggi, dan Proyek – proyek Bilateral/Multilateral dari Provinsi Riau, Jambi, Palembang, dan Lampung. Selain itu, semiloka ini dihadiri juga oleh perwakilan dari Direktorat Kebakaran Hutan, Departemen Kehutanan, Jakarta. Semiloka ini diliput oleh berbagai media baik koran maupun radio yang difasilitasi oleh Unit Komunikasi CIFOR.

Dalam semiloka ini, terdapat 18 makalah yang dipaparkan yang merupakan perspektif dari berbagai pemangku kepentingan *(stakeholders*) tentang masalah dan solusi kebakaran di lahan rawa/gambut. Ke 18 makalah yang dibagi ke dalam empat skenario: 1) Pengembangan HTI dan Perkebunan, 2) Vegetasi hutan alam (hutan lindung dan produksi), 3) Kehidupan masyarakat di lahan basah dan 4) Pengembangan pertanian transmigrasi.

Center for International Forestry Research (CIFOR) dan The World Agroforestry Centre (ICRAF) mengucapkan penghargaan dan terima kasih sebesar-besarnya kepada BAPPEDA Propinsi Sumatera Selatan dan Wetlands International Palembang, yang telah bekerja sama dalam melaksanakan semiloka ini. Ucapkan terima kasih juga kami tujukan kepada Uni Eropa *South Sumatra Forest Fire Management Project* dan LSM-LSM di Sumatera yang telah mendukung pelaksanaan semiloka ini.

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Preface

The papers, findings and recommendations compiled in this volume arise from a multi-stakeholder workshop entitled "Fire in the wetlands/peatlands of Sumatra: Problems and Solutions" held in Palembang, South Sumatra, Indonesia, 10-11 December, 2003.

The workshop was attended by 63 participants from local government agencies, forestry plantation companies, non-governmental organizations (NGOs), local and transmigrant communities, research institutions, and bilateral/multilateral projects from the provinces of Riau, Jambi, Palembang, and Lampung. There was also representation from the Directorate of Forest Fire Control, Ministry of Forestry, Jakarta.

Papers were prepared for the workshop by 18 participants providing different stakeholder perspectives on the problems and solutions of fire in the wetlands of Sumatra in relation to the four key wetland scenarios analysed at the workshop: Plantation development (forestry and estate crops), Remaining natural forest areas (production and protection forest), Local wetland livelihood practices, and Transmigration agricultural development. There was extensive media coverage of the event organized by the CIFOR communications unit.

The Center for International Forestry Research (CIFOR) and The World Agroforestry Centre (ICRAF) would particularly like to express their gratitude for the collaboration and support extended by BAPPEDA South Sumatra, Wetlands International Palembang, the European Union South Sumatra Forest Fire Management Project, and many NGOs across Sumatra in planning and organising this workshop. Thanks are also due to the staff of ICRAF and CIFOR who contributed substantially to this event. This workshop was supported by funding from the European Union under the project "Underlying causes and impacts of fires in Indonesia" and by the Australian Center for International Agricultural research (ACIAR) under the project "Impacts of fire and its use for sustainable land and forest management in Indonesia and northern Australia". We would like to express our sincere appreciation to all participants for their active and enthusiastic contribution to the discussions. Thanks in particular to those who contributed to the papers, presentations, session moderation and reporting; and to those who participated in the talk shows and media interviews.

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Latar Belakang dan Tujuan

Luas lahan basah tropis (termasuk gambut) di Sumatera diperkirakan sebesar 6,3 juta hektar atau 33 persen dari total lahan basah di Indonesia (RePPProt 1990). Lahan basah tropis adalah komponen penting dari siklus karbon global dan menjadi perhatian penting bagi the United Nations Framework Convention on Climate Change (UNFCCC). Lahan basah menyimpan sekitar 2150 sampai 2875 t C/ha (Chokkalingam *et al. in prep.*, Maltby dan Immirzi 1993) dengan laju penyerapan sebesar 0,01-0,03 Gt C/ year (Neuzil 1997). Lahan basah juga mempunyai peran penting dalam fungsi hidrologi. Penting sebagai daerah tangkapan air, sistem kontrol, pengatur fluktuasi air, pencegah banjir dan pencegah terjadinya penggaraman *air (saline water intrusion)* (Rieley *et al.* 1997). Di samping itu, lahan basah air tawar di Indonesia merupakan tempat yang baik untuk beranakpinaknya ikan dan merupakan penghasil ikan baik untuk konsumsi domestik maupun export (Giesen dan Sukotjo 1991, MacKinnon *et al.* 1996).

Hutan rawa dataran rendah juga penting untuk keanekaragaman hayati (Rieley *et al.* 1996, Shephard *et al.* 1997) dan menarik perhatian the International Convention on Biological Diversity (CBD). Hutan gambut umumnya memiliki kayu yang bernilai ekonomi baik untuk kebutuhan lokal maupun national. Tetapi ekstraksi kayu sering dilakukan dengan cara yang tidak berkelanjutan (Dwiyono dan Rachman 1996). Nilai penting dari lahan basah seperti yang dijelaskan di atas, diakui oleh komunitas international melalui konvensi Ramsar yang berupaya untuk meningkatkan tindak (aksi) nasional dan kerjasama international dalam konservasi serta pemanfaatan lahan basah secara bijak. Indonesia sebagai anggota dari CBD dan konvensi Ramsar mempunyai komitmen dalam konservasi dan pemanfaatan lahan basah secara bijaksana.

Lahan basah tropis juga penting bagi masyarakat dan berfungsi sebagai sumber mata pencaharian penting. Karena lahan basah menyediakan sumberdaya yang digunakan secara langsung, antara lain kayu kontruksi, bahan baku untuk anyaman tanaman herba untuk konsumsi dan obat-obatan, ikan sebagai sumber protein. Di Sumatera bagian selatan, masyarakat lokal menggantungkan hidupnya dari lahan basah sejak 50 sampai 200 tahun lalu.

Dengan telah berkembangnya lebih dahulu pembangunan di dataran rendah dan dataran tinggi, lahan basah menjadi perhatian penting dalam rencana pembangunan daerah. Di Sumatera, pembangunan di lahan basah mencakup kegiatan pembalakan kayu komersial, kontruksi kanal dan drainase, pertanian, perkebunan, dan pemukiman transmigrasi. Degradasi hutan dan meningkatnya tekanan penduduk dan aksesibilitas adalah hasil dari meningkatnya aktivitas manusia di lahan basah. Kegiatan-kegiatan tersebut antara lain perikanan, ekstraksi kayu, dan penanaman padi rawa yang dilakukan oleh penduduk yang sudah menetap lama, maupun kaum pendatang.

Penggunaan api yang tidak terkontrol, timbulnya kebakaran, dan penyebarannya berkaitan dengan sebagian besar dari kegiatan-kegiatan pengembangan di lahan basah. Hal tersebut telah menimbulkan kebakaran di sebagian besar areal lahan basah dalam dua dekade terakhir ini. Peningkatan kebakaran juga berkaitan dengan El Niño yang memberikan kontribusi dalam peningkatan luasan dan penyebaran kebakaran. Kebakaran yang berulang-ulang telah menjadi salah satu ancaman terbesar bagi konservasi lahan basah, pemanfaatan yang lestari dan pemulihan areal yang telah rusak di Indonesia. Kebakaran tersebut disebabkan oleh meluasnya kerusakan hutan (*deforestasi*) di lahan basah, perubahan sumberdaya dan perubahan adaptasi dalam kehidupan. Kebakaran di areal rawa gambut juga menyebabkan timbulnya masalah gangguan asap, kesehatan, dan jarak pandang di wilayah Asia Tenggara. Diduga pada kebakaran tahun 1997 El Niño di Indonesia, antara 0.81 sampai 2.57 Gt karbon dilepas ke atmosfer sebagai akibat dari pembakaran gambut dan vegetasi. Jumlah ini setara dengan 13-40% dari global karbon emisi (Page *et al*. 2002). Pada periode tersebut, diduga lahan gambut menyumbang 60% dari produksi asap di Asia Tenggara dan mempengaruhi 35 juta orang (ADB/BAPPENAS 1999). Penyebaran asap secara regional telah menjadi perhatian ASEAN *Ministrial Meeting* ke sembilan tentang *Haze* (AMMH) dalam memulai ASEAN *Peatland Management Initiative* (APMI), untuk mengembangkan pengelolaan lahan basah terpadu serta mengurangi risiko kebakaran dalam kaitanya dengan penyebaran asap secara regional.

Tetapi, ada beberapa pertanyaan yang harus dijawab dalam menyelesaikan masalah kebakaran dan akibatnya, khususnya di lahan basah. Rangkaian pertanyaan tersebut adalah: apakah pemanfaatan dan pembangunan lahan basah rentan terhadap masalah kebakaran? Tipe pemanfaatan dan pembangunan yang mana yang rentan terhadap kebakaran, dalam kondisi apa dan perspektif siapa? Apakah ada pendekatan yang menjanjikan baik dari segi teknik, sosial ekonomi dan kelembagaan yang dapat mengatasi masalah kebakaran? Apakah ada gap, hambatan dan peluang dan bagaimana caranya untuk mengatasi atau memanfaatkan hal tersebut dalam mengatasi masalah kebakaran. Dukungan kebijakan apa yang diperlukan?

Adanya kebutuhan untuk mengidentifikasi, mengkaji, dan mengatasi masalah kebakaran di lahan basah menjadi sangat penting dan kritis. Hal ini mencakup penyeimbangan kebutuhan konservasi dan pembangunan. Selain itu, hal ini membutuhkan pendekatan pembangunan yang lestari dan alternatif pilihan kehidupan, mencakup kegiatan yang ekonomis dengan cara tidak membakar, serta kemungkinan pemberian insentif atau disinsentif bagi pengendalian dan pengelolaan api yang tepat.

