

マケドニア旧ユーゴスラビア共和国  
森林火災危機管理  
能力向上プロジェクト  
終了時評価調査報告書

平成26年5月  
(2014年)

独立行政法人国際協力機構  
地球環境部

環境
JR
14-092



マケドニア旧ユーゴスラビア共和国  
森林火災危機管理  
能力向上プロジェクト  
終了時評価調査報告書

平成26年5月  
(2014年)

独立行政法人国際協力機構  
地球環境部



# 目 次

目次	
地図	
写真	
略語表	
評価調査結果要約表（和文・英文）	
<b>第1章 終了時評価調査の概要</b>	<b>1</b>
1-1 プロジェクトの背景と概要	1
1-2 終了時評価の目的	1
1-3 調査団の構成	2
1-4 調査日程	2
1-5 評価方法	3
1-5-1 評価の手順	3
1-5-2 情報の収集・分析方法	4
1-5-3 評価5項目	5
<b>第2章 プロジェクトの実績</b>	<b>6</b>
2-1 投入の実績	6
2-1-1 日本側の投入	6
2-1-2 マケドニア側の投入	7
2-2 成果の達成状況	7
2-2-1 成果1	7
2-2-2 成果2	9
2-3 プロジェクト目標の達成予測	10
2-4 上位目標の達成見込み	11
2-5 実施プロセスの検証	12
<b>第3章 評価5項目による分析</b>	<b>13</b>
3-1 妥当性	13
3-2 有効性	13
3-3 効率性	14
3-4 インパクト	14
3-5 持続性	15
3-5-1 政策・制度・組織面	15
3-5-2 体制面	16
3-5-3 財政面	16
<b>第4章 合同評価の結論・提言・教訓</b>	<b>17</b>
4-1 結論	17
4-2 提言	17
4-3 教訓	18

<b>第5章 所感</b> .....	<b>20</b>
5-1 総括コメント .....	20

別添資料

1 合同評価報告書 (英文).....	25
2 プログラム運営委員会 (SC) ミニッツ (英文).....	67

# 地 図

プロジェクト対象地域







# 写 真



Kichevo 地方行政庁舎



プロジェクトで設置した自動気象観測装置



危機管理センターKichevo 地方支部での聞き取り調査



Kichevo 地区の森林火災跡地



Kichevo 地区の森林火災跡地

利用できそうな材は伐採されて土場に並べられていた



プロジェクト運営委員会での終了時評価報告発表



## 略 語 表

略語	英語名	日本語名
AWS	Automatic Weather Station	自動気象観測装置
C/P	Counterpart	カウンターパート
CMC	Crisis Management Center	危機管理センター
CMS	Crisis Management System	危機管理システム
DPR	Directorate for Protection and Rescue	保護・救助局
EU	European Union	欧州連合
GFIS	Geographic Forest Information System	地理森林情報システム
HM	Hydro Meteorological Service	水文気象局
HQ	Headquarters	本庁
JET	Japanese Expert Team	日本側専門家チーム
JICA	Japan International Cooperation Agency	国際協力機構
LCM	Law on Crisis Management	危機管理法
MAFWE	Ministry of Agriculture, Forestry and Water Economy	農業・森林・水経済省
MKFFIS	Macedonian Forest Fire Information System	マケドニア森林火災情報システム
MOEPP	Ministry of Environment and Physical Planning	環境物理計画省
NGO	Non-Governmental Organization	非政府組織
ODA	Official Development Assistance	政府開発援助
PD	Project Director	プロジェクト・ディレクター
PDM	Project Design Matrix	プロジェクト・デザイン・マトリックス
PEMF	Public Enterprise Macedonian Forests	マケドニア森林公社
PM	Project Manager	プロジェクト・マネジャー
PO	Plan of Operations	活動計画
R/D	Record of Discussions	討議議事録
RCMC	Regional Crisis Management Center	危機管理センター地方支部
RDPR	Regional Directorate for Protection and Rescue	保護・救助局地方支部
RPEMF	Regional Public Enterprise Macedonian Forests	マケドニア森林公社地方支部
SC	Steering Committee	プログラム運営委員会
TCG	Technical Coordination Group	技術調整グループ



## 評価結果要約表

1. 案件の概要	
国名：マケドニア旧ユーゴスラビア共和国	案件：森林火災危機管理能力向上プロジェクト
分野：自然環境保全	援助形態：技術協力
所轄部署：地球環境部 森林・自然環境保全第二課	協力金額（予定）：約 2.94 億円
協力 期間	(R/D): 2011 年 5 月 10 日～2014 年 5 月 9 日
	(延長):
	(F/U):
	(E/N):
	先方関係機関：危機管理センター（CMC）
	日本側協力機関：農林水産省 林野庁、東京大学 生産技術研究所
	他の関連協力： マケドニア「全国地理情報データベース整備計画」
1-1 協力の背景と概要	
<p>マケドニア旧ユーゴスラビア共和国（以下、「マケドニア」と記す）を含むバルカン半島地域全体では、森林火災の発生率が高く、その被害が深刻な問題となっている。マケドニアにおいては、国土面積の約 38%を森林地帯が占めるが、過去 15 年間（1998 年～2012 年）で森林火災の発生件数は約 3,800 件、延焼森林面積は約 15.5 万 ha に及ぶと推計されている。特に 2007 年には大規模な森林火災が発生し、14 日間にわたり国家緊急事態宣言が発せられる事態であった。</p> <p>このような状況の中、マケドニア政府は、2005 年に「危機管理法（LCM）」を制定・施行し、森林火災を含むあらゆる国家的脅威の予防、早期警戒、及び関係機関の調整に基づく効果的な対処を目指す国家的な仕組みとして、「危機管理システム（CMS）」を定めた。CMS には、すべての中央省庁、議会、援護・救助部門、地方政府、国営企業、マケドニア赤十字、非政府組織（NGO）、メディア、一般市民等の幅広い関係者の参加が規定されている。</p> <p>この CMS の意思決定機関の実務を担う独立した行政機構として、同じく 2005 年に「危機管理センター（CMC）」が設立された。CMC の役割は、あらゆるリスク・脅威に係わる情報蓄積と分析を行い、関係各機関との連携・調整を図ることである。森林火災の予防・早期警戒を適切に行うには、森林火災に関する情報が CMC で一元管理され、その情報に基づく分析結果及び提言が CMC から CMS の意思決定機関に報告されることが必要である。また、大規模森林火災の勃発時には、迅速に CMS 傘下の関係機関や国民に指示が出され、調整のとれた対応が実施されることが想定される。</p> <p>しかし、CMC は、情報の収集・蓄積・分析の能力、更にそれらの情報を所有または利用する関係各機関の連携を図る調整能力の双方に課題がある。特に情報収集・蓄積の中核となるべき CMC の地理情報システム（GIS）について、地図情報を定期的に更新する体制が整っていない、ライセンス数の不足による入力可能量の制限、ユーザーである CMC 職員の GIS 利用に関する能力の不足など整備が必要な状況である。さらに、森林火災に関するさまざまな情報・データは複数の関係機関が個別に保有しており、CMC に情報が集まる体制が確立されていないという連携不足からくる情報の未整備も問題となっている。</p> <p>このような背景の下、2009 年 8 月にマケドニア政府から、CMC の森林火災の予防・早期警戒に係る能力向上を目的とした本技術プロジェクトの要請がなされた。独立行政法人国際協力機構（JICA）は 2010 年 7 月に詳細計画策定調査を実施し案件内容を協議した後、2011 年 1 月 27 日にマケドニア政府と R/D を締結し、2011 年 5 月 9 日より 3 年間の期間でプロジェクトを開始した。</p>	
1-2 協力内容	
(1) 上位目標	
森林火災の予防・早期警戒に対する社会全体の対応能力の向上により、大規模森林火災の発生が抑制される。	
(2) プロジェクト目標	
CMC の森林火災の予防・早期警戒について国内の関係者に情報を発信し、関係者間の調整を図る能力が強化される。	
(3) 成果	
1. 統合的 GIS を活用した森林火災についての国家的なリスクアセスメントの仕組みが構築される。	
2. 森林火災の予防・早期警戒に係る国内の関係者間で情報共有・連携を図るための調整メカニズムが強化される。	

(4) 投入	
日本側：投入総額 3 億円	
専門家派遣長期専門家 2 名 (72 人月)	機材供与 車両 1 台、PC 111 台 自動気象観測装置 (AWS) 15 台等
短期専門家 延べ 17 名 (25.17 人月)	ローカルコスト負担 現地業務費 41,629 千円
本邦研修受入 7 名、	
マケドニア側：	
カウンターパート (C/P) 配置 14 名	
執務環境の提供、ローカルコスト	
2. 評価調査団の概要	
調査者	総括： 五関 一博 JICA 地球環境部 技術審議役 森林監理：赤羽 元 林野庁 林政部木材産業課 課長補佐 協力企画：深澤 晋作 JICA 地球環境部 森林・自然環境第二課 評価分析：浅野 剛史 日本工営株式会社 環境技術部 副参事 マケドニア側評価者：Mr. Xheladin Llokmani Associate, Department for Bilateral and Multilateral Assistance, Secretariat for European Affairs
調査期間	2013 年 11 月 25 日～12 月 14 日
	評価種類：終了時評価
3. 評価結果の概要	
3-1 プロジェクトの実績	
(1) 投入の実績 (上記のとおり)	
(2) 成果の達成状況	
1) 成果 1	
成果 1 に設定された 6 つの指標のうち、3 つが達成され、2 つはほぼ達成され、1 つははまだ達成されていないと判断された。	
<ul style="list-style-type: none"> <li>マケドニア森林火災情報システム<sup>1</sup> (MKFFIS) (ver.1) は 2013 年 3 月に完成した。終了時評価の時点では MKFFIS (ver.2) は開発中であり、2013 年 12 月に完成予定であった (指標 1a：ほぼ達成)。</li> <li>MKFFIS (ver.1) を構築する際、必要な情報はマケドニア森林公社 (PEMF)、水文気象庁 (HM)、CMC 並びに欧州気象衛星開発機構 (EUMETSAT) と米国航空宇宙局 (NASA) のウェブ公開情報から入手された。収集されたすべての情報は MKFFIS (ver.1) のデータベースに格納されており、2013 年 3 月の完成以降は、決められた頻度でデータの更新が行われている (指標 1b：達成)。</li> <li>Hotspot map<sup>2</sup>、Vegetation dryness map<sup>3</sup>、FWI map<sup>4</sup>はマケドニア国全土をカバーし、Forest vegetation map は森林の 90% をカバーする形で、2013 年 3 月に作成された。消火機材配置図と、想定される森林被害額のレイヤーは、マケドニア国全土をカバーする形で作成される予定である (指標 1c：ほぼ達成)。</li> <li>MKFFIS (ver.1) の使い方と地図利用に関する研修は、CMC から 91 名、PEMF から 57 名、その他の関連機関から 28 名の合計 176 名の参加を得て実施された (指標 1d：達成)。</li> <li>MKFFIS (ver.1) のアクセス権限は、研修に参加した中から計 147 名の関係者に対し付与された。それ以降、森林火災の予防・早期警戒に必要な情報は、MKFFIS の利用を通じて彼らに提供されている。MKFFIS (ver.1) のリスク評価のツール群は、4 つの危機要素 (hazard, exposure, vulnerability, capacity &amp; measures) のすべてを含み、包括的かつ効果的なリスク分析が可能である (指標 1e：達成)。</li> <li>2013 年 12 月の終了時評価時点では、MKFFIS (ver.1) は 3 つの関係機関 [PEMF、保護・救助局 (DPR)、農業・森林・水経済省 (MAFWE)] 以外の機関や、広く一般へ公開していなかった。プロジェクトは MKFFIS (ver.2) により、広く一般への公開を開始する予定である (指標 1f：達成されていない)。</li> </ul>	
2) 成果 2	
成果 2 に設定された 3 つの指標のうち、1 つは達成途上であり、2 つははまだ達成されていないと	

<sup>1</sup> 森林火災の防止及び早期警戒のための統合地理情報システム

<sup>2</sup> 衛星データから周辺に比べて温度の高い地点を検出し、火災地点として表示した図

<sup>3</sup> 衛星画像から森林の乾燥程度を推定し、強度により色分けして示した図

<sup>4</sup> 湿度、気温、風速、降雨量等から火災が発生する危険性を推定し、強度により色分けして示した図

判断された。

- MAFWE の管轄する森林保護と森林管理計画に関連する法令の改訂案について議論された。その結果、MAFWE は 9 つの関連法令の改訂を準備している（指標 2a：達成途上）。
- 技術調整グループ（TCG）を技術レベルの正式な会議とするための手続きは、2014 年 4 月頃に開始する予定であった。正式化の根拠となり得る法令は複数あるが、具体的な正式化の手続きはいまだ定まっていなかった（指標 2b：達成されていない）。
- MKFFIS を活用した調整改善のための提案書については、その作成方法やスケジュールなどはいまだ定まっていなかった（指標 2c：達成されていない）。

### (3) プロジェクト目標の達成予測

プロジェクト目標に設定された 3 つの指標のうち、2 つはほぼ達成されており、1 つは達成途上だと判断された。すべての指標がプロジェクト終了までに達成されると予測された。

- プロジェクトが開発した MKFFIS と地理森林情報システム（GFIS）を、関係機関の業務のなかで正式に位置づけることを目的に、関連法令の改訂を議論するワークショップが 2 回開催された。ワークショップでの議論を基に、正式化に向けた手続きが MAFWE によって始まっている（プロジェクト目標 指標 1：達成途上）。
- Hotspot map、FWI map、Vegetation dryness map、Forest vegetation map、Forest fire history map は 2013 年 3 月に作成され、それ以降は定期的にアップデートされている（プロジェクト目標 指標 2：ほぼ達成）。
- 指標に定められた森林火災の予防・早期警戒のための関連情報は、2013 年 4 月から MKFFIS (ver.1) をとおして関係者へ提供されている（プロジェクト目標 指標 3：ほぼ達成）。

## 3-2 評価 5 項目による分析

評価 5 項目の観点からの価値判断は、A = 高い、B = 中程度、C = 低いの 3 段階で行った。

### (1) 妥当性

プロジェクトの妥当性は、主に以下の理由から「A」と判断された。

- 森林火災の予防と早期警戒のための効率的なシステムの導入は、マケドニア政府の「森林持続的開発戦略」（2006 年）の中のビジョンと合致している。
- プロジェクトは CMC 本庁で集中管理する森林火災の予防・早期警戒のためのデータベースと GIS の導入を目指すものであり、プロジェクト目標は C/P である CMC の期待とニーズに合致するものである。
- 日本の政府開発援助（ODA）中期政策（2005 年）では環境を重点分野としており、対マケドニア国別援助方針（2012 年）では、環境を重点分野と位置づけている。

### (2) 有効性

プロジェクトの有効性は、主に以下の分析結果から「B」と判断された。

- プロジェクト・デザイン・マトリックス（PDM）で設定された 2 つの成果は、1) 森林火災に関する情報を評価し、関係者間で共有するための統合 GIS の構築と 2) 関係機関の連携・調整機能を果たす組織機能の強化からなり、プロジェクト目標の達成に貢献するように計画されている。
- 2 つの成果の達成状況には差があるものの、マケドニア側と日本側の継続した努力を得られれば、プロジェクト終了までにプロジェクト目標が達成されると予測される。
- プロジェクトが導入した MKFFIS (ver.1) は、高度なウェブベースの GIS であり、多くの関係機関がインターネットを経由して直接アクセスし、森林火災リスクに関する情報を同時に受け取ることができる。それにより、関係機関の調整の質は飛躍的に向上することが期待できるため、森林火災を防ぐ実質的な手段だと考えられる。
- 2013 年の火災頻発時期において、システム上の問題から、情報提供の時間帯が限られていたり、関係者がシステムに不慣れであったため森林火災報告が入力されていなかったなどにより、システムへの信頼性が低く、危機管理センター地方支部（RCMC）の期待に十分に答えるものとなっていなかったことから、終了時評価の時点では、MKFFIS (ver.1) が現場の関係職員に十分に活用されているとは言い難いことが判明した。このような状況から現場レベルでの関係機関の調整が、プロジェクトにより強化されたとは判断できなかった。一方、プロジェクトではこれらの問題について改善を進めており、プロジェクト終了までには内容面での改善が見込まれている。

### (3) 効率性

プロジェクトの効率性は、主に以下の理由から「B」と判断された。

- プロジェクトでは、森林関連情報のデジタル化に極めて多くの人的、資金的資源を投入した。デジタル化された森林関連情報は、Forest vegetation map の作成に必要なものの、投入を最低限とすることが必要であった。
- 自動気象観測装置（AWS）への投入は、他の情報収集方法を検討したり、既存の気象情報の正確さを高めるなどの方法で最低限とし、プロジェクトの効率性を担保することが必要であった。
- プロジェクトの求める経歴、能力、経験を備えた日本人専門家が投入された。短期専門家は、MKFFIS の開発に大きな役割を果たした。
- 機材の投入は適切なタイミングで行われた。品種、スペック、数量などは、C/P と協議するとともに、事前に合意されたシステム・デザインに則って、適切なものが投入された。

### (4) インパクト

プロジェクト実施によるインパクトは、以下の理由から「A」と見込まれる。

終了時評価の時点では、上位目標の達成見込みを測るには時期尚早だと判断されたが、その一方、上位目標の達成につながると考えられる良い影響が確認できた。

- 森林火災の発生は、MKFFIS から提供される情報のみではなく、現場において実際に対策をとる関係職員によるところも大きい。さらに火災発生は毎年の気象条件にも左右されるため、本指標の達成見込みを測るには、プロジェクト終了後更に数年の経過を見てからの判断が妥当である（上位目標 指標 1）。
- MKFFIS (ver.1) は4つの危機要素（hazard、exposure、vulnerability、capacity & measures）のすべてを包括的に含み、8種類のリスク地図を提供するものである。MKFFIS を通じて CMC が提供する情報は、極めて充実したものであり、また更新頻度は迅速で十分なものと判断される。このように、森林火災リスクを評価するために必要十分な情報は MKFFIS (ver.1) の中で蓄積を続けており、CMC が継続してこれらの情報を蓄積していくことにより、大規模火災のリスクを分析する基礎情報となることが期待される。それにより将来にわたって、実際の大規模森林火災の減少に寄与すると考えられる（上位目標 指標 2）。
- MKFFIS は、森林火災リスク評価に必要な広範な情報を提供している。本システムは、森林火災の予防・早期警戒のための、より大きな国家レベルの枠組みへ発展することが期待される。
- 上位目標を達成するためには、関係機関の職員の協働による森林火災リスク分析を推し進めることや、関係機関のコーディネーション・メカニズムを強固にするための努力が更に必要である。
- MKFFIS は PEMF による持続可能な森林管理を可能とするものであり、それは森林火災のリスク低減の基礎となるものである。

### (5) 持続性

プロジェクト終了後の持続性の見通しは、主に以下の理由から「B」と見込まれる。

- 政策・制度・組織面：現行の森林火災の予防・早期警戒に関連する政策・制度は、プロジェクト終了後も継続すると考えられる。CMC 及び関連機関の業務で MKFFIS を正式に位置づけ、効果的に利用するためには、諸制度の改訂が必要だと考えられ、成果 2 での関係機関との協働により改訂案を作成することを確実に実施する必要がある。また TCG を通じて関係機関との連携・協力関係は強化されたが、プロジェクト終了後も引き続き技術的に MKFFIS の持続性を確保するためには TCG を正式な会議とするための手続きを明確にし、プロジェクト終了前に正式化する必要がある。
- 技術面：CMC 及び関係機関の職員は、MKFFIS の利用に関する高い技術レベルを既に有している。長期的に安定して MKFFIS を利用するためには、知識を継続的にアップデートすることが必要である。
- 体制面：CMC 本庁の関係職員は、今後も継続して関係ポストに就くことが見込まれており、また RCMC、マケドニア森林公社地方支部（RPEMF）、保護・救助局地方支部（RDPR）の現場レベルにおいても、関係職員は継続して業務に関わることが見込まれ、森林火災の予防・早期警戒に関する調整の持続性を高めることが期待される。最も重要だと考えられるのは、データ・サーバを管理する3つの機関（CMC、PEMF、HM）におけるシステム・アドミニストレーションのための人員配置である。
- 財政面：関係機関それぞれにおける情報管理は、MKFFIS から発信される情報の質とタイミング



に影響を与えるため、特にデータ・サーバを管理する機関（CMC、PEMF、HM）は、ソフトウェアのライセンス更新、故障の際の部品交換、予期せぬシステムエラーの修理などの予算を確保する必要がある。また 15 セット調達された AWS の維持管理コストについて、HM は確保する必要がある。プロジェクト実施に関連するほぼすべてのコスト（研修費、旅費・交通費等）は JICA 側予算にて支出されたが、プロジェクト終了後は、マケドニア国側により、活動を継続するためのコストが確保される必要がある。