Melalui semiloka dua hari dengan tema, “Kebakaran di Lahan Rawa/Gambut di Sumatera: Masalah dan solusi”, kami menyediakan sarana untuk saling bertukar pengetahuan dan pandangan dari berbagai pihak yang terkait dalam masalah kebakaran, mengidentifikasikan masalah, dan mencari solusi yang tepat dalam berbagai keadaan/ situasi lahan basah di Sumatera.

Dalam semiloka ini, secara khusus akan dibahas masalah kebakaran dalam kaitannya dengan:

- Pengembangan HTI dan Perkebunan
- Vegetasi hutan alam (hutan lindung dan produksi)
- Kehidupan masyarakat di lahan basah seperti sonor, perikanan, dll
- Pengembangan pertanian transmigrasi

Kami juga berharap untuk dapat mengidentifikasi kegiatan atau langkah nyata dari berbagai pihak yang memiliki kepentingan, seperti pemerintah daerah dan perusahaan, dalam usaha mengurangi atau mengatasi masalah kebakaran dalam berbagai skenario yang berbeda. Langkah atau kegiatan tersebut dapat dilakukan melalui penelitian, penerapan, atau adanya kebijakan.

Tujuan Seminar

1. Berbagi pengalaman tentang isu dan solusi masalah kebakaran di lahan rawa/ gambut dari hasil-hasil penelitian dan aktivitas proyek pembangunan.

2. Memperoleh pandangan dan perspektif dari berbagai pihak terkait (*stakeholder*) tentang masalah kebakaran dan mencari solusi pada lahan rawa/gambut di Sumatera.

3. Membangun agenda bersama dan rencana aksi untuk memecahkan atau mengurangi masalah kebakaran.

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Background and objectives

Sumatra is home to approximately 6.3 million hectares, or 33 %, of Indonesia's tropical freshwater wetlands (RePPProT 1990). These inland freshwater wetlands include both peat and alluvial swamps. Tropical peatlands in particular are important components of the global carbon cycle and are of interest to the United Nations Framework Convention on Climate Change (UNFCCC). They store as much as 2150 to 2875 t C/ha (Chokkalingam *et al. in prep.*, Maltby and Immirzi 1993) with overall sequestration rates of 0.01-0.03 Gt C/year (Neuzil 1997). Wetlands also play a key role in hydrological regulation. They are important water catchment and control systems, regulating flows, mitigating floods and preventing saline water intrusion (Rieley *et al.* 1997). In addition, the freshwater wetlands of Indonesia are major breeding grounds and suppliers of fish for domestic consumption and export (Giesen and Sukotjo 1991, MacKinnon *et al.* 1996).

Lowland swamp forests are also important for their biodiversity (Rieley *et al.* 1996, Shephard *et al.* 1997) and are of interest to the International Convention on Biological Diversity (CBD). Peat forests often contain valuable timber species of importance for local and national economies, however, commercial extraction of timber is considered to be unsustainable in peatlands (Dwiyono and Rachman 1996). The key values of wetlands suggested above are recognized by the international community through the Ramsar convention which seeks to foster national action and international cooperation to promote the conservation and wise use of wetlands. Indonesia, as a party to the CBD and the Ramsar convention, is committed to the conservation and wise use of wetlands.

Tropical wetlands also provide valuable livelihood opportunities for the rural poor, including construction timber, materials for weaving, herbs for consumption and medicinal purposes, and fish for protein. In southern Sumatra many local communities have used wetlands for their livelihoods for anywhere between the past 50 and 200 years.

With the prior development of lowland and upland areas, the vast wetland areas of Indonesia became the focus of regional development plans. In Sumatra, activities have included commercial logging; road and canal construction and drainage; agricultural, timber plantation and estate crop development; and transmigration settlements. Forest degradation, increased population pressures and accessibility have also resulted in the intensification of livelihood activities such as fishing, wood extraction, and swamp rice cultivation by both long-term residents and migrants. Uncontrolled burning and incidental fires have been associated with most of the above activities and developments. Five El Niño drought periods have affected Sumatra in the last two decades. In these frequent long drought periods, land clearing activities and livelihood pressures intensified further and resulted in widespread fires on the dry degraded wetlands.

Repeated fire has emerged as one of the biggest threats to conservation, sustainable use and restoration (where degraded) of wetlands. It has resulted in widespread deforestation and forest degradation, resource changes, livelihood changes and impoverishment. Peatland fires in particular have also resulted in major carbon emissions and acrid haze problems. It is estimated that during the 1997 El Niño fire event in Indonesia, between 0.81 and 2.57 Gt of carbon was released in to the atmosphere as a result of burning peat and vegetation. This is equivalent to 13-40% of mean annual global carbon emissions from fossil fuels (Page *et al.* 2002). In the same period, it is estimated that peatland fires contributed 60% of the acrid haze production in the Southeast Asian region, which affected 35 million people (ADB/ BAPPENAS 1999). Concerns over the regional haze from widespread peatland fires led the 9th ASEAN Ministerial Meeting on Haze to initiate the ASEAN Peatland Management Initiative to promote integrated peatland management and to reduce the risk of fire and associated regional haze.

But is all wetland use and development prone to problem fires? Which types of use and development lead to such fires, under what circumstances and from whose perspective? To date, what are the most promising approaches in the technical, socio-economic, and/or institutional arena to resolving the problem fires? What are the gaps, constraints and opportunities involved and how could these be resolved or taken advantage of to mitigate these fires? What policy support is required?

Identifying, assessing and resolving the problem fires and related issues in wetlands has become urgent and critical. It involves striking a balance between conservation and development needs. It involves searching for and implementing promising sustainable development approaches and livelihood options, economically viable alternatives to burning, feasible incentives for controlling inappropriate burning, and effective fire management practices.

The two-day workshop, "Fires in the Wetlands of Sumatra: Problem and Solutions" provided a platform for different stakeholders in the wetlands of Sumatra to share their perspectives and reach a common understanding of key fire problem areas and possible solutions. Specific settings that were explored in this workshop include:

- Plantation development (Forestry and estate crops)
- Remaining natural forest areas (Production and protection forests)
- Local wetland use practices such as swamp rice cultivation (*sonor*) and fishing
- Transmigrant settlement and agricultural development

Also identified were actions (related to research, industry or local management practices, or policies) needed from different stakeholders, such as local governments, companies, NGOs, communities and researchers, to reduce or resolve the problem fires in the different scenarios.

Objectives of the workshop

- To share insights and experiences on fire issues and problems in the wetlands gained from past research and development activities
- To obtain the perspectives of different actors on key fire problem areas and possible solutions in the wetlands of Sumatra
- To develop a common agenda and plan for action to resolve or reduce the problem fires in the wetlands of Sumatra

REKOMENDASI	HTI	Pem	LSM	Litbang
1. Mengkaji dan mengaudit alokasi pemanfaatan lahan gambut yang ada untuk pembangunan/ konservasi, termasuk seluruh *stakeholders*. Melakukan pengkajian ilmiah sebagai dasar pembuatan peraturan.	KELOMPOK			
2. Meningkatkan kapasitas dan menumbuhkan kemauan politik untuk memanfaatkan teknologi informasi yang tersedia bagi penanganan masalah kebakaran secara cepat.	KELOMPOK			
3. Penguatan kapasitas dan komitmen dari lembaga pemerintah daerah untuk berupaya menuju pemanfaatan serta konservasi lahan basah yang berkelanjutan.	KELOMPOK			
4. Meningkatkan tekanan internasional dan menguatkan kapasitas pemerintah dalam menegakan hukum *zero burning* yang ada. Menyediakan insentif untuk tidak membakar.	KELOMPOK			
5. Belajar dari dan mendorong praktek pengelolaan terbaik bagi pengembangan lahan gambut.	KELOMPOK			
6. Pengembangan program peningkatan kesejahteraan masyarakat.	KELOMPOK			
7. Pemerintah dan perusahaan mendukung masyarakat dalam praktek pengelolaan kebakaran lahan pertanian untuk mencegah perluasan kebakaran.	KELOMPOK			

Talkshow Pengembangan dan pengelolaan HTI dan perkebunan

Sesi III. Wilayah Hutan Alami yang Tersisa (hutan produksi dan lindung)

Hutan rawa dataran tinggi yang pada awalnya menutupi sebagian besar lahan basah (termasuk gambut) di Sumatera telah berkurang luasnya menjadi bagian-bagian terpencil dan terpencar-pencar. Pembalakan yang sifatnya komersial, reklamasi lahan basah berskala besar bagi pengembangan wilayah transmigrasi dan perkebunan, serta tekanan mata pencaharian adalah faktor-faktor yang penting dalam transformasi bentang lahan sejak akhir 1960-an hingga kini. Wilayah yang tersisa dari hutan rawa dataran tinggi berada di Provinsi Riau dan di wilayah Kawasan Konservasi Berbak-Sembilang, dan di sekitar konsesi hutan di Jambi dan Sumatera Selatan. Wilayah sisa hutan ini berada dalam resiko kebakaran yang tinggi. Kebakaran hutan gambut mengakibatkan degradasi gambut tersebut, peningkatan kemasaman air, peningkatan kerawanan kebakaran, emisi asap dan karbon yang tinggi, serta hilangnya produk hutan dan keanekaragaman hayati. Begitu terdegradasi dan tertekan oleh keberadaan manusia secara terus menerus, rusaknya hutan gambut sulit untuk dipulihkan.

Hutan rawa gambut di Taman Nasional Berbak dan wilayah konsesi HPH yang bersebelahan (PT Putra Duta Indah Wood) di Jambi mengalami kebakaran berulang dalam dekade terakhir ini, dan yang paling parah adalah kebakaran yang terjadi pada tahun 1997. Andri Ginson dari *Taman Nasional Berbak* dan Hari Subagyo dari *PT Putra Duta Indah Wood* menunjukkan bahwa kebakaran hutan memiliki kaitan erat dengan kegiatan pembalakan (*logging*), baik yang dilakukan oleh karyawan perusahaan konsesi, maupun pembalak liar; NTFP dan pengambilan ikan, perambahan bagi wilayah pertanian, dan penyebaran kebakaran akibat pertanian dari batas wilayah hutan. Api adalah perangkat yang sangat berguna, baik bagi pertanian maupun sebagai alat bantu kegiatan pembalakan dan perburuan di hutan rawa yang tidak ramah. Saat ini, kedua pihak tersebut tidak memiliki metode lain dalam melakukan pembukaan lahan untuk dikembangkan kepada masyarakat. Pengelolaan rawa yang salah, terutama dalam pembuatan kanal, berperan penting dalam memicu insiden kebakaran hutan.

Sistem pencegahan dan pemadaman kebakaran memang tersedia, namun lokasi kebakaran sulit untuk diidentifikasi dan dijangkau, sehingga kebakaran di daerah gambut yang mudah terbakar sulit dipadamkan. Selain itu, pengelola mengalami kesulitan karena kurangnya peralatan dan sumberdaya untuk melaksanakan tugasnya serta kurangnya informasi mengenai lokasi kebakaran pada saat yang tepat. Mereka juga telah melakukan kegiatan penyuluhan bagi masyarakat seperti kampanye peningkatan kesadaran akan isu kebakaran. Namun demikian, dalam penanganan kebakaran secara efektif yang harus mereka lakukan adalah menangani penyebab utama kebakaran tersebut, yaitu mengurangi pembakaran yang tidak terkendali/terawasi dan mencari alasan masyarakat memasuki hutan. Untuk itu diperlukan upaya perbaikan mata pencaharian masyarakat setempat, rehabilitasi hutan yang terdegradasi, identifikasi dan mendorong dilaksanakannya sistem pembakaran terkendali serta metode *zero burning*, dan pelibatan masyarakat dalam pengelolaan kebakaran.

Pihak pengelola hutan dan *organisasi non-pemerintah (LSM)* menyatakan bahwa masalah kebakaran hutan mengalami peningkatan sejalan dengan desentralisasi dan konflik alokasi lahan antara pemerintah pusat dan pemerintah daerah. Perwakilan LSM yang lain menambahkan bahwa kemampuan kelembagaan dan komitmen untuk memerangi kebakaran hutan sangat rendah dan tidak ada panduan standar yang jelas untuk digunakan. Kadang-kadang, hutan yang terbakar diserahkan begitu saja untuk pengembangan HTI.

Masyarakat memandang kontrol pemerintah terhadap hutan sebagai hal yang tidak adil dan tidak ada insentif bagi pemerintah untuk melindungi masyarakat dari kebakaran. Wahidin dan Sakimin dan Edy Candra, perwakilan masyarakat yang tinggal dekat Taman Nasional Berbak mengatakan bahwa hasil sawah yang ditanam di gambut yang dikeringkan sangat rendah, mata pencaharian yang lain sangat terbatas, dan masyarakat terpaksa pergi ke hutan gambut. Masyarakat menggunakan api untuk membuka lahan bagi perkebunan dan padi karena penggunaan merupakan cara termudah dan termurah. Kebakaran menyebabkan masalah kesehatan dan penurunan kesuburan tanah dalam jangka panjang. Selain itu, kebakaran lahan pertanian sering menyebar ke wilayah hutan karena kondisinya yang terdegradasi dan kurangnya kesadaran masyarakat tentang pengendalian kebakaran. Masyarakat mengusulkan untuk memperbaiki ekonomi lokal, mendorong dilaksanakannya pembakaran terkendali dan peraturan setempat mengenai penggunaan api, serta melibatkan masyarakat setempat dalam kegiatan pengendalian kebakaran. Alternatif kegiatan pembakaran yang dapat dilakukan antara lain pengumpulan sisa-sisa penebangan dan membiarkannya membusuk di lokasi dan menjadi pupuk bagi tanaman. Masyarakat juga siap untuk melindungi hutan dari kebakaran tetapi mereka tidak memiliki infrastruktur, peralatan, dan bantuan yang tepat waktu. Selain itu, terdapat kebutuhan akan rehabilitasi hutan dan lahan gambut serta perbaikan pengelolaan air di wilayah yang dikeringkan.

Rivani Noor dari *WALHI Jambi* menyatakan bahwa pemanfaatan api tidak selalu buruk karena sebagian masyarakat melakukan pengelolaan api secara tradisional. Rivani mengungkapkan bahwa pembalakan liar, pengeringan dan konversi lahan dalam skala besar di rawa, serta kurangnya penegakan hukum merupakan masalah utama. Resiko kebakaran harus diperhitungkan dalam kebijakan pembangunan. Partisipasi masyarakat dalam pengembangan kebijakan dan pengendalian kebakaran merupakan hal penting dalam pengelolaan lahan gambut yang lestari. Namun demikian, Satya Ismunandar dari PT RAPP, menunjukan bahwa praktek dan peraturan tradisional dapat bertentangan dengan transformasi sosial ekonomi dalam skala yang lebih luas dan perlu dikaji ulang. Para pihak yang berkepentingan merasakan kebutuhan peningkatan kemampuan dalam pengelolaan kebakaran di lahan gambut secara umum.

Irwansyah Reza Lubis dari *Wetlands International* menyatakan bahwa wilayah yang terbakar memerlukan rehabilitasi untuk mengurangi kerawanannya terhadap kebakaran dan mempercepat proses perbaikan lahan tersebut. Cara terbaik untuk mencapai tujuan ini adalah melalui pengelolaan berbasis masyarakat yang terpadu, melibatkan seluruh pihak yang berkepentingan dari tingkat bawah. Strategi ini sedang dilaksanakan oleh proyek yang didanai oleh lembaga dari Canada, yaitu: *Climate Change, Forest and Peatlands in Indonesia* (proyek "Perubahan Iklim, Hutan dan Lahan Gambut di Indonesia") di Kawasan Konservasi Berbak-Sembilang. Dalam proyek ini, Wetlands International bekerjasama dengan masyarakat desa, PT Putra Duta Indah Wood, dan Balai Taman Nasional Berbak. Tim ini bekerja untuk rehabilitasi hutan terbakar, menutup kanal yang tidak layak, menyediakan mata pencaharian alternatif, dan membatasi kegiatan masyarakat di hutan rawa gambut. Selain itu, dilakukan pula upaya pengembangan lembaga setempat, rencana pengelolaan konservasi, kegiatan penyadaran lingkungan, penyediaan dana dan kompensasi bagi masyarakat, kepemilikan lahan yang jelas, serta patroli dan pengendalian kebakaran berbasis masyarakat.

Tabel di bawah ini menunjukan isu utama dan rekomendasi untuk menyelesaikan masalah kebakaran di wilayah hutan alami yang tersisa. Isu dan rekomendasi ini terungkap dari makalah, *talkshow*, dan diskusi kelompok yang menyoroti sudut pandang *stakeholders* kunci - masyarakat setempat dan transmigran (Masy), lembaga pemerintah

(Pem), perusahan konsesi pengusahaan hutan (HPH), dan organisasi non pemerintah (LSM).

ISU/MASALAH UTAMA	Masy	Pem	HPH	LSM
1. Masalah kebakaran hutan dari pembalakan liar, perambahan, dan kebakaran lahan pertanian yang bersebelahan.		X	X	X
2. Api merupakan hal yang penting bagi masyarakat, belum ada alternatif lain yang teridentifikasi.	X	X	X	X
3. Rendahnya hasil pertanian dan kemiskinan yang berakibat pada ketergantungan masyarakat setempat terhadap sumberdaya hutan.	X	X	X	X
4. Hak dan akses masyarakat setempat terhadap hutan sangat terbatas, berakibat pada masyarakat yang apatis terhadap kebakaran hutan.	KELOMPOK*			
5. Perubahan sosial-ekonomi dan ekologi serta terhentinya praktek pengelolaan tradisional.	KELOMPOK			
6. Degradasi hutan dan meningkatnya kerawanan kebakaran dengan pembalakan.	KELOMPOK			
7. Sulitnya pengendalian kebakaran lahan gambut – masalah aksesibilitas dan yang lainnya.		X	X	X
8. Tidak memadainya sumberdaya, informasi, dan keahlian diantara *stakeholders* dalam pengelolaan kebakaran.		X		X
9. Lembaga yang berwenang menangani pengelolaan kebakaran tidak efektif dan bertanggungjawab, dan tidak ada panduan standar dalam mengatasi masalah kebakaran hutan.				X
10. Penerapan desentralisasi berakibat pada peningkatan kebakaran hutan.		X		X

*KELOMPOK – dari diskusi kelompok

Diskusi kelompok wilayah hutan alami yang tersisa (hutan produksi dan lindung)