### 3-3 効果発現に貢献した要因

特になし

### 3-4 効果発現を阻害した要因

特になし

### 3-5 結論

本プロジェクトは、森林火災リスクアセスメントに必要な情報を統合的に管理するシステム MKFFIS を提供し、その活用を柱とした危機管理体制の強化を目指し実施された。構築された MKFFIS は、さまざまな関係機関の持つ情報を一元的に共有・管理することにより、関係機関相互の連携を強化し、森林火災への対応能力の向上に大きな効果を持つと考察される。

MKFFIS の開発のための日本側投入が当初の想定より膨らんだことにより、効率性に懸念があるものの、本システムについては気象観測や持続的な森林管理への活用も可能であるなど間接的にも大きなインパクトがあることが確認され、マケドニア側からも高い評価を得ている。一方、プロジェクトの成果の持続的発現に向けては、プロジェクト終了後、マケドニア側において継続的な予算の確保、システム運用のための法的な枠組みの整備等が不可欠であり、一層の努力が求められる。

こうしたなか、今後プロジェクト終了時までには、システムの活用について、関係機関への能力強化及び周知徹底、研修などを通じた利用者への普及啓発などの活動を継続して行うことにより、プロジェクト目標は達成されると考えられる。

### 3-6 提言

#### (1) 社会への森林火災リスク情報の周知拡大

森林火災の最大要因である人為による失火を防ぐために、一般に公開される MKFFIS（ver.2）の活用により、森林火災のリスク情報を社会に周知し、森林火災に対する国民の理解を高めることは、森林火災の減少、ひいては上位目標である大規模火災の減少に寄与することから、今後の情報発信の強化を提言する。

#### (2) 地方関係機関への MKFFIS 活用のフォローアップ研修の実施

地方関係機関に対しては既に MKFFIS（ver.1）公開時に中央での集合研修を実施し、（ver.2）公開後も同様の研修が計画されているが、現状以上の活用に向けては十分ではないと判断される。このため、プロジェクトは引き続きプロモーションも兼ねて現地を訪問し、研修のフォローアップを実施することを提言する。

#### (3) MKFFIS 利用 ID の発給範囲の確定と発給促進

MKFFIS 利用のための ID については研修受講者とその受講者から研修を受けたスタッフへ発給するとされているが、更なる利用促進のため、早急に ID 付与が必要なスタッフの範囲を確定し、それらのスタッフへの研修及び ID の発給を速やかに実施することを提言する。

#### (4) MKFFIS 運用の持続性確保に向けての組織的枠組みの整備

プロジェクトで構築した MKFFIS を活用した体制の持続性を確保するため、さまざまな機関が行っている情報の入力、管理、提供、利用に関する相互的な義務や権利について明文化した取決めをプロジェクト終了までに作成すること、また、TCG を通じた関係機関の自立発展的な連携・協力を促すため、遅くともプロジェクト終了前には TCG の法的な位置づけが整理されるよう、ロードマップを明らかにし、作業を進めることを提言する。

#### (5) MKFFIS のリスク情報を活用するための緊急時の対応手順書の整備

MKFFIS の構築に伴い、緊急時に即時適切に対応するため、本部及び地方においてこれまでの緊急時の対応手順書等のルールを見直し、例えば Hotspot の発生時の対応などの項目を新たに含めるなど、CMC は MKFFIS からの情報に対応した手順書をプロジェクト終了を目途に、早急に整備することを提言する。

(6) 地方関係機関や地方自治体の連携強化

上位目標である「社会的能力の向上」につなげるためには、実際に現地に対応に当たる地方関係機関や地方自治体も巻き込んだ予防・早期警戒に向けた連携の促進が不可欠である。一方、MKFFIS の利用開始が遅れたこともあり、これまで地方における関係機関や地方自治体の連携強化に向けた活動は十分に行われていない。このため、プロジェクトは協力期間終了までに「提案書」(指標 2c) を作成するとともに、並行してモデルエリアで得られた知見をその他のエリアに広めるなど、効率的な地方関係機関や地方自治体の巻き込みの強化を行うことを提言する。

(7) プロジェクト終了後の予算確保

プロジェクト実施期間中はプロジェクト実施にかかるほぼすべての予算が JICA によって支出されているが、プロジェクト終了後、マケドニア側がプロジェクト成果の継続的な発現による上位目標の達成に必要な予算を確実に措置することを強く求める。特に、HM に供与された AWS や MKFFIS に関する情報技術 (IT) 機材の維持管理費及び MKFFIS の継続的な維持・活用に向けた定期的な研修などスタッフの能力強化に関する予算措置は不可欠である。

### 3-7 教訓

(1) プロジェクトスコープの範囲管理

MKFFIS の構築の過程で、当初想定されていなかった AWS や森林管理のための GIS (森林情報システム) がプロジェクト進捗に伴って、必要に応じて導入された。これにより、MKFFIS は非常に高い能力を有するものとなったが、そのための多大な投入によりプロジェクトの効率性において懸念の残る結果となった。

同様のシステム開発を伴うプロジェクトにおいては、効果を高めるために追加的な投入がプロジェクト途中で求められることが想定されるところ、資金的・人的投入の上限をあらかじめ関係者間で共有するとともに、システムのスコープを当初計画において明確に限定し、その上限内で計画を適切に管理することによりプロジェクト目標の達成に向けた投入量を効率的なものとするについて、関係者間で統一的な認識を共有することが必要である。また、その際には、構築されたシステムがプロジェクト終了後も先方政府の予算を含む能力の範囲内で維持されることも考慮することが求められる。

(2) 持続可能な森林管理の一環としての森林火災リスク管理

MKFFIS には、森林火災リスクアセスメントに必要な情報として、樹種、樹齢等の森林情報が取り込まれた。この結果 MKFFIS は、森林火災防止のみならず、PEMF による持続可能な森林管理にも活用することが可能となった。

これは本プロジェクトの範囲を超えたものではあるが、これにより、森林の健全性を高める持続可能な森林管理が行われることとなり、結果的に森林火災発生リスクを抑えることに結びつく。これを踏まえ、今後同様のプロジェクトを検討する際には、森林火災のリスク管理を持続可能な森林経営の一環として捉え、包括的なアプローチとして計画することが求められる。

(3) 地方自治体やマルチセクトラルな関係機関の巻き込み

本プロジェクトは、主に中央の関係機関を対象とした組織間の連携強化を目的として行われた。一方、実際に災害への「対策」にあたるのは、地方自治体や地方部におけるマルチセクトラルな関係機関であり、これらの果たす役割は大きい。

このため、その役割や責任範囲を検討した上で、地方自治体を含めた地方部におけるマルチセクトラルな関係機関を C/P または準 C/P に含めるべきである。

(4) 季節性を考慮したプロジェクト期間設定

本プロジェクトは 2011 年 5 月から 3 年間のプロジェクトであったことから、結果的にマケドニアの森林火災シーズンである夏期が来る前に終了することとなった。このため、完成した MKFFIS (ver. 2) をプロジェクト期間内の森林火災シーズンにおいて実際に運用できず、その成果を確認すること

ができなかった。

このことから、本来、本プロジェクトは最終的に完成したシステムがプロジェクト期間内の森林火災シーズンに適用されるよう期間を設定することが望ましかったと考えられる。プロジェクトの成果をより十分なものとするためにも、このように活動が季節的な影響を受けるプロジェクトについては、季節性を十分考慮した上で、開始時期を検討する必要がある。



## Terminal Evaluation Summary

1. Outline of the Project	
Country : Former Yugoslav Republic of Macedonia	Project title : Project on Development of Integrated System for Prevention and Early Warning of Forest Fires
Issue/Sector : Forest and Nature Conservation	Cooperation Scheme : Technical Cooperation
Division in charge : Forestry and Nature Conservation Division 2, Global Environment Department	Total cost (at the time of evaluation) : Approximately 294 million Yen
Period of Cooperation (R/D): 10, May 2011~9, May 2014	Partner Country's Implementing Organization : Crisis Management Center (CMC)
	Supporting Organization in Japan : Ministry of Agriculture, Forestry and Fisheries Institute of Industrial Science, the University of Tokyo
<p>1-1 Background of the project</p> <p>The rate of occurrence of forest fires is high in the whole Balkans region including the Former Yugoslav Republic of Macedonia (hereinafter, referred to as “Macedonia”), where damages caused them have become serious problems. In Macedonia where about 38 % of its territorial area is occupied with forest areas, it is estimated that about 3,800 cases of forest fire occurred and about 155 thousand ha of forest areas burnt by spread fires during the last 15 years (1998-2012). The large-scale forest fire occurred particularly in 2007, leading to a situation where the national emergency declaration was issued for 14 days.</p> <p>Under such circumstances, the Government of Macedonia formulated and enforced the “Law on Crisis Management (LCM)” in 2005, establishing the “Crisis Management System (CMS)” as a national mechanism intended for the prevention of all national threats including forest fires, early warning, and effective countermeasures based on the coordination with related agencies. The CMS provides for the participation of a wide range of stakeholders such as all of the central government ministries and agencies, assemblies the assistance and rescue sector, local governments, state-owned enterprises, the Macedonia Red Cross, non-governmental organizations (NGOs), media, and the general public.</p> <p>As an independent administrative organization responsible for practice services of the decision-making body of this CMS, the "Crisis Management Center (CMC)" was established in 2005 as well. The role of the CMC is to store and analyze information related to all risks and threats and to promote the cooperation and coordination with related agencies. In order to properly carry out the prevention and early warning of forest fires, it is necessary to manage information on forest fires centrally at the CMC, from which analysis results and recommendations based on such information should be reported to the decision-making body of CMS. In addition, the prompt issue of instructions to related agencies under the umbrella of CMS and the general public as well as the implementation of well-coordinated measures are assumed at the time of the outbreak of large-scale forest fires.</p> <p>However, the CMC faces challenges to its capability of collecting, storing, and analyzing information and furthermore its ability of coordination to promote the collaboration among related organizations that own or use such information. It is in the situation of requiring improvements against its flaws, including the state in which no system has yet been readily available to update cartographic information periodically especially with respect to the geographic information system (GIS) of the CMC to be the core of collecting and storing information, limitations on the feasible amount of inputs due to the shortage in the number of licenses, and the lack of the abilities of the CMC staff as users to use GIS. Moreover, the poor maintenance of information has also been a problem, arising from the lack of collaboration in the sense that various information and data related to forest fires are owned separately by multiple related organizations whereas a system has not yet been developed in which information is accumulated at the CMC.</p> <p>In this context, a request was made by the Government of Macedonia for this technical cooperation project aiming at building capacities of the CMC for the prevention and early warning of forest fires in August 2009. After conducting a detailed planning survey in July 2010 to discuss contents of the project, JICA concluded the R/D with the Government of Macedonia on January 27, 2011, and the project was initiated for the period of 3 years from May 9, 2011.</p> <p>1-2 Project Overview</p> <p>(1) Overall Goal</p> <p style="padding-left: 20px;">The occurrences of massive forest fire are reduced by strengthening the response capability of the entire society for prevention and early warning of forest fire.</p> <p>(2) Project Purpose</p>	

The capacity of CMC for transmitting information to domestic relevant institutions for prevention and early warning of forest fire and coordinating them is strengthened.