REKOMENDASI	Masy	Pem	HPH	LSM
1. Proyek pengembangan mata pencaharian alternatif.	X	X	X	X
2. Pengembangan metode pembukaan lahan alternatif.	X	X	X	
3. Pelibatan masyarakat setempat dan kearifan tradisional mereka dalam kegiatan pengendalian kebakaran.	KELOMPOK			
4. Mengembangkan kemitraan setara antara pemerintah/perusahaan dan masyarakat dalam pembangunan lahan basah.	KELOMPOK			
5. Pengembangan prosedur pembalakan yang lestari untuk mengurangi bahaya kebakaran.	KELOMPOK			
6. Rehabilitasi hutan dan penutupan kanal.		X		X
7. Pengadaan peralatan, sumberdaya, dan dana untuk memerangi kebakaran hutan pada saat yang tepat (dibutuhkan).	X	X		
8. Rekomendasi yang khusus bagi deteksi, pemantauan, dan pemadaman kebakaran.			X	
9. Penguatan lembaga yang ada untuk pengelolaan kebakaran.				X
10. Prosedur untuk memecahkan masalah kebakaran di berbagai tingkat pemerintahkan perlu diperjelas.	KELOMPOK			
11. Pengkajian ulang kebijakan desentralisasi dan peran dalam penanganan kebakaran.		X		X

IV. Pembangunan Pemukiman transmigrasi dan pertanian

Hingga tahun 1994, 3.3 juta ha lahan basah di Sumatera, Kalimantan, dan Sulawesi dikeringkan dan direklamasi untuk pemukiman transmigrasi penduduk yang berasal dari pulau yang padat seperti Jawa, Bali, dan Madura. Sekitar 1.6 juta keluarga ditempatkan di wilayah lahan basah. Masing-masing keluarga mendapatkan lahan seluas 2.25 ha bagi pertanian dan pemukiman. Lahan tersebut disiapkan bagi pertanian dengan cara penebangan, pengeringan lahan basah, dan pembakaran. Padi merupakan jenis tanaman yang paling banyak ditanam, namun tanaman *agroforestry* seperti kopi dan kelapa juga ditanam.

Di Sumatera Selatan saja, 320 673 ha lahan direklamasi sejak tahun 1969 hingga 1988 dan sebanyak 54 671 keluarga ditempatkan di lokasi tersebut. Anton Sugianto, *perwakilan masyarakat* dari Dearah Transmigrasi Air Sugihan Kanan, OKI, Sumatera Selatan menjelaskan kesulitannya dalam pertanian di rawa yang dikeringkan. Masalah-masalah yang dialaminya antara lain kurangnya air pada musim kering, serangan hama, serta rendahnya kesuburan dan tingginya kadar kemasaman tanah. Masyarakat tidak memiliki dana untuk pengelolaan tanah dan input lain yang diperlukan untuk bertani di rawa. Api merupakan perangkat yang penting bagi pertanian. Sisa pembakaran memberikan unsur hara yang diperlukan tanaman dan api dapat menyingkirkan tumbuhan hama. Penggunaan herbisida tidak seefektif penggunaan api.

Sejak tahun 1981 hingga tahun 1990, hasil panen padi cukup baik. Namun sejak kebakaran hutan di tahun 1991, 1994 dan 1997, terjadi masalah yang serius yang berkaitan dengan hasil panen. Peneliti di kelompok ini menyatakan bahwa penurunan hasil panen mungkin disebabkan oleh menurunnya kesuburan tanah dengan seringnya pembakaran. Selain itu, lahan pertanian yang ditinggalkan oleh transmigran merupakan sumber serangan hama.

Karena gagalnya pertanian, sebagian transmigran yang meninggalkan lokasi tersebut. Sebagian lain melakukan kegiatan sonor, mengambil kayu Gelam, dan menebang kayu di hutan sekitarnya. Para transmigran kemudian beralih ke tanaman keras seperti kelapa dan sawit untuk memperbaiki kehidupan mereka. Rencana penanaman tanaman keras tersebut didanai oleh investor lokal yang berada di wilayah tersebut. Masyarakat kemudian mengembangkan peraturan yang berkaitan dengan pembakaran bagi pertanian untuk mencegah menyebarnya kebakaran. Anton menegaskan bahwa kebakaran pertanian bukan sumber kebakaran hutan tahun 1991, 1994 dan 1997.

Dari sudut pandang *penelitian ilmiah* (dipaparkan oleh Robiyanto Susanto), pembakaran tahunan di wilayah transmigrasi yang dikeringkan dapat berakibat pada penurunan permukaan gambut dan penurunan kadar unsur hara dalam jangka panjang. Namun pada saat yang sama, pembakaran membantu membersihkan tumbuhan secara murah dan mudah, menyediakan abu bagi tanaman, menetralkan kadar kemasaman tanah, mendorong mineral tanah ke permukaan, dan memberikan daerah perakaran yang lebih baik. Para transmigran memiliki mata pencaharian alternatif yang terbatas. Hutan gambut yang berbatasan juga merupakan daerah tangkapan air bagi Air Sugihan Kanan, dengan demikian pembakaran dan perubahan struktur hidrologi di tempat tersebut dapat mempengaruhi kualitas dan kuantitas air di wilayah transmigrasi.

Pengembangan proyek transmigrasi di wilayah rawa bukan merupakan pemikiran yang baik. Banyak pengembangan serupa mengalami kegagalan karena turunnya permukaan gambut, kesulitan dalam pengelolaan air, kondisi sulfat asam dan rendahnya kesuburan tanah. Pengeringan juga meningkatkan tingkat kerawanan kebakaran secara drastis. Dalam tahun-tahun kering yang panjang, kebakaran lahan pertanian di gambut yang dikeringkan dapat berakibat pada penyebaran kebakaran yang merusak.

Pada lokasi transmigrasi yang ada, mengalihkan penanaman ke tanaman keras merupakan pemikiran yang baik. Jenis tanaman pohon setempat, seperti kelapa dan sawit lebih baik dari pada menanam jenis *Acacia*. Tanaman lahan kering yang memiliki perakaran yang dalam seperti *Acacia*, memerlukan drainase yang besar, tidak terlalu produktif, dan meningkatkan resiko kebakaran. Sawit yang memiliki perakaran dangkal yang juga dapat menahan banjir dalam waktu lama, merupakan pilihan yang lebih baik. Namun demikian, kegiatan skala besar yang mahal diperlukan untuk keberhasilan ekonomi dan mungkin di luar jangkauan pelaku ekonomi skala kecil.

Menurut Ahmad Zuber dari *Dinas Transmigrasi Sumatera Selatan*, yang menjadi masalah utama dalam pengembangan transmigrasi adalah implementasi kebijakan yang buruk di lapangan dan upaya-upaya yang tidak terkoordinasi. Pembakaran untuk pembukaan lahan transmigrasi sekarang telah dilarang. Masalah di lokasi transmigrasi yang ada yang harus ditangani.

Peserta dari *organisasi non-pemerintah* mengungkapkan bahwa diperlukan lebih banyak lagi penelitian mengenai pertanian lahan gambut dan pilihan pembangunan, mencakup kesesuaian lahan bagi beragam tanaman. Mereka yakin, berdasarkan pengalaman yang lalu, tanaman keras seperti sawit dan kelapa dapat berhasil, dan pengembangan mekanisme pasar akan diperlukan.

Tabel di bawah ini merangkum isu dan masalah utama serta rekomendasi dalam menyelesaikan masalah kebakaran yang berkaitan dengan pemukiman transmigrasi dan kegiatan kehidupan sehari-harinya. Isu dan rekomendasi ini terungkap dari makalah, *talkshow*, dan diskusi kelompok dari sudut pandang *stakeholder* kunci, yaitu: transmigram (trans), lembaga pemerintah (pem), penelitian (litbang), dan organisasi non pemerintah (LSM).

Talkshow Pembangunan Pemukiman transmigrasi dan pertanian

MASALAH/ISU UTAMA	Trans	Pem	Litbang	LSM
1. Pertanian padi bukan kegiatan yang cocok bagi lahan basah yang dikeringkan (hasil yang menurun dan lahan ditinggalkan).	X		X	X
2. Api merupakan perangkat pertanian yang penting bagi petani.	X		X	
3. Penggunaan api bagi pertanian memiliki dampak positif dan negatif.			X	
4. Drainase meningkatkan resiko kebakaran.	X		X	
5. Kebakaran hutan gambut yang berbatasan (daerah tangkapan air) memberikan dampak negatif bagi lahan transmigrasi dan pertanian.	X		X	
6. Masalah implementasi prosedur pemanfaatan lahan transmigrasi yang tidak sesuai dengan kondisi lapangan.		X		
7. Para transmigran mengadopsi cara-cara pertanian termasuk sonor yang berbasiskan api) dengan mengalami kegagalan.	KELOMPOK*			
8. Pengembangan infrastruktur yang buruk dan tidak siapnya pemerintah daerah (akan desentralisasi) dalam menangani masalah lokasi transmigrasi.	KELOMPOK			
9. Tidak adanya lembaga maupun sumberdaya setempat dalam penanganan masalah kebakaran hutan.	KELOMPOK			

* KELOMPOK – dari diskusi kelompok

	REKOMENDASI	Trans	Pem	Litbang	LSM
1.	Pengalihan dari pertanian tahunan ke perkebunan/*agroforestry* (kemitraan dengan perusahaan) untuk memperbaiki kehidupan masyarakat dan menghindari pembakaran tahunan.	X		X	X
2.	Pemilihan tanaman keras yang sesuai.			X	X
3.	Tidak mengembangkan wilayah transmigrasi baru di daerah rawa.			X	X
4.	Dukungan pemerintah dan pihak lain dalam pengembangan infrastruktur, perkebunan, dan mata pencaharian alternatif di desa.	X			
5.	Pengkajian masalah pembangunan kanal dan pengelolaan air.	KELOMPOK			
6.	Penyediaan insentif dan dana dari Pemerintah Pusat ke Daerah untuk memelihara dan memperbaiki daerah transmigrasi.	KELOMPOK			
7.	Penyuluhan untuk meredam dan mengurangi kegiatan sonor dan penggunaan api.	KELOMPOK			
8.	Pengaturan penggunaan api bagi pembukaan lahan pertanian untuk mencegah kebakaran yang merusak.	KELOMPOK			
9.	Menciptakan lembaga/sistem pengendalian kebakaran secara lokal .	KELOMPOK			

Diskusi kelompok Pembangunan Pemukiman transmigrasi dan pertanian

V. Risalah isu dan masalah utama kabakaran di lahan basah Sumatera

- Degradasi hutan rawa dan peningkatan kerawanan kebakaran disebabkan oleh pembalakan, pengeringan, pembangunan dan peningkatan populasi penduduk.

- Banyak pihak yang meragukan keberlanjutan pengembangan lahan gambut bagi perkebunan dan pertanian skala besar karena kegagalan yang di masa lalu. Resiko kebakaran sangat tinggi. Kesulitan karena pengelolaan air, tanah, dan kebakaran. Pertanian tanaman padi bukan kegiatan yang tepat dilakukan di lahan basah yang dikeringkan. Selain itu, terdapat pula keraguan akan kelestarian pengembangan pertanian Acacia di lahan basah.

- Wilayah lahan gambut yang luas saat ini sedang menjadi pusat perhatian pembangunan. Diperlukan klarifikasi tentang alokasi pemanfaatan lahan bagi konservasi dan pembangunan, serta dasar-dasar ilmiah bagi pengembangan peraturan.

- Lemahnya penegakan hukum dan dukungan terhadap *zero burning* bagi perusahaan.

- Penggunaan api merupakan hal yang penting bagi masyarakat di berbagai kondisi dan kegiatan di lahan basah, serta belum ada cara lain yang dapat digunakan untuk menggantikan penggunaan api. Pembakaran tidak dikendalikan dan penggunaan api di rawa tidak didasari oleh praktek tradisional yang lestari. Pengelolaan lahan berbasis api semakin meningkat sejalan dengan degradasi bentang alam dan tekanan penduduk.

- Masyarakat miskin yang tinggal di sekitar rawa dengan keterbatasan modal, keterbatasan sumberdaya bernilai tinggi, keterbatasan pilihan mata pencaharian yang berkelanjutan, serta kurangnya dampak dari keuntungan perkebunan skala besar. Hasil panen pertanian rendah dan kehidupan mereka bergantung pada sumberdaya hutan rawa yang tersisa, di luar status kepemilikan lahannya. Masalah kebakaran hutan timbul dari kegiatan pembalakan (penebangan), baik oleh karyawan konsesi maupun masyarakat, perambahan, dan kebakaran lahan pertanian yang berbatasan.

- Pertimbangan untung rugi (*trade - offs*) antara kebutuhan saat ini bagi kehidupan masyarakat setempat dan kebutuhan konservasi global dalam jangka panjang.

- Terungkap serangkaian pertanyaan mengenai status kepemilikan lahan hutan negara dan wewenang serta hak yang lebih besar yang diberikan kepada perusahaan tanpa mempertimbangkan kebutuhan masyarakat.

- Sulitnya mengendalikan kebakaran lahan gambut karena masalah aksesibilitas dan masalah-masalah lainya. Keterbatasan sumberdaya, informasi, dan keahlian pengelolaan kebakaran dari pemangku kepentingan secara umum. Lembaga yang berwenang dalam pengelolaan kebakaran tidak efektif dan bertanggung jawab, serta tidak adanya panduan standar bagi pengelolaan kebakaran tersebut. Tidak ada lembaga maupun sumberdaya setempat yang menangani masalah kebakaran hutan.

- Penerapan desentralisasi berakibat pada peningkatan kebakaran hutan.

VI. Rekomendasi untuk menyelesaikan masalah kebakaran lahan basah di Sumatera

- Pengkajian ulang dan audit bagi alokasi pemanfaatan bagi pembangunan lahan gambut versus konservasi dan mencakup seluruh pemangku kepentingan. Pengkajian ulang secara ilmiah bagi pengelolaan kebakaran sebagai dasar bagi pengembangan peraturan. Jangan membangun daerah transmigrasi baru di wilayah rawa.

- Belajar dari pengalaman dan dorongan bagi praktek pengelolaan terbaik pembangunan lahan gambut. Pengkajian pembangunan kanal dan masalah pengelolaan air. Pengembangan prosedur penebangan yang lestari untuk mengurangi bahaya kebakaran.

- Penutupan kanal dan rehabilitasi hutan.

- Peningkatan tekanan internasional dan penguatan kapasitas lembaga pemerintah untuk menegakan hukum *zero burning* yang ada bagi perusahaan. Pernyediaan insentif untuk tidak melakukan pembakaran.

- Dukungan pemerintah dan perusahaan bagi masyarakat dalam kegiatan pengelolaan kebakaran lahan pertanian untuk mencegah penyebarannya. Identifikasi dan promosikan metode pembukaan lahan alternatif yang layak.

- Pengembangan mata pencaharian alternatif yang berkelanjutan bagi masyarakat sehingga mengurangi penggunaan api. Pengembangan kemitraan yang setara antara pemerintah/perusahaan dan masyarakat dalam pembangunan lahan basah. Pengalihan pertanian tanaman setahun menjadi perkebunan/*agroforestry* (dalam kemitraan dengan perusahaan)untuk meningkatkan taraf hidup dan menghindari pembakaran tahunan. Pemilihan tanaman keras yang cocok.

- Klarifikasi kepemilikan lahan – masyarakat, negara, dan industri - untuk mendorong pengelolaan lahan basah yang lestari.

- Pelibatan masyarakat dalam sumberdaya dan pengelolaan kebakaran dan peningkatan kesadaran lingkungannya. Penyediaan insentif sosial-ekonomi kepada masyarakat bagi pengelolaan lahan basah yang lestari. Penciptaan dan penguatan kelembagaan dan peraturan lokal bagi pengelolaan kebakaran.

- Penguatan lembaga yang ada dan klarifikasi prosedur pemecahan masalah kebakaran di berbagai tingkat pemerintahan. Penyediaan peralatan, sumberdaya, informasi, dan dana untuk memerangi kebakaran pada saat yang tepat (dibutuhkan).

- Pengkajian kebijakan desentralisasi dan peran dalam kebakaran. Penguatan kapasitas dan komitmen lembaga pemerintah daerah ke arah pemanfaatan lahan basah yang lestari dan konservasi. Penyediaan insentif dan dana dari pemerintah Pusat ke Daerah untuk memelihara dan memperbaiki daerah transmigrasi.

VII. Tindak Lanjut

Peserta yang menyatakan minatnya dalam melaksanakan rekomendasi berikut:

a. Pengkajian ulang kebijakan mengenai lahan bagi pembangunan lahan gambut versus konservasi
Isdarma, ST, Bappeda Kab. Musi Banyuasin, Sumatera Selatan
Ir. Belly Pahlupi, Bappeda Provinsi Lampung
Rivani Noor, WALHI, Jambi
Susi Aengraeni, LSM KALIPTRA, Riau
Rini Armeini, LSM LPH-PEM, Palembang
Eliezer Lorenzo, PT Riau Andalan Pulp and Paper (PT RAPP)

b. Perbaikan matapencaharian dan kesejahteraan masyarakat
Transmigrasi
Mahnizar, Dinas Perikanan dan Kelautan, Kab. Musi Banyuasin, Sumatera Selatan
Prehanto, Petani Transmigran, Air Sugihan, Sumatera Selatan - kelapa sawit
Anton Sugianto, Petani Transmigran, Air Sugihan, Sumatera Selatan

Umum
Edy Candra, Petani Setempat, Jambi
Sakimin, Petani Setempat, Jambi
Zainal Abidin, Dinas Perkebunan Provinsi Lampung
Deddy Permana, LSM Wahana Bumi Hijau, Palembang
Maslian, LSM Yayasan Pinse, Jambi
Wetlands International, Palembang
Noviana Khususiyah, ICRAF, Bogor
Suyanto, ICRAF, Bogor

c. Pengelolaan kebakaran berbasis masyarakat
Andri Ginson, Taman Nasional Berbak, Jambi
Satya Ismunandar, PT Riau Andalan Pulp and Paper
Hairul, LSM Yayasan Pinse, Jambi
Maslian, LSM Yayasan Pinse, Jambi
Wetlands International, Palembang

d. Penyadaran lingkungan bagi masyarakat dan publik secara umum
Idris Sardi, LSM Yayasan Prakarsa Mandiri, Jambi
Rivani Noor, LSM WALHI, Jambi
Wetlands International, Palembang

e. Penguatan kelembagaan setempat
Sakimin, petani setempat, Jambi
Aidil Fitri, LSM WALHI, Sumatera Selatan

f. Sertifikasi pengelolaan hutan yang berkelanjutan
Indra Arinal, Wetlands International, Palembang
Hari Subagyo, PT Putra Duta Indah Wood

g. Penguatan kapasitas aparat untuk deteksi dan pemadaman kebakaran
Ir. Bandono Suharto, Dinas Perkebunan Provinsi Riau
Hairul Sani, Dinas Kehutanan dan Perkebunan, Kab. Musi Banyuasin, Sumatera Selatan
Andri Ginson, Taman Nasional Berbak, Jambi
Tri Prayogi, BKSDA, Sumatera Selatan
Zainal Abidin, Dinas Perkebunan, Provinsi Lampung
Satya Ismunandar, PT Riau Andalan Pulp and Paper

h. Pengkajian ulang peran dan kinerja lembaga pemerintah di berbagai tingkat dalam menngatasi masalah kebakaran
LSM WALHI Riau
LSM KALIPTRA, Riau

Summary of workshop results

Unna Chokkalingam[1] and Suyanto[2]

I. Community wetland management

Suyanto from ICRAF presented *CIFOR-ICRAF research* on community fire management and impacts in the wetlands of southern Sumatra. Fire is an important community wetland management tool. Burning is not controlled and widespread, repeated fires have transformed the landscape from mature high swamp forests to fire-adapted *Gelam* (*Melaleuca cajuputi*) forests, open savannas and grasslands. Large-scale developments such as commercial logging, building canals, draining and transmigration projects have contributed to the spread of fire-based land management.