(3) Outputs

- 1) National system for forest fire risk assessment is developed with the use of integrated GIS.
- 2) National coordination mechanism of information sharing and cooperation among domestic relevant institutions for prevention and early warning of forest fire is reinforced.

(4) Inputs

Japanese side: The total amount of input: 300 million yen

- |                     |                                    |
|---------------------|------------------------------------|
| Dispatch of Experts | 2 long-term experts (72MM)         |
|                     | 17 short-term experts (25.17MM)    |
| Equipment           | 1 vehicle, 111 PCs, 15 AWSs, etc., |
| Training in Japan   | 7 participants                     |
| Local cost          | 41,629 thousand yen                |

Macedonian Side:

- |                  |              |
|------------------|--------------|
| Counterpart(C/P) | 14 people    |
| Facilities       | Office space |

2. Evaluation Team

Members of Evaluation Team	<p><b>Japanese side:</b>  <b>Japanese Team Leader:</b> Mr. Kazuhiro Goseki, Executive Technical Advisor to the Director General, Global Environmental Department, JICA  <b>Forest Management:</b> Mr. Gen Akahane, Deputy Director, Wood Industry Division, Forestry Agency, Ministry of Agriculture, Forestry and Fisheries  <b>Cooperation Planning:</b> Mr. Shinsaku Fukazawa, Advisor, Forestry and Nature Conservation Division 2, Global Environmental Department, JICA  <b>Analysis &amp; Evaluation:</b> Mr. Koji Asano, Senior Engineer, Environmental Science &amp; Engineering Department, Nippon Koei Co., LTD.</p> <p><b>Macedonian side:</b>  <b>Macedonian Team Leader:</b> Mr. Xheladin Llokmani, Associate, Department for Bilateral and Multilateral Assistance, Secretariat for European Affairs</p>
----------------------------	---

Period of Evaluation	25, Nov. 2013~14, Dec. 2013	Type of Evaluation : Terminal Evaluation
----------------------	-----------------------------	--

3. Result of Evaluation

3-1 Achievement of the Project

- (1) Results of Inputs (as described above)
- (2) Project Progress
  - 1) Output 1

Out of six indicators set for the output 1, three were “achieved”, two were “almost achieved”, and one was “not achieved yet”.

- MKFFIS (ver.1) was launched in March 2013. MKFFIS (ver.2) is currently under development, expected to be completed in December 2013. (Indicator 1a: almost achieved)
- Data/information required for MKFFIS (ver.1) were acquired from PEMF, HM, CMC and websites of EUMETSAT and NASA, initially stored in the database of MKFFIS (ver.1) in March 2013, subsequently, have been updated. (Indicator 1b: achieved)
- Hotspot map, Vegetation dryness map, FWI map, which were created in March 2013, cover the entire country, while vegetation map covers 90% of forests in Macedonia. Upcoming suppression resource table and expected damaged forest value are planned to cover the entire country. (Indicator 1c: almost achieved)
- Trainings regarding MKFFIS (ver.1) administration and use of maps were conducted with participation of 91 CMC officers, 57 PEMF officers and 28 officers from other institutions (a total of 176 participants). (Indicator 1d: achieved)
- A total of 147 key participants of the training were granted ID and password to access MKFFIS (ver.1). Since then, information has been provided to them. MKFFIS (ver.1) integrates four risk elements (hazard, exposure, vulnerability, and coping capacity) that enable to assess the risk of forest

fire comprehensively and effectively. (Indicator 1e: achieved)

- At the time of evaluation (December 2013), forest fire risk assessment tools have not yet been available for other institutions (other than PEMF, DPR and MAFWE) and the general public. However, those are planned to be available when MKFFIS (ver.2) will be released. (Indicator 1f: not achieved yet)

## 2) Output 2

Out of three indicators set for the output 2, one was “under progress” and two were “not achieved yet”.

- How rulebooks (ministerial ordinance) of MAFWE on forest protection and forest management planning should be modified was discussed. MAFWE plans to submit nine (9) modified rulebooks. (Indicator 2a: under progress)
- The process to formalize TCG to be a national level technical coordination meeting was planned to start in April 2014. Potential legislative justification already exists in several laws, however, actual procedures of formalization are yet to be defined. (Indicator 2b: not achieved yet)
- Methodology and procedures to elaborate recommendations for improvement of coordination using MKFFIS are yet to be defined. (Indicator 2c: not achieved yet)

## (3) Progress towards the Project Purpose

Out of three indicators set for the project purpose, two were “almost achieved” and one was “under progress”. All indicators are predicted to be achieved before the termination of the Project.

- In order to make MKFFIS and GFIS fit in the legislative framework of relevant institutions two workshops were held to draft modified rulebooks. MAFWE has started modification of their rulebooks in the existing government procedures. (Indicator Project Purpose 1: under progress)
- Hotspot map, FWI map, Vegetation dryness map, the Forest vegetation map and the Forest fire history map had created in March 2013, and since then, continuously updated. (Indicator Project Purpose 2: almost achieved)
- Information has been available to the domestic relevant institutions since April 2013 through MKFFIS (ver.1). (Indicator Project Purpose 3: almost achieved)

## 3-2 Review by the Five Criteria

Value judgment from the view points of the five evaluation criteria was rated as: A = High, B = Medium and C = Low.

### (1) Relevance

The relevance of the project was evaluated as “A” from the following reasons.

- In the Strategy for Sustainable Development of Forestry (2006), establishment of an efficient system for early warning and suppression of forest fires is a part of its vision.
- The project had newly introduced centrally managed database and GIS system to specifically work for prevention and early warning of forest fires. The project purpose meets CMC's organizational fundamental requirements.
- Japan's Medium-Term Policy of Official Development Assistance (2005) states environmental sector as one of the most important sectors. Japan's Country Assistance Policy for Macedonia (2012) states that environment issues as a priority area.

### (2) Effectiveness

The effectiveness of the project was evaluated as “B” from the following reasons.

- Two outputs set in the Project Design Matrix (PDM) consist of: 1) the building of integrated GIS to assess information on forest fires and share it among interested persons; and 2) the strengthening of organizational functions to achieve the functions of collaboration and coordination among related organizations, planned to contribute to the achievement of the project goal.
- Although their level of achievement of outputs varies at this moment, with continuous effort of people concerned, the project purpose is most likely to be achieved by the project end.
- MKFFIS (ver.1) introduced by the project is an advanced web-based GIS, enabling many related organizations to have direct access to it via the Internet to receive information relating to forest fire

risks at the same time. It is believed to be a substantial means to prevent forest fires, because it is expected to improve the quality of coordination by related organizations dramatically.

- It turned out that MKFFIS (ver.1) could not be said to be fully utilized by related staff in the field at the time of terminal evaluation because the reliance on the system was low and it was far from meeting expectations of Regional Crisis Management Centers (RCMCs) sufficiently, arising from the fact that: the time zone of providing information was limited due to the problems in the system during the period of frequent occurrence of forest fires in 2013; and reports on forest fires were not entered into the system as the concerned personnel were not familiar with it. It could not be determined from such a situation that the coordination among the related organizations at the field level was strengthened by the project. On the other hand, improvements are being made against these problems in the project, and activity contents are expected to be improved until the end of the project.

### (3) Efficiency

The efficiency of the project was evaluated as “B” from the following reasons.

- The project had invested a significantly large amount of financial and human resources to digitize forest related information. Although, digitized forest related information was required to create forest vegetation maps, the investment should have been more economized.
- Financial input for AWSs should have been more economized by considering the alternative data collections method and/or enhancing accuracy of existing data to ensure the efficiency of the project.
- Japanese experts with the relevant background, appropriate experiences, and sufficient technical level have been assigned. Short-term experts made a significant contribution to the development of MKFFIS.
- Equipment has been procured and delivered in appropriate timing. Items, specifications and quantity of the equipment have been determined in consultation with concerned C/P and on system design to be appropriate.

### (4) Impact

The impact of the project was evaluated as “A” from the following reasons.

The situation was too premature to assess the prospects of achieving the overall goal. However, there were many good signs for achieving the overall goal in the future.

- The actual reduction of forest fire depends not only on MKFFIS but also the reaction of concerned officers in the field. Besides, climate conditions may affect occurrence of forest fires. Therefore the prospect of achieving the overall goal cannot be judged at this moment. (Indicator Overall Goal 1)
- MKFFIS comprehensively consider four risk elements (hazard, exposure, vulnerability, and capacity and measures) by producing eight risk assessment maps. The data/information provided by CMC is considered to be remarkably adequate. MKFFIS updates eight risk assessment maps as soon as their data sources (data providers) are updated. The frequency of the update is considered to be particularly prompt and sufficient. Likewise, information necessary and sufficient for evaluating forest fire risks continues to be accumulated in MKFFIS (ver.1), which is expected to be the basic information to analyze risks of large-scale fires through the CMC’s continuous accumulation of such information. It is believed to contribute to the reduction of actual large-scale forest fires in the future (Indicator Overall Goal 2).
- MKFFIS provides a broad-range of data which are necessary in the forest fire risk assessment. The system will give an opportunity for a larger development of a national system for forest fire risk assessment.
- To achieve the overall goal, more efforts need to be made to ensure a joint approach in assessing forest fire risks to provide for a stronger coordination mechanism among relevant institutions.
- The MKFFIS enabled sustainable forest management by PEMF which is fundamental for mitigating forest fire risk.

### (5) Sustainability

The prospect of sustainability was evaluated as “B” from the following reasons.

- (Policies, legislations & institutional viewpoint) Current legislative framework and policy/strategy for



prevention and early warning of forest fires will continue after the termination of the project. In order to effectively utilize MKFFIS in the operation of CMC as well as concerned institutions officially, necessary modifications of the existing government procedures in collaboration with the relevant institutions envisaged under Output 2 need to be accomplished. In addition, collaborative/cooperative relationships with related organizations have been enhanced through the TCG; however, formalization procedures need to be defined, and actual formalization should be realized before the termination of the project in order to continue to secure the sustainability of MKFFIS technically after the end of the project.