Local communities extract fish, wood and other resources from the wetlands. Fire is used in the course of these activities to enable access to the resource and ease camping in the wetlands. With the depletion of commercial timber, the communities harvest the lower-value *Gelam*. They also cultivate swamp rice (*sonor*) in the wetlands in long drought years, using fire to clear the land and provide nutrients for the crops. The *sonor* system and fire use has expanded and intensified in recent years following degradation of the swamp forests through logging and the increased frequency of long drought periods. Paddy yields are significantly high and *sonor* is currently a major source of income in drought years. The decline in fish and high-value timber resources has, however, led to falling incomes and fewer livelihood options. Workers now migrate into neighbouring forests to extract resources. Baharudin, *a local community representative* from the study site, Air Sugihan, confirmed that livelihood options were very limited in the swamps and fire use was critical.

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[2]*World Agroforestry Centre (ICRAF), P.O. Box 161, Bogor 16001*

Djoko Setijono from the *Bilateral South Sumatra Forest Fire Management Project* (SSFFMP) in Palembang also confirmed that villagers use fire for fishing and swamp rice cultivation in the wetlands. Swamp fire use is not based on any sustainable traditional practice. Active participation of the communities is required to resolve the peatland fire problem and this is the approach being developed by the SSFFMP project for South Sumatra. Given the importance of fire for the local economy, ways to regulate burning would be explored including building canals as fire breaks. Also, alternative livelihood opportunities to reduce fire use would be identified. Joko Kiswanto from *Dinas Kehutanan Jambi* objected to building canals as fire breaks as they would tend to drain the peatlands.

Ahmad Samodra from *LPHPEM (an NGO)* suggested that communities were unaware of long-term conservation needs. However, Wilistra Danny from the *Ministry of Forestry, Jakarta* indicated that it was normal for the communities to prioritize their livelihood needs over long-term resource conservation. He felt it was important to increase local awareness about the environment, and strengthen local institutions and regulations to reduce the fire problem. Suyanto from ICRAF responded that there was a trade-off between local and global interests and resolving this conflict may require providing incentives to communities for sustainable practices.

Hasanuddin from *Dinas Kehutanan South Sumatra* noted that fire was formerly viewed as a forestry sector problem but the importance of community perception and participation is increasingly being recognized. South Sumatra contains vast areas of highly fire prone wetlands which have been severely affected by frequent widespread fires in the last two decades. There is no quick way to resolve the peatland fire problem as it requires finding alternative livelihood options and altering community behaviour. The department is actively promoting community-based fire management in the province with technical assistance from the SSFFMP project.

Idris Sardi from the *NGO Yayasan Prakasa Mandiri*, Jambi was concerned that communities appeared to be getting an unfair share of the blame. He asserted that company activities on wetlands were major sources of fire.

Summarized below are the key issues and recommendations for solving the problem fires related to community wetland management. These arise out of the papers, talk show and group discussion highlighting the perspectives of the key stakeholders – Community (Comm), government agencies (Govt), NGOs, research and development agencies (Res/Dev).

KEY ISSUES/CONCERNS	Comm	Govt	NGO	Res/Dev
1. Fire important tool for community wetland use and livelihoods	X	X	X	X
2. Burning is not controlled. Swamp fire use is not based on any sustainable traditional practice	X			X
3. No alternative yet for land clearing without fire for the communities	X	X	X	X
4. Limited economic opportunities, declining income	X	X	X	X
5. Long-term negative impacts of forest fires on resources and livelihoods	X		X	X
6. Tradeoff between local stakeholder livelihood needs and long-term conservation needs		X	X	X
7. More authority being given to big companies to use forest land, community has no incentive to control forest fire	X		X	
8. Large-scale plantation and forestry operations changed local cultures and management practices			X	
9. Different stakeholders have different opinions about the wisdom of community fire management practices	GROUP*			

*GROUP – from group discussions

RECOMMENDATIONS	Comm	Govt	NGO	RES
1. Identify and promote integrated and sustainable peatland agricultural system	GROUP			
2. Sustainable livelihood options for communities that reduce fire use	X	X	X	X
3. Identify and promote technically and socially feasible fire management practices	GROUP			
4. Involve and strengthen community-based institutions for fire management	GROUP			
5. Enhance community awareness of long-term resource conservation needs		X	X	
6. Provide incentives to communities for sustainable practices				X
7. Government and private companies to develop plantations in partnership with communities	GROUP			
8. Promote dialogue between different stakeholders and use local community wisdom as a basis for fire management	GROUP			
9. Forest rehabilitation upstream to downstream	GROUP			

II. Plantation development and management

With dryland areas already extensively developed, the wetlands of Sumatra are increasingly the focus of economic activities, including large-scale forestry and oil palm plantations, particularly in Riau and North Sumatra. The companies believe that the peatlands are suitable for large-scale tree plantations because they are vast and largely uninhabited, with few land claims, unlike the dryland areas. Forestry plantation companies such as PT Arara Abadi and PT Riau Andalan Pulp and Paper (RAPP) are in the lead in terms of forestry plantation development on peat.

Darjono from *BAPEDAL Riau Province* spoke about the legislation and enforcement regarding fires in timber and estate crop plantation concessions. From 1997 to 2001, 51255 ha were burnt in Riau, of which 33000 ha were in timber and estate crop plantation lands. From 1995-2003, 49 companies were investigated for using fire in land clearing operations. Only two of these companies were finally convicted. The zero burning law is difficult to enforce because of the vastness and remoteness of the wetland concessions, limited resources and expertise, lack of company cooperation and lack of field insurance for the investigators.

Olle Wennstrom from *PT Arara Abadi* stated that between 2002 and 2003, the area affected by fires within their concessions had reduced from 12500 to 600 ha. He acknowledged that a wetter year was a factor in fire reduction, but a significant role was played by their increased fire fighting capacity, fire prevention and community extension programs. He was confident of their full capacity to fight and manage peatland fires. They have a strict no-burn policy enforced by agreement with all contractors working in their area. They try to help the communities on the concession boundaries to implement zero burning or controlled burning measures in their agricultural land clearing operations. They also work with the local government to handle illegal logging operations within their concession. Pt Arara Abadi, PT RAPP and four other companies have formed a Haze Prevention Group.

Eliezer Lorenzo from *PT RAPP* talked about the lack of available drylands and the resulting increase in pressure on the vast peatland areas for development of timber and estate crops and local agriculture. Meanwhile the peatlands were also being degraded through illegal logging, fire use and improper drainage systems. So far there has been no clear penalty for the companies charged with violating the zero burning law passed in 1997. PT RAPP has a strict no-burn policy enforced since 1994 and believes in sustainable wetland development. So far they have planted 50000 ha of the 70000 ha allocated for development on the peatlands. Forest plantation development on peatland involves a lot of challenges in terms of minimizing peat subsidence, land clearing without fire, reducing fire risks, and protecting against fires originating on the concession boundaries. Also *Acacia* plantations need dry conditions and thus water management is critical. They are also involved in community extension activities as part of the fire prevention and awareness building program.

Questions were raised by Indra Arinal of *Wetlands International* and Hari Subagyo of *PT Putra Duta Indah Wood* regarding the appropriateness of trying to grow dryland species such as *Acacia* on wetlands given all the associated risks of massive environmental degradation. They asserted that it may be better to protect the natural forests for their conservation value on wetlands, and establish forest plantations on drylands in partnership with local communities. Also, a question was raised about increasing access and fire hazards through canals developed for the plantations. Eliezer Lorenzo from *PT RAPP* responded that *Acacia* was growing quite well on

their wetland concession and that the canals were not connected to the rivers, thus limiting access. He stated that wetland development policies originated from the government and not from the companies. The policy was aimed at agricultural development and poverty alleviation. Population and degradation pressures are increasing and the wetlands have to be used, preferably in a sustainable manner. Eliezer argued that timber plantations would be a more favourable option for peatland development than annual agriculture or estate crop development since they provide more efficient carbon sinks and require less nutrients. They also cause less peat subsidence than annual cultivation.

Rully Syumanda of the *NGO, WALHI* from Riau stated that since 1995, industry has been using slash and burn practices to convert land to estate crop and timber plantations in Riau. In addition massive exploitation of the forests, since the 1980s, had left them in a degraded condition and increased their flammability. He suggested that the reasons behind the widespread forest degradation are government policies that allow large-scale conversion, granting of timber utilization permits to companies, global demand for palm oil, and the overcapacity of the pulp and plywood industry. With regional autonomy, the local government has focused on rapid exploitation of the forest resource, with no concern for local livelihoods and the environment. No strong punitive action has been taken against the violators of the zero burning law. Also, the burn prohibition can be bypassed with special permits from the authorities. There is a need for clear and strong disincentives to companies who violate the zero burning laws and incentives for companies who abide by it.

Bandono Suharto from *Dinas Perkebunan Riau Province* stated that Riau had multiple fire spots, the monitoring of which takes up a lot of time. Peatlands are very vulnerable to fire and difficult to access. They had limited facilities, equipment and funds to deal with the peatland fire problem. About 390,000 ha of wetlands in Riau was reserved for development into estate crops. Regulations regarding conversion of forest areas to estate crops are in the hands of the Ministry of Forestry.

Summarized below are the key issues and recommendations for solving the problem fires related to plantation development and management on wetlands. These arise out of the papers, talk show and group discussion highlighting the perspectives of the key stakeholders – forestry plantation companies (HTI), government agencies (Govt), NGOs, and researchers (Res).

KEY ISSUES/CONCERNS	HTI	Govt	NGO	Res
1. Large peatland areas now under development focus. Need clarifications on land use allocation for conservation and development, and the scientific basis for the regulations	X	X	X	X
2. Need clarifications on land tenure – community versus industry to prevent conflicts and degradation			X	
3. High fire risks - draining and development degrades the peatlands and brings people into the area			X	X
4. High cost and difficulties of water, soil and fire management in the peatlands	X			X
5. Because of big failures in the past, lots of doubts about sustainability of peatland development			X	X
6. Lack of timely information on fire locations. Limited resources and expertise for responsible government authorities		X		
7. Decentralisation of natural resource management not matched by adequate local government capacity	GROUP*			
8. Weak law enforcement and support of zero burning.	GROUP			
9. Community land clearing fires on boundaries of plantations, with limited capacity of community to manage fire	X			
10. Impoverished communities on the margins of the plantations with no access to capital, resources, alternative livelihood options or profits from plantations	GROUP			

*GROUP – from group discussions

RECOMMENDATIONS	HTI	Govt	NGO	Res
1. Review and audit existing peatland use allocation for development/conservation including all stakeholders. Review scientific management basis of regulations	GROUP			
2. Promote capacity and political will to use available information technology to tackle the fire problem speedily	GROUP			
3. Strengthen the capacity and commitment of local government agencies to work towards sustainable wetland use and conservation	GROUP			
4. Increase international pressures and strengthen government staff capacity to enforce current zero burning laws. Provide incentives for not burning	GROUP			
5. Learn from and promote best management practices for peatland development	GROUP			
6. Programs to improve community welfare	GROUP			
7. Government and companies to support communities in their agricultural fire management practices to prevent escapes	GROUP			

III. Remaining natural forest areas (production and protection forest)

The high swamp forests that once covered the majority of the wetlands (including peatlands) of Sumatra have been reduced to a few remote sections and scattered fragments. Commercial logging, large-scale wetland reclamation for transmigration and plantation development, as well as livelihood pressures have been important factors in this transformation from the late 1960s to present. The last remaining large sections of high swamp forest are in the province of Riau, and in the Berbak-Sembilang Conservation area and surrounding timber concessions in Jambi and South Sumatra.

These remaining forests are at high risk from fires. Peat forest burning results in peat degradation, acidification of water, increase in flammability, substantial haze and carbon emissions, and loss of forest products and biodiversity. Once degraded and subject to continuous high human pressures, peat forests are difficult to regenerate.

The peat swamp forests of Berbak National Park and neighbouring timber concession, PT Putra Duta Indah Wood in Jambi have been subject to repeated burning in the last decade, most extensively in the 1997 drought. Andri Ginson of *Berbak National Park* and Hari Subagyo of *PT Putra Duta Indah Wood* indicated that the forest fires are associated with logging activities (both by concession staff and illegal loggers), NTFP and fish extraction, agricultural encroachment, and agricultural fires spreading from the forest boundaries. Fire is an invaluable tool, in both agriculture and in the course of logging and hunting in the inhospitable swamp forests. At present, they have no alternative land clearing methods to promote to the communities. Improper swamp management, primarily the building of canals also plays a critical role in fire incidence.

Fire prevention and suppression systems are in place but fires are difficult to locate, reach and extinguish in the inaccessible, easily flammable peatlands. Managers also suffer from a lack of equipment and resources for the task as well as timely information on fire locations. They have done some community extension work, such as awareness campaigns, but they need to take care of the underlying causes of the fires in order to be effective – i.e. reduce uncontrolled burning and reasons for community entry into the forest. This requires improving local livelihoods, rehabilitating the degraded forests, identifying and promoting controlled burning and zero burning methods, and involving communities in fire management.

Forest managers and *NGOs* suggest that forest fire problems have increased following decentralization and conflicts between central and local land allocations. Other NGO representatives add that institutional capacity and commitment to fight the forest fires is low and there are no standard guidelines for use. Burnt forests, on occasion, were inappropriately handed over for plantation forestry development.

Communities perceive state control of the forests as inequitable and have no incentives to protect them from fire. Sakimin and Edy Candra, local community representatives near Berbak National Park say that paddy yield on drained peatland is low, livelihood options are limited and people are forced go into the peat forests. The communities use fire for clearing land to plant estate crops and paddy since it is the cheapest and easiest way. The fires cause health problems and soil fertility

declines over time. Also, the farm fires often spread into the forests given their degraded condition and communities' lack of awareness about fire control. They suggest improving the local economy, promoting controlled burning and local regulations for fire use, and involving local people in fire control activities. Alternatives to burning such as gathering debris and allowing it to decay on site, as nutrients for the crops could be explored. They are prepared to help protect against forest fires but lack infrastructure, tools, and timely aid. There was also a need for forest and peat rehabilitation and improved water management in drained areas.

Rivani Noor of the *NGO WALHI-Jambi* stated that fire use is not all bad, as some communities practice traditional fire management. He suggested that illegal logging, large-scale draining and land conversion using fires in the swamps and lack of law enforcement were the key problems. Fire risks need to be taken into account in development policies. Community participation in policy making and fire control is essential to sustainably manage the peatlands. Satya Ismunandar from *PT RAPP*, however, indicated that traditional practices and regulations may be breaking down with large-scale socio-economic transformations and need to be readjusted. There was an overall need to increase expertise in peatland fire management among all stakeholders.

Irwansyah Reza Lubis of *Wetlands International* indicated that burned areas need assisted rehabilitation to reduce their flammability and speed up the recovery process. The best way to achieve this is through community-based integrated management, involving all the stakeholders from bottom up. This strategy is being pursued by the Canadian-funded project "Climate Change, Forest and Peatlands in Indonesia" in Berbak-Sembilang Conservation Area, where Wetlands-International is working with the villagers, PT Putra Duta Indah Wood, and the National Park office. They will work to rehabilitate the burned forests, close inappropriate canals, provide alternative incomes, and limit community activities in the peat swamp forests. Attention is also paid to the development of local institutions, conservation management plans, environmental awareness, funds and rewards for communities, clear land ownership, and community-based fire patrols and suppression.

Summarized below are the key issues and recommendations for solving the problem fires related to the remaining natural forest areas. These arise out of the papers, talk show and group discussion highlighting the perspectives of the key stakeholders - local and transmigrant communities (Comm), government agencies (Govt), forest concession company (HPH), NGOs.

KEY ISSUES/CONCERNS	Comm	Govt	HPH	NGO
1. Forest fire problems from illegal logging, encroachment, and bordering agricultural fires		X	X	X
2. Fire use is critical for communities, no alternatives in sight	X	X	X	X
3. Low agricultural yields and poverty leading to local dependence on forest resources	X	X	X	X
4. Local rights and access to state forest limited – so local apathy to forest fires	GROUP*			
5. Socio-economic and ecological changes and breakdown of traditional management practices	GROUP			
6. Forest degradation and increased flammability with logging	GROUP			
7. Difficult to control peatland fires - access and other problems		X	X	X
8. Insufficient resources, information and expertise for fire management among all stakeholders		X		X
9. Existing institutions in charge of fire management not effective and responsible, and no standard operating guidelines to solve the forest fire problem				X
10. Decentralisation implementation resulted in increased forest fires		X		X

*GROUP – from group discussions

RECOMMENDATIONS	Comm	Govt	HPH	NGO
1. Livelihood development projects	X	X	X	X
2. Alternative land clearing methods	X	X	X	
3. Involve local people and their traditional knowledge in fire control activities	GROUP			
4. Develop equitable partnerships between government/ companies and community in wetland development	GROUP			
5. Sustainable logging procedures to reduce fire hazard	GROUP			
6. Forest rehabilitation and closure of canals		X		X
7. Provision of equipment, resources and funds to fight fires in a timely manner	X	X		
8. Specific recommendations for fire detection, monitoring and suppression			X	
9. Strengthen existing institutions for fire management				X
10. Clarify procedures for solving the fire problem at different government levels	GROUP			
11. Review decentralisation policies and role in fires		X		X

IV. Transmigration settlement and agricultural development

Up to 1994, 3.3 million ha of wetlands in Sumatra, Kalimantan and Sulawesi were drained and reclaimed for transmigration or resettlement of people from the crowded islands of Java, Bali and Madura. About 1.6 million households were resettled on the wetlands. Plots of 2-3 ha per household were assigned for permanent crop cultivation and settlement. The land was prepared for agriculture through logging, draining and burning. Rice is the main crop cultivated. Agroforestry crops such as coffee and coconuts are also grown.

In South Sumatra alone, 320673 ha were reclaimed from 1969 to 1988 with 54671 households resettled on these sites. Anton Sugianto, the *community representative* from the Air Sugihan Kanan transmigration area, OKI, South Sumatra discussed the difficulties with agriculture on the drained swamps. Problems included lack of water in the dry season, pest infestations, low soil fertility and high acidity. They do not have funds for the kind of site management and inputs required to cultivate on the swamps. Fire use was critical for annual cultivation, to provide nutrients for the crops and get rid of the weedy vegetation. Herbicides were not as effective as fire use.

From 1981 to 1990, rice yields were satisfactory. But since the forest fires of 1991, 1994 and 1997, there have been serious problems with rice cultivation. The researchers in the group suggested that the declining yields are probably due to reduced fertility over time with frequent burning. Also, agricultural land abandoned by many transmigrants was a source of pest invasion.