- (Technical viewpoint) Staff members of CMC as well as other relevant institutions are already equipped with high-level technical capacity for utilizing MKFFIS. For long-term and stable system utilization, it is necessary to continuously update the knowledge.
- (Organizational viewpoint) Officers of CMC HQ are expected to be continuously assigned to the relevant posts. Also in regional level at RCMC, RPEMF and RDPR, human resources involved will continue to be the major drivers enabling sustainability of the coordination. The greatest challenge is to ensure proper staff assignment for administration of the systems in three institutions (CMC, PEMF and HM) where data servers are maintained.
- (Financing viewpoint) Data maintenance within key service providers gives influence on the quality and regularity of data from MKFFIS. Three institutions (CMC, PEMF and HM) which maintain data servers need to have financial resources to renew necessary software licenses, replace broken parts and corrective maintenance of unexpected system failure. The cost of the maintenance of fifteen (15) AWSs needs to be provided by HM. All the cost of the project implementation (training, trip, etc.) has been borne by JICA. After the termination of the project, cost for continuous activities should be secured by Macedonian side.

3-3 Factors that promoted realization of effects  
None specifically.

3-4 Factors that impeded realization of effects  
None specifically.

### 3-5 Conclusion

The project was implemented, aiming at to strengthen risk management by constructing and utilization of integrated information management system for, forest fire risk assessment. It was concluded that MKFFIS strengthened coordination among relevant institutions, and extraordinarily improved their capacity for prevention of forest fires by its function for integration and transmission of information of various institutions.

Additional huge impacts, such as utilization of the system for meteorological observation and sustainable forest management, were confirmed which are very much positively evaluated by Macedonian side, although it affected the efficiency of the project. However, more efforts are required to sustainably maintain the results of the project, such as securing necessary budget by Macedonian side after the termination of the project and modifying the existing government procedures to fit the system in legislative framework.

We conclude that the project purpose will be achieved, by continuously reinforcing the relevant institutions through extension services for and expanding utilization of the system and strengthening capacity of the users through providing trainings, until the termination of the project.

### 3-6 Recommendations

(1) Dissemination of forest fire risk information to the public.

The main reason for the forest fire is a human factor. By using MKFFIS (ver.2), information regarding forest fire should be widely disseminated to the public, which leads to actual reduction of massive forest fires as stated in the overall goal of the project. Within the framework of the project, the activities related to information dissemination should be further strengthened.

(2) Implementation of follow-up trainings for MKFFIS to regional relevant offices.

At the time of MKFFIS (ver.1) was released, group trainings were conducted in Skopje to relevant

organizations and their regional offices, and similar trainings are planned to be conducted when MKFFIS (ver.2) will be released. However, it is determined that there is still room further utilization of MKFFIS especially in regional relevant offices Japanese experts and CMC's project staff are expected to visit as much as possible to the field to promote use and to implement follow-up trainings for MKFFIS.

(3) Determination of target group/staff to issue MKFFIS ID and promotion of the issuance.

Issuance of access ID for MKFFIS was executed to the staff members of relevant institutions who participated in the training(s) conducted by the project. To further promote use of MKFFIS, determination of the target groups/staff that require MKFFIS access ID, and promotion of the issuance are needed.

(4) Development of institutional framework for the sustainable operation of MKFFIS.

In order to ensure the sustainability of the coordination with utilizing MKFFIS, before the end of the project, agreements/reciprocity terms that clarify the rights and obligations regarding data input, system administrations, information exchange and utilization should be made. In addition, to ensure sustainable collaboration and cooperation of concerned institutions through TCG, legislative/legal justification of TCG needs to be defined by the end of the project. It is recommended to clarify the road map for formalization of TCG immediately.

(5) Preparation of emergency procedures in response to risk information from MKFFIS.

In order to make prompt and adequate responses in emergencies along with the building of MKFFIS, it is recommended that the CMC immediately prepare procedures responding to information from MKFFIS by the end of the project, including the incorporation of new items such as responses in the event of hot spots, by reviewing rules such as conventional emergent response procedures at the headquarters and local offices.

(6) Strengthening of cooperation among local governments and regional offices.

In order to strengthen "social capacity" which is stated in the overall goal of the project, involving the local governments and regional offices of relevant institutions and promotion of cooperation among them for prevention and early warning of forest fire are necessary. However, activities related to strengthen cooperation in the field level have not been done sufficiently until now. Therefore, it is recommended that the project prepare "a proposal" (indicator 2c of PDM) before the end of the cooperation period and in parallel strengthen the efficient involvement of related local organizations and local government bodies, including the dissemination of findings obtained in model areas to other areas.

(7) Budget requirement after the termination of the project.

All the cost for project implementation has been borne by JICA during the project period. In order to sustain project results, and to achieve the overall goal in the future, necessary budget for continuous activities should be secured by Macedonian side after the termination of the project. In particular, budget for maintenance of AWSs which have been granted to HM, maintenance of IT equipment including MKFFIS and continuous training to sustain technical capacity of staff should be secured.

### 3-7 Lessons Learned

(1) Management of the range of the project scope.

In the development of functions of MKFFIS, AWS and GIS-base information system for forest management were introduced which were not originally planned. Thus, MKFFIS has equipped advanced functions, but remarkably large amount of its cost negatively affected the efficiency of the project. In similar projects, it is necessary to clearly predetermine financial and human resource constraints and define the scope of the system in the original plan to be appropriately managed by the stakeholders for economizing inputs to achieve the project purpose. In doing so, moreover, the maintenance of the established system within the capacity of the recipient government including its budget after the end of the project should also be considered.

(2) Forest fire risk management as a part of sustainable forest management.

Forest related data such as species, age etc. were captured to be a part of MKFFIS database for forest fire risk assessment. As a result, data of MKFFIS became to be utilized not only for forest fire prevention, but for

sustainable forest management by PEMF which is beyond the project scope. However, such sustainable forest management could enhance the health of the forest, and results in reducing the risk of forest fire. There forest fire management should be considers as a part of sustainable forest fire management. Such logistic approach should be taken in designing of similar projects.

(3) Involvement of local governments and multi-pectoral local offices.

The project was implemented for the purpose of strengthening the cooperation among mainly central offices of concerned institutions. However, local governments and multi-pectoral local offices have a vital role in actual prevention of forest fires. Therefore local governments and local offices of multi-pectoral related institutions should be involved as the project C/P or sub-C/P in accordance with their role and responsibility.

(4) Consideration of seasonality in project period.

Since the project launched in May, it needs to finish in May just before the forest fire season in Macedonia. Therefore the project failed to have an opportunity to practically use MKFIIS (ver.2) in the fire season before its termination. Therefore, it was considered desirable to set a period of this project so that a finalized system could be applied to forest fire seasons with the project period under ordinary circumstances. It is necessary to consider the timing of inauguration by sufficiently considering the seasonality for a project whose activities are susceptible to seasonal factors in order to make its outcomes more satisfactory.



# 第1章 終了時評価調査の概要

## 1-1 プロジェクトの背景と概要

近年マケドニア旧ユーゴスラビア共和国（以下、「マケドニア」と記す）を含むバルカン半島地域全体では、森林火災の発生率が高く、その被害が深刻な問題となっている。マケドニアにおいては、国土面積の約 38%を森林地帯が占めるが、過去 10 年間で森林火災の発生件数は約 2,400 件、延焼森林面積は約 9.6 万 ha（東京都面積の約半分）、被害総額は約 60 億円に及ぶと推計されている。特に 2007 年には大規模な森林火災が発生し、14 日間にわたり国家緊急事態宣言が発せられる事態であった。

このような状況のなか、マケドニア政府は、2005 年に「危機管理法（Law on Crisis Management : LCM）」を制定・施行し、森林火災を含むあらゆる国家的脅威の予防、早期警戒、及び関係機関の調整に基づく効果的な対処を目指す国家的な仕組みとして、「危機管理システム（Crisis Management System : CMS）」を定めた。CMS には、すべての中央省庁、議会、援護・救助部門、地方政府、国営企業、マケドニア赤十字、非政府組織（Non-Governmental Organization : NGO）、メディア、一般市民等の幅広い関係者の参加が規定されている。

この CMS の意思決定機関の実務を担う独立した行政機構として、同じく 2005 年に「危機管理センター（Crisis Management Centre : CMC）」が設立された。CMC の役割は、あらゆるリスク・脅威に係わる情報蓄積と分析を行い、関係各機関との連携・調整を図ることである。森林火災の予防・早期警戒を適切に行うには、森林火災に関する情報が CMC で一元管理され、その情報に基づく分析結果及び提言が CMC から CMS の意思決定機関に報告されることが必要である。また、大規模森林火災の勃発時には、迅速に CMS 傘下の関係機関や国民に指示が出され、調整のとれた対応が実施されることが想定される。

しかし、CMC は、情報の収集・蓄積・分析の能力、さらにそれらの情報を所有または利用する関係各機関の連携を図る調整能力の双方に課題がある。特に情報収集・蓄積の中核となるべき CMC の地理情報システム（Geographic Information System : GIS）について、地図情報を定期的に更新する体制が整っていない、ライセンス数の不足による入力可能量の制限、ユーザーである CMC 職員の GIS 利用に関する能力の不足など整備が必要な状況である。さらに、森林火災に関するさまざまな情報・データは複数の関係機関が個別に保有しており、CMC に情報が集まる体制が確立されていないという連携不足からくる情報の未整備も問題となっている。

このような背景の下、2009 年 8 月にマケドニア政府から、CMC の森林火災の予防・早期警戒に係る能力向上を目的とした本技術協力プロジェクトの要請がなされた。独立行政法人国際協力機構（Japan International Cooperation Agency : JICA）は 2010 年 7 月に詳細計画策定調査を実施し案件内容を協議した後、2011 年 1 月 27 日にマケドニア政府と R/D を締結し、2011 年 5 月より 2014 年 5 月までの 3 年間、協力を実施した。

## 1-2 終了時評価の目的

今回実施の終了時評価調査では、プロジェクト期間の終了前 6 カ月の段階において本プロジェクトの目標達成度や成果等を分析し、プロジェクト終了時の目標達成の見込みを明らかにするとともに、残り期間の課題及び今後の方向性について確認し、同結果を合同評価報告書として取りまとめ、その結果を双方関係機関に提出する。

### 1-3 調査団の構成

終了時評価は、日本側、マケドニア側双方からなる合同チームが実施する。評価チーム構成は以下のとおりである。

表1 調査団メンバー

役割	所属・役職	氏名
団長	JICA 地球環境部 技術審議役	五関 一博
協力企画	JICA 地球環境部 森林二課	深澤 晋作
森林管理	林野庁 林政部木材産業課 課長補佐	赤羽 元
評価・分析	日本工営株式会社 環境技術部 副参事	浅野 剛史
マケドニア側評価者	Secretariat for European Affairs	Xheladin Llokmani

### 1-4 調査日程

Date, Time		Mr. Goseki, Mr. Fukazawa, Mr. Akahane	Stay
Nov 24 Sun	12:50	Departure from Japan (Narita, TK0051, TK1005)	Skopje
	19:45	Arrive at Skopje	
Nov 25 Mon	9:00	Meeting with JET <sup>1</sup>	Skopje
	13:00	Interview at CMC (PM, <sup>2</sup> Mr. Stefanoski)	
	14:00	Interview at CMC (Mr. Karafirovski)	
	15:00	Interview at CMC (PM, Mr. Stefanoski)	
	16:00	Interview to JET	
	17:00	Security briefing at JICA Skopje Office	
Nov 26 Tue	9:00	Interview at CMC (Mr. Petrovski)	Skopje
	10:00	Interview at CMC (Mr. Kumanovski)	
	12:00	Visit to PEMF	
	14:00	Visit to HM	
Nov 27 Wed	10:00	Interview to JET	Skopje
Nov 28 Thu	9:00	Visit to MOEPP	Skopje
	10:00	Visit to RCMC Skopje	
	12:00	Visit to RPEMF Skopje	
	13:00	Interview to JICA Short-term Expert	
Nov 29 Fri	15:00	Interview to a specialist of IZZIS	Skopje
	9:00	Visit to PEMF (Protection Section)	
	11:00	Visit to PEMF (Planning Section)	
	12:00	Visit to UNDP <sup>3</sup>	
Nov 30 Sat	14:00	Visit to RDPR Skopje	Skopje
		Information collection & analysis, report writing	

<sup>1</sup> 日本側専門家チーム

<sup>2</sup> プロジェクト・マネージャー (Project Manager)

<sup>3</sup> 国連開発計画 (United Nations Development Programme)

1	Sun	Information collection & analysis, report writing		Skopje
2	Mon	10:00 Interview to a staff of MAFWE	13:00 Departure from Japan (Narita, LH715, LH1726)	Skopje
		14:00 Interview to JET	20:40 Arrive at Belgrade	
3	Tue	Interview to JET, information collection & analysis, report writing		Skopje
		Interview to JET, information collection & analysis, report writing	14:00 Departure from Belgrade (JU162) 14:55 Arrive at Skopje 17:30 Security briefing at JICA Skopje Office	Belgrade
4	Wed	8:30 Meeting with JET, internal meeting of the Japanese Evaluation Team		Skopje
		11:00 Courtesy visit to the Director of CMC (PD <sup>4</sup> of the Project)		
		12:00 Presentation about MKFFIS by CMC C/Ps, interview to CMC C/Ps (PM, Mr.Stefanoski and others)		
		14:00 Visit to MAFWE, interview with officers of MAFWE 16:00 Interview at CMC (Mr. Petrovski), visit to CMC's Situation Room		
5	Thu	7:45 (leave hotel, move to Kichevo)		Skopje
		10:20 Visit to RPEMF-Mk.Brod, interview with officers of the RPEMF		
		12:20 Visit to RCMC-Kichevo, interview with officers of the RCMC		
		13:15 Visit to RDPR-Kichevo, interview with officers of the RDPR		
		14:30 Site visit(Burnt area by forest fire, AWS) 19:30 (arrive at Skopje)		
6	Fri	Internal meeting of the terminal evaluation team, report writing		Skopje
7	Sat	Internal meeting of the terminal evaluation team, report writing		Skopje
8	Sun	Internal meeting of the terminal evaluation team, report writing		Skopje
9	Mon	Public holiday		Skopje
10	Tue	9:00 Internal Meeting of the Joint Evaluation Team		Skopje
		11:00 Meeting with C/P of CMC		
		14:00 Internal Meeting of the Joint Evaluation Team		
11	Wed	11:00 Meeting of the Joint Terminal Evaluation Meeting (sign the Joint Terminal Evaluation Report)		Skopje
		14:00 Steering Committee		
12	Thu	Internal meeting of the terminal evaluation team		Belgrade
		15:35 Departure from Skopje (JU163) 16:30 Arrive at Belgrade		
13	Fri			On board
		20:20 Departure from Belgrade (TK1084, TK0052)	13:10 Departure from Belgrade (LH1723, LH7202)	
14	Sat	Arrive at Japan		—

## 1-5 評価方法

### 1-5-1 評価の手順

本終了時評価調査は、経済協力開発機構（Organization for Economic Cooperation and Development : OECD）開発援助委員会（Development Assistance Committee : DAC）が1991年

<sup>4</sup> プロジェクト・ディレクター (Project Director)

に採択した「開発援助における評価原則」を踏まえて作成された、『新 JICA 事業評価ガイドライン第 1 版』（2010 年 6 月）に基づき実施された。評価対象であるプロジェクトの枠組みとして、2012 年 11 月 15 日に改訂・合意されたプロジェクト・デザイン・マトリックス (Project Design Matrix : PDM) 第 2 版を使用した。

本終了時評価調査の手順を図 1 に示す。JICA 事業評価ガイドラインに基づいて、まず必要な情報を収集、分析した上で、「実績 (投入、活動、成果、プロジェクト目標達成度)」「実施プロセス」「因果関係」を順に検証し、更に「評価 5 項目」の視点から価値判断を行う。最後にすべての調査結果を踏まえて提言・教訓を抽出する。

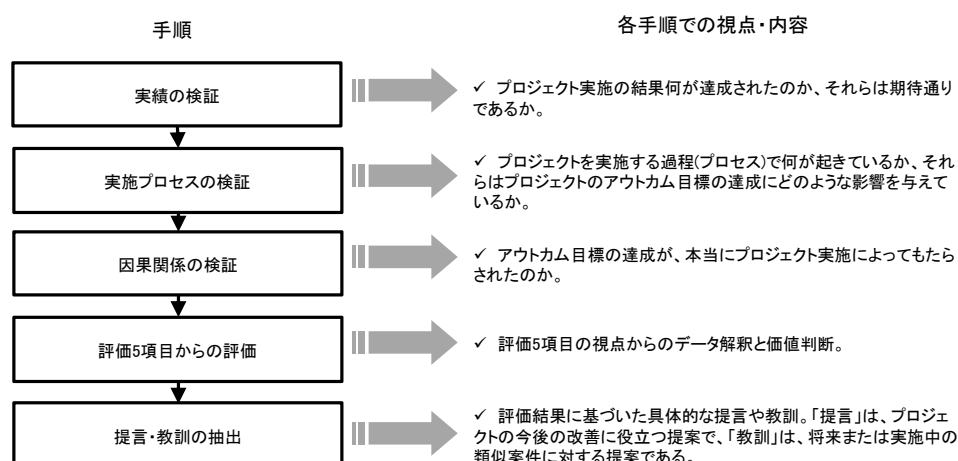


図 1 評価の手順

(新 JICA 事業評価ガイドライン第 1 版(2010)に基づいて調査団作成)

#### 1-5-2 情報の収集・分析方法

終了時評価調査に必要な情報は、それぞれ事前に調査項目を設定した上で、文献調査、質問票調査、聞き取り調査、現場視察などを通じて収集・整理された。文献調査では、プロジェクトの各種報告書や関連法制度など、さまざまな資料をレビューした。情報ソースとして日本人専門家からは、主に調査項目に基づいて事前に情報を収集し、それらを 3 種類のグリッド (2 種の達成度グリッドと 1 種の評価グリッド) [合同評価報告書 (英文) Annex 11、12、13] に整理した上で、調査団到着後に聞き取り調査を行い追加的な情報を収集・分析し、適宜グリッドに反映させた。またマケドニア側のカウンターパート (Counterpart : C/P) 機関と関係機関の職員からは、主に日本側調査団が作成した質問票を事前に配布し、それに対する回答を調査団の到着前に回収し、内容を分析した上で適宜グリッドに反映させた。回答が不明確であったり、未回答の質問、更に追加的に必要な情報については、調査団到着後に直接聞き取り調査を行った。

マケドニア側の質問票調査、聞き取り調査の対象としては、C/P 機関である CMC と、プロジェクト関係機関であるマケドニア森林公社 (Public Enterprise Macedonian Forests : PEMF)、水文気象局 (Hydro Meteorological Service : HM)、農業・森林・水経済省 (Ministry of Agriculture, Forestry and Water Economy : MAFWE)、保護・救助局 (Directorate for Protection and Rescue : DPR)、環境物理計画省 (Ministry of Environment and Physical Planning : MOEPP) の本省職員と、更に CMC、PEMF、DPR 各地方支部の現場関係者であった [合同評価報告書 (英文) Annex4 参照]。



現場視察は、プロジェクトが設定した2カ所のパイロット地域のうち1カ所を実際に訪問し、危機管理センター地方支部（Regional Crisis Management Center：RCMC）、PEMF 地方支部（Regional Public Enterprise Macedonian Forests：RPEMF）、保護・救助局地方支部（Regional Directorate for Protection and Rescue：RDPR）の関係へ聞き取りを行うとともに、プロジェクトが支援した施設や植林地などの現場状況を検分した。

文献調査、質問票調査、聞き取り調査、現場視察などを通じて収集された情報は、3種類のグリッドに整理された上で、「プロジェクト実績」「実施プロセス」「因果関係」を順に検証し、更に「評価5項目」の視点からの価値判断を行った。最後にすべての調査結果を踏まえて提言・教訓を抽出した。

### 1-5-3 評価5項目

「評価5項目」の視点からの判断基準は、以下の5項目である。

評価項目	評価内容
妥当性 (Relevance)	プロジェクトの目標が、受益者の要望、対象国のニーズ、地球規模の優先課題及び援助関係者とドナーの政策との整合性の度合い。
有効性 (Effectiveness)	プロジェクトの目標が実際に達成された、あるいはこれから達成されると見込まれる度合い。PDMの成果の達成がプロジェクトの目標の達成につながったかの因果関係を明確にして判断する。
効率性 (Efficiency)	投入に対する成果（定性並びに定量的）を計測する。投入のタイミング、規模、内容などを整理して、資源が効率的に利用されたかを判断する。
インパクト (Impact)	開発援助によって直接または間接的に、意図的であるか否かを問わず生じる、肯定的、否定的及び一次的、二次的な効果。
持続性 (Sustainability)	プロジェクトが終了しても、開発援助による便益が継続するか。政策・制度・組織面、財政面、技術面、人員面などの観点を用いて、現時点の持続性を見通しから判断する。