With the failure of agriculture, many transmigrants have left. Others have taken to *sonor*, *Gelam* extraction, and informal logging in neighbouring forest areas. The transmigrants are looking at tree crops like coconut and oil palm to help improve their livelihoods. Plans to develop such tree cropping funded by local investors already exist in the area. The community has also developed regulations for agricultural burning to prevent fire escapes. Anton asserted that farm fires were not the source of the forest fires of 1991, 1994 and 1997.

From the *research perspective* (Robiyanto Susanto), annual burning in the drained transmigration area leads to peat subsidence and decreases long-term nutrient content. But at the same time, it helps clear the vegetation cheaply and conveniently, provides ash for the crops, neutralizes the acidity, brings the minerals soil closer to the surface and provides a better rooting zone. The transmigrants do not have many alternative livelihood options. The adjacent peat forest was also the water catchment area for Air Sugihan Kanan, and burning and alteration of the hydrological structure there affected the water quality and quantity in the transmigration area.

Developing new transmigration projects in the swamps is not a good idea. A lot of such developments have failed because of peat subsidence, difficulties with water management, acid sulphate conditions and low fertility. Draining also increases flammability drastically. In long drought years, farm fires on drained peat can lead to widespread destructive fires.

In existing transmigration sites, branching out to tree crops might be a good idea. Local tree species, coconut and oil palm are preferable to planting *Acacia* sp. The deep-rooting dryland *Acacia* sp. require considerable drainage, are not very productive and increase fire risks. Shallow-rooted oil palm which can also withstand longer

flooding is preferable, but large-scale expensive operations are required for economic success and may be out of the reach of smallholders.

According to Ahmed Zuber, *Dinas Transmigrasi*, South Sumatra, the problems with transmigration development is really one of poor implementation of policies on the ground and uncoordinated efforts. Burning for land clearance in transmigration areas is now forbidden. The current problems on existing sites have to be fixed.

The NGO participants suggested that more research was required on peatland agriculture and sustainable development options, including the land compatibility for different crops. They believe tree crops such as oil palm and coconut could work, based on past experience in the area. Market development would be required.

Summarized below are the key issues and recommendations for solving the problem fires related to transmigration settlements and livelihood practices. These arise out of the papers, talk show and group discussion highlighting the perspectives of the key stakeholders - Transmigrants (Trans), government agencies (Govt), researchers (Res), NGOs.

KEY ISSUES/CONCERNS	Trans	Govt	Res	NGO
1. Rice cultivation is not a suitable practice on drained wetlands (yields declining and lands being abandoned)	X		X	X
2. Fire use is a must for cultivation by farmers	X		X	
3. Agricultural fire use has both positive and negative impacts			X	
4. Drainage increases fire risk	X		X	
5. Adjacent peat forest fires (water catchment area) negatively impact on transmigrant lands and agriculture	X		X	
6. Implementation problems with transmigration land use procedures (does not match field situation)		X		
7. Transmigrants adopt local practices (including fire-based *sonor*) with agricultural failure	GROUP*			
8. Poor infrastructural development and district government (with decentralization) not ready to deal with transmigration site problems	GROUP			
9. No local institution or resources to deal with forest fire problem	GROUP			

*GROUP – from group discussions

RECOMMENDATIONS	Trans	Govt	Res	NGO
1. Shift from annual to estate crops/agroforestry (in partnership with companies) to improve livelihoods and avoid annual burning	X		X	X
2. Appropriate tree crops should be chosen			X	X
3. Do not develop new transmigrant areas in the swamps			X	X
4. Government and others to support infrastructure, plantation and livelihood development in the villages	X			
5. Review the canal development and water management problems	GROUP			
6. Incentives and funds from Central to District governments to maintain and improve transmigration area	GROUP			
7. Extension work to discourage sonor and fire use	GROUP			
8. Regulate fire use for agricultural land clearing - to avoid destructive fires	GROUP			
9. Create local fire control institution/systems	GROUP			

V. Summary of key fire issues and concerns in wetlands of Sumatra

- Swamp forest degradation and increased flammability with logging, draining, development and increased populations.
- Many doubts about sustainability of peatland development for large-scale plantations and agriculture because of big failures in the past. Fire risks very high. Difficulties with water, soil and fire management. Rice cultivation not a suitable practice on drained wetlands. Doubts about sustainability of *Acacia* plantation development on wetlands as well.
- Large peatland areas are now under development focus. Need clarifications on land use allocation for conservation and development, and the scientific basis of the regulations.
- Weak law enforcement and support of zero burning for companies.
- Fire use is critical for communities in all settings and activities in the wetlands and there are no alternatives to fire use in sight. Burning is not controlled and swamp fire use is not based on any sustainable traditional practice. Fire-based land management is intensifying with landscape degradation and population pressures.
- Impoverished communities inhabit the marginal swamps with limited access to capital, high-value resources, sustainable livelihood options and profits from large-scale plantations. Agricultural yields are low and they depend on remaining

swamp forest resources for their livelihoods, irrespective of tenure status of the land. Forest fire problems arise from logging activities (both by concession staff and communities), encroachment and bordering agricultural fires.

- Tradeoffs exist between immediate local livelihood needs, and long-term and global conservation needs.
- Questions arose about state ownership of forest lands and greater authority and rights given to companies with no concern for community needs.
- Difficult to control peatland fires because of access and other problems. Insufficient resources, information and expertise for fire management among all stakeholders. Existing institutions in charge of fire management are not effective and responsible, and there are no standard operating guidelines. No local institutions or resources to deal with forest fire problem.
- Decentralisation implementation resulted in increased forest fires.

VI. Key recommendations to resolve the wetland fire problem in Sumatra

- Review and audit existing use allocation for peatland development versus conservation including all stakeholders. Review scientific management basis of regulations. Do not develop new transmigrant areas in the swamps.
- Learn from and promote best management practices for peatland development. Review the canal development and water management problems. Sustainable logging procedures to reduce fire hazard.
- Close canals, rehabilitate forests
- Increase international pressures and strengthen government staff capacity to enforce current zero burning laws for companies. Provide incentives for not burning.
- Government and companies to support communities in their agricultural fire management practices to prevent escapes. Identify and promote feasible alternative land clearing methods.
- Sustainable livelihood options for communities that reduce fire use. Develop equitable partnerships between government/companies and community in wetland development. Shift from annual to estate crops/agroforestry (in partnership with companies) to improve livelihoods and avoid annual burning. Appropriate tree crops should be chosen.
- Need clarifications on land tenure – community, state and industry - to promote sustainable wetland management.
- Involve communities in resource and fire management and increase their environmental awareness. Provide socio-economic incentives to communities for sustainable wetland management. Create and strengthen local institutions and regulations for fire management.

- Strengthen existing institutions and clarify procedures for solving the fire problem at different government levels. Provide equipment, resources, information and funds to fight fires in a timely manner.

- Review decentralisation policies and role in fires. Strengthen the capacity and commitment of local government agencies to work towards sustainable wetland use and conservation. Incentives and funds from Central to District governments to maintain and improve transmigration area.

VII. Follow up

Participants expressed interest in pursuing the following recommendations.

a. Landscape policy review for peatland development versus conservation
Isdarma, ST, Bappeda Kab. Musi Banyuasin, South Sumatra
Ir. Belly Pahlupi, Bappeda Lampung Province
Rivani Noor, NGO WALHI, Jambi
Susi Aengraeni, NGO KALIPTRA, Riau
Rini Armeini, NGO LPH-PEM, Palembang
Eliezer Lorenzo, PT Riau Andalan Pulp and Paper

b. Improving community livelihoods and welfare
Transmigration
Mahnizar, Dinas Perikanan dan Kelautan, Kab. Musi Banyuasin, South Sumatra
Prehanto, Transmigration Farmer, Air Sugihan, South Sumatra – oil palm
Anton Sugianto, Transmigration Farmer, Air Sugihan, South Sumatra

General
Edy Candra, Local farmer, Jambi
Sakimin, Local farmer, Jambi
Zainal Abidin, Dinas Perkebunan Lampung Province
Deddy Permana, NGO Wahana Bumi Hijau, Palembang
Maslian, NGO Yayasan Pinse, Jambi
Wetlands International, Palembang
Noviana Khususiyah, ICRAF, Bogor
Suyanto, ICRAF, Bogor

c. Community-based fire management
Andri Ginson, Berbak National Park, Jambi
Satya Ismunandar, PT Riau Andalan Pulp and Paper
Hairul, NGO Yayasan Pinse, Jambi
Maslian, NGO Yayasan Pinse, Jambi
Wetlands International, Palembang

d. Community and public environmental awareness
Idris Sardi, NGO Yayasan Prakarsa Mandiri, Jambi
Rivani Noor, NGO WALHI, Jambi
Wetlands International, Palembang

e. Local institutional strengthening
Sakimin, Local farmer, Jambi
Aidil Fitri, NGO WALHI, South Sumatra

f. Sustainable forest management certification
Indra Arinal, Wetlands International, Palembang
Hari Subagyo, PT Putra Duta Indah Wood

g. Strengthening official fire detection and suppression capacity
Ir. Bandono Suharto, Dinas Perkebunan Riau Province
Hairul Sani, Dinas Kehutanan dan Perkebunan, Kab. Musi Banyuasin, South Sumatra
Andri Ginson, Berbak National Park, Jambi
Tri Prayogi, BKSDA, South Sumatra
Zainal Abidin, Dinas Perkebunan, Lampung Province
Satya Ismunandar, PT Riau Andalan Pulp and Paper

h. Review role and performance of government agencies at different levels in dealing with the fire problem
NGO WALHI Riau
NGO KALIPTRA, Riau