## 第2章 プロジェクトの実績

### 2-1 投入の実績

#### 2-1-1 日本側の投入

##### (1) 専門家派遣

2011年1月27日に、日本側とマケドニア側の政府代表者の間で、合意された討議議事録(Record of Discussions : R/D)に基づいて、長期専門家2名が派遣された(チーフアドバイザー/森林火災管理、業務調整/情報システム整備運用)。3年間のプロジェクト期間における長期専門家の総派遣年数は6年(計2,190人日、プロジェクト終了までの見込みを含む)であった。長期専門家の活動を補完するため、延べ14回(7名)の短期専門家が派遣された。3年間のプロジェクト期間における短期専門家の総派遣人月の実績は25.17人月であり計755人日であった。短期専門家の専門性と派遣時期・期間については、日本人専門家がC/Pと協議して要請が出された。各専門家の氏名や派遣期間などは、合同評価報告書(英文) Annex 5に示す。また、プロジェクトに関するさまざまなサポートのため、現地スタッフが1名雇用された。

##### (2) 本邦研修

プロジェクト期間中に、CMC及びPEMFから合計7名のC/Pが、本邦研修を受けるため日本へ派遣された。2012年の第1回派遣では、CMC本庁に勤務するプロジェクト・ディレクターとプロジェクト・マネジャーを含むマネジメント・レベルの職員が3名派遣されたが、2013年の第2回派遣では、CMC本庁とPEMF本庁に所属するオペレーション・レベル(IT担当官)が派遣された。各研修員の氏名、所属、派遣期間、コース名並びに主な訪問先を、合同評価報告書(英文) Annex 6に示す。

##### (3) 資機材供与

プロジェクト活動を円滑に実施するためJICAが調達した主な機材は、車両1台、PC111台<sup>5</sup>、自動気象観測装置(Automatic Weather Station : AWS)15台などである。供与されたすべての機材名と各数量を合同評価報告書(英文) Annex 7に示す。調達内容は、JICA専門家がCMC並びに関係各機関の職員と協議して決定した。システムを構成する機材(ハード、ソフト、その他)は、プログラム運営委員会(Steering Committee : SC)にて事前に合意されたシステム・デザインに沿って調達された。すべての機材はプロジェクト活動のために有効に活用されている事が確認された。

##### (4) プロジェクト予算(日本国側)

日本国側はプロジェクト活動の実施に必要なすべての経費を支出した。プロジェクト運営費、資機材購入費、ローカルスタッフの雇用費、旅費・交通費などを含んだ現地業務費の2011年から2013年(ただし2013年は9月末まで)の総額は、約41,629,000円(MKD 25,100,080)であった。プロジェクトの支出内容を、合同評価報告書(英文) Annex 8に示す。

<sup>5</sup> PCの内訳は、CMC本庁へ15台、関係機関の本庁へ計23台、CMCと関係機関の地方支部へ計73台であった。

## 2-1-2 マケドニア側の投入

### (1) C/P の配置

C/P として首都スコピエ市の CMC 本庁で働く職員とともに、現場である CMC 地方支部の職員が配置された。終了時評価までの過去 30 カ月間では、プロジェクト・ディレクターは交代したため計 2 名、プロジェクト・マネジャーが 1 名、また 7 名の本庁職員と 4 名の CMC 地方支部職員が配置された。プロジェクト専属の人員は配置されなかったため、各職員は必要に応じプロジェクト活動に参加した。C/P の氏名・所属、及びプロジェクト活動に携わった期間を、合同評価報告書（英文）Annex 9 に示す。

### (2) プロジェクト事務所及び資機材の提供

首都スコピエ市にある CMC 本庁に、プロジェクト事務所（広さ約 50 m<sup>2</sup>）が提供された。プロジェクト事務所の維持管理代（光熱費、水道、電話、インターネット、備品の部品交換等）は、CMC の負担であった。

## 2-2 成果の達成状況

PDM の各成果に対応したプロジェクト活動の主な実績は、2 種類の達成度グリッドを使用して整理された。合同評価報告書（英文）Annex10「Accomplishment Grid 1 (Accomplishment based on the indicators)」に、PDM の指標ごとのプロジェクト実績を整理した。また、各活動に対応した実績は、合同評価報告書（英文）Annex11「Accomplishment Grid 2 (Accomplishment based on the activities)」に整理した。以下に各指標に対応した主な活動実績を成果ごとに整理する。

### 2-2-1 成果 1

成果 1	指標
National system for forest fire risk assessment, using the integrated GIS, is developed.	1a. By February 2013, integrated GIS is developed based on the risk assessment methodology developed by the Project (i.e. integrated GIS ver.1); and is improved by December 2013 (i.e. integrated GIS ver.2).
	1b. From March 2013, all of the data required for forest fire risk assessment with pre-determined time/spatial resolution, provided by PEMF and HM, is received and stored in the integrated GIS.
	1c. By February 2013, four forest risk assessment tools (i.e. hot spot map and vegetation dryness map, covering all land of Macedonia, as well as forest vegetation map and fire history map, covering 90% of forests in Macedonia) are stored in the integrated GIS; and the other three (i.e. FWI map and suppression resource table, covering all land of Macedonia, as well as damaged forest value table, covering 90% of forests) are stored by December 2013.
	1d. By March 2013, at least X officers from HQ and regional CMC

---

and X officers from HQ and regional offices of the principal information user institutions (X from PEM, X from MAFWE, X from DPR) are trained in administration and/or utilization of the integrated GIS as well as interpretation of the first 4 forest fire risk assessment tools; and the other four tools by March 2014.

- 1e. By March 2013, information contained in the forest fire risk assessment tools of the integrated GIS is available to the principal information users through intranet for utilization in prevention and early warning according to the agreed access rights.
  - 1f. By April 2013, part of information contained in the forest fire risk assessment tools (ie.X, X, . . . ) of the integrated GIS is published at CMC's website for utilization by other relevant institutions.
- 

達成度：PDM で成果 1 に設定された上記 6 つの指標のうち、3 つが達成され、2 つはほぼ達成され、1 つはいまだ達成されていないと判断された。以下にその主な判断理由を挙げる。

- (1) 指標 1a：ほぼ達成と判断された。

マケドニア森林火災情報システム (Macedonian Forest Fire Information System : MKFFIS) (ver.1) は 2013 年 3 月に完成した。終了時評価の時点で MKFFIS (ver.2) の開発中であり、2013 年 12 月に完成予定である。MKFFIS (ver.2) によるシステム改良の主な内容は、①ユーザーインターフェースの改良、②新レイヤーの追加 (国立公園、森林被害額、CMC オペレーション地図等)、③新機能の追加 (消火機材配置図、人口情報、公開情報と内部情報の峻別、④GFIS (地理森林情報システム) への新機能の追加 (計画実績簿の作成、過去の計画の検索機能、林小班面積の自動計算機能)、⑤MKFFIS、GFIS の改良 (火災報告書を林小班入力から火災毎入力へ改良)、⑥MKFFIS、GFIS のスピードの向上、である。

- (2) 指標 1b：達成と判断された。

MKFFIS (ver.1) を構築するに際し、必要な情報は PEMF、HM、CMC 並びに欧州気象衛星開発機構 (European Organisation for the Exploitation of Meteorological Satellites : EUMETSAT) と米国航空宇宙局 (National Aeronautics and Space Administration : NASA) のウェブ公開情報から入手した。収集したすべての情報は MKFFIS (ver.1) のデータベースに格納しており、2013 年 3 月の完成以降は、決められた頻度でデータの更新が行われている。

- (3) 指標 1c：ほぼ達成と判断された。

Hotspot map、Vegetation dryness map、FWI map はマケドニア国全土をカバーし、Forest vegetation map は森林の 90% をカバーする形で、2013 年 3 月に作成された。終了時評価の時点で作成中の消火機材配置図と、想定される森林被害額のレイヤーは、マケドニア国全土をカバーする形で 2013 年 12 月に完成予定である。

- (4) 指標 1d：達成と判断された。

MKFFIS (ver.1) の使い方と地図利用 (Hotspot map、Vegetation dryness map、FWI map、Forest vegetation map、Forest fire history map) に関する研修は、CMC から 91 名、PEMF から 57 名、その他の関連機関から 28 名の合計 176 名の職員の参加を得て実施された。

(5) 指標 1e : 達成と判断された。

2013 年 3 月から 4 月にかけて実施された MKFFIS (ver.1) の使い方と地図利用に関する研修の参加者の中から、計 147 名の重要な関係者に対し MKFFIS (ver.1) のアクセス権限を付与し、ID とパスワードを支給した。147 名の内訳は、CMC 91 名、PEMF 31 名、DPR 23 名、MAFWE 2 名であった。それ以降、森林火災の予防・早期警戒に必要な情報は、MKFFIS の利用を通じて彼らに対し提供されている。MKFFIS (ver.1) のリスク評価のツール群は、4 つの危機要素 (hazard、exposure、vulnerability、capacity & measures) のすべてを含み、包括的なリスク分析が可能なものである。関係機関は MKFFIS (ver.1) から提供された情報を利用して森林火災のリスクを評価し、効果的な対策につなげることができる。

(6) 指標 1f : 達成されていないと判断された。

終了時評価時点では、MKFFIS (ver.1) は 3 つの関係機関 (PEMF、DPR、MAFWE) 以外の機関や、広く一般への公開をシステム開発の遅れから開始しておらず、したがって PDM 指標に示されるように森林火災の評価ツールは提供されていなかったと判断された。プロジェクトでは公開用のバージョンを現在開発中であり、プロジェクト終了までには MKFFIS (ver.2) により、広く一般への公開を開始する予定である。

## 2-2-2 成果 2

成果 2	指標
National coordination mechanism of information sharing and cooperation among domestic relevant institutions for prevention and early warning of forest fire is reinforced.	2a. By the Project end, the final draft(s) for necessary modifications of the existing government procedures is (are) submitted by the responsible organizations to the relevant authority/authorities for adoption.
	2b. By the Project end, a technical-level coordination meeting on prevention and early warning is formalized for the post-project period.
	2c. By the Project end, recommendations for improvement of coordination, using the integrated GIS, are made based on monitoring in some model areas within jurisdiction of selected RCMCs for action by CMC.

達成度 : PDM で成果 2 に設定された上記 3 つの PDM 指標のうち、1 つは達成途上であり、2 つははまだ達成されていないと判断された。以下にその主な判断理由を挙げる。

(1) 指標 2a : 達成途上だと判断された。

2013 年 10 月 29 日から 30 日と、2013 年 11 月 12 日から 13 日に実施されたワークショップでは、それぞれ MAFWE、PEMF、MOEPP、DPR、大学から計 15 名が参加し、MAFWE の管轄する森林保護と森林管理計画に関連する法令の改訂案について議論した。その結果、

MAFWE は9つの関連法令の改訂を想定しており、既に一部の改訂に向けて省内手続きを進めている。

(2) 指標 2b : 達成されていないと判断された。

技術調整グループ (Technical Coordination Group : TCG) をマケドニアの関連法令に基づいて、森林火災の予防・早期警戒に関する技術レベルの正式な会議とするための手続きは、プロジェクト終了直前の2014年4月頃に開始する予定であった。CMCによれば、正式化の根拠となりうる法令は、危機管理法や森林法など複数あるが、どの法令に基づいてどういった手続きで正式化するかなど、具体的な方針ははまだ定まっていなかった。

(3) 指標 2c : 達成されていないと判断された。

終了時評価時点では、PDM 指標に設定された MKFFIS を活用した調整改善のための提案書については、その作成方法やスケジュールなどはいまだ決まっていなかった。

### 2-3 プロジェクト目標の達成予測

プロジェクト目標	指標
The capacity of CMC for transmitting information to domestic relevant institutions for prevention and early warning of forest fire and coordinating them is strengthened.	<ol style="list-style-type: none"> <li>1. By the Project end, modifications in the existing government procedures, necessary to fit the integrated GIS, in legislative framework, are adopted by the relevant authorities.</li> <li>2. By the Project end, information contained in forest fire risk assessment tools of the integrated GIS at CMC is updated with pre-determined frequency for transmission to the relevant institutions.</li> <li>3. By the Project end, data/information from CMC based on the integrated GIS is utilized by the domestic relevant institutions for prevention and early warning of forest fire.</li> </ol>

達成度：プロジェクト目標に設定された3つのPDM指標のうち、2つはほぼ達成されており、1つは達成途上だと判断された。ただし、すべての指標がプロジェクト終了までに達成されると予測された。以下にその主な判断理由を挙げる。

(1) プロジェクト目標 指標 1 : 達成途上だと判断された。

プロジェクトが開発した MKFFIS と GFIS を、関係機関の業務のなかで正式に位置づけることを目的に、関連法令の改訂を議論するワークショップが、2013年10月29日から30日と、2013年11月12日から13日に開催された。ワークショップでの議論を基に、実際の改定案が作成され、既に正式化に向けた手続きがMAFWEにおいて始まっている。MAFWEへのインタビューによれば、2014年3月までの正式化を想定している。

(2) プロジェクト目標 指標 2 : ほぼ達成と判断された。

Hotspot map、FWI map、Vegetation dryness map、Forest vegetation map、Forest fire history map は2013年3月に作成され、それ以降はデータソースの更新に合わせて定期的にアップデートされている。更新頻度は1) SEVIRI Hotspot は15分ごと、2) MODIS Hotspot は6時間ごと、3) ファイヤー・ウェザー・インデックス (Fire Weather Index : FWI) map は毎日、4) Vegetation

dryness map は 8 日ごと、5)Forest vegetation map は毎年、6) Forest fire history は森林火災の発生都度である。

(3) プロジェクト目標 指標 3：ほぼ達成と判断された。

指標に定められた森林火災の予防・早期警戒のための関連情報は、2013 年 4 月から MKFFIS (ver.1) をとおして関係者へ提供されている。2013 年 7 月に CMC 本庁から各 RCMC に対して、MKFFIS (ver.1) を日常業務で利用するための指示が発令された。2013 年 7 月には、関係機関の職員やマスコミ関係者など 79 名が出席して、MKFFIS (ver.1) のお披露目のイベントが開催された。現段階では入力頻度や公開方法などにおいて MKFFIS (ver.1) の信頼性についての問題点が指摘されているが、プロジェクトの終了に向けた改善が進められており、プロジェクト終了時においてはほぼ達成されるものと判断する。

#### 2-4 上位目標の達成見込み

上位目標	指標
The occurrences of massive forest fire are reduced by strengthening the social capacity for prevention and early warning of forest fire.	<ol style="list-style-type: none"> <li>1. Data/information provided from CMC to institutions under the Crisis Management System will become more promptly and adequately.</li> <li>2. Rate of forest fire that reaches massive level will be reduced.</li> </ol>

達成度:終了時評価の段階では、上位目標の達成見込みを測るには時期尚早だと判断されたが、その一方、上位目標の達成に繋がる良い影響がいくつか確認できた。以下にその主な判断理由を挙げる。

(1) 上位目標 指標 1：

MKFFIS (ver.1) は 4 つの危機要素 (hazard、exposure、vulnerability、capacity & measures) のすべてを包括的に含んでおり、8 種類のリスク評価ツール (地図) を提供するものである。MKFFIS を通じて CMC が提供する情報は、森林火災の予防・早期警戒防止のために特化したものであり、極めて充実したものだと考えられる。また MKFFIS は 8 種類のリスク評価ツールを、それらのデータソースの更新頻度に合わせて自動更新しており、その頻度は極めて迅速であるといえる。

他方、森林火災リスクを評価するために必要十分な情報は MKFFIS (ver.1) のなかで蓄積を続けており、これは将来にわたって大規模火災のリスクを分析する基礎情報となることが期待される。それにより、実際の大規模森林火災の減少に間接的に寄与すると考えられる。

(2) 上位目標 指標 2：

上位目標では、大規模森林火災の発生件数が将来実際に減少することを想定している。森林火災の発生は、MKFFIS から提供される情報のみではなく、現場において情報を受け取り実際に対策をとる関係機関や地方自治体政府の職員によるところも大きい。さらに火災発生は毎年の気象条件にも左右されるため、MKFFIS 導入後に実際の火災減少を測るためには、少なくとも 5 年間のモニタリングが必要だと考えられる。評価団は、現段階では本指標の達成見込みを測るには時期尚早だと判断した。

## 2-5 実施プロセスの検証

プロジェクト活動は2012年11月に実施された中間レビューの時点で遅れを指摘されていたが、中間レビュー調査団の提言に従ってPDMと活動計画(Plan of Operations : PO)を改訂するとともに、短期専門家の投入を増やすなどの措置により、その後はおおむね計画どおりに進捗した。そのマネジメントは適切であったと判断される。以下に、実施プロセスに関連した特記事項を記述する。

- (1) 中間レビュー調査団は、PDM (ver.1) はプロジェクト管理ツールとして有効に機能していないと判断した。そのため調査団は関係者と議論を行い、PDMとPOの改定案を作成した。改定案は2012年11月15日の第4回SCにおいて承認され、その後正式に利用された。2013年11月には、PDM指標では“X”となっていた数値目標を定めたPDM (ver.3) が作成され、2013年12月11日に開催された第6回SCの場で承認された。
- (2) PDM、PO (ver.2) の正式化後に、プロジェクトの状況をかんがみてPOは2回改訂された。それにより計画は適切なものとなり、関係者にとってより明確なものとなった。改訂されたPOに沿って活動は予定通りに実施された。
- (3) プロジェクト期間を通じて、CMC関係者と日本人専門家は必要に応じて、日常的または定期的にコミュニケーションをとった。特にMKFFIS (ver.1) の開発中は、毎日午前中に会議の場を設け、委託先のシステム開発者や関係機関(PEMF、HM、MAFWE等)の職員を招き、テーマ別会議を開催した。
- (4) プロジェクト内部のコミュニケーションは、プロジェクト実施のために必要十分なものであった。CMC本庁とRCMCの職員に対する聞き取りと質問票調査の結果から、日本人専門家とのコミュニケーションは円滑で効率的であり、日本人専門家はC/Pとの信頼関係を築くことに成功し、プロジェクト内部の人間関係も良好であったと判断された。



## 第3章 評価5項目による分析

評価5項目の観点からの価値判断は、A= 高い、B= 中程度、C= 低いの3段階で行った。

### 3-1 妥当性

プロジェクトの妥当性は、以下のとおり、対象国の政策、政策実施機関のニーズ及び対象国へのわが国の援助方針にも合致したものであり、「A」と判断された。

- (1) プロジェクトはマケドニアの政策と合致している。プロジェクトの目指す森林火災の予防と早期警戒は、マケドニア政府の森林持続的開発戦略（2006年）の中のビジョンと合致しており、またマケドニア政府業務プログラム2011年～2015年（2011年）における戦略目標は、情報技術への投資である。
- (2) プロジェクト目標はC/PであるCMCの期待とニーズに合致するものである。プロジェクト実施以前は、CMCにはデータベースがなくGISはあまり利用していなかったが、プロジェクトは新たにCMC本庁で集中管理できる森林火災の予防・早期警戒のためのデータベースとGISを導入した。また本プロジェクトは、異なった機関や遠隔地に散らばる関係者が、森林火災の予防と早期警戒の情報を受け取ることを目指すもので、関係者の期待とニーズにも合致したものだと考えられる。
- (3) プロジェクトは、わが国の援助方針に合致したものである。日本の政府開発援助（Official Development Assistance : ODA）大綱では、地球温暖化をはじめとする環境問題は重点課題と位置づけられており、またODA中期政策（2005年）では、「地球温暖化対策」及び「自然環境保全」を重点分野としている。対マケドニア国別援助方針（2012年）では、「環境インフラ整備と管理能力向上」を重点分野と位置づけている。

### 3-2 有効性

プロジェクトの有効性は、以下の分析結果のとおり、現時点では統合GISの信頼性の問題点などが揚げられているものの、プロジェクト終了までにはシステムの改善、完成が見込まれ、またプロジェクト目標の達成に果たす同統合GISの有効性についても認められることから、「B」と判断された。

- (1) PDMで設定された2つの成果は、プロジェクト目標の達成に貢献するように計画されている。「2-2 成果の達成状況」で要約したとおり、2つの成果の達成状況には差があるものの、成果を達成するための努力が続けられており、マケドニア側と日本側の継続した努力を得られれば、プロジェクト終了までにプロジェクト目標が達成されると予測される。
- (2) プロジェクトが導入したMKFFIS (ver.1) は、高度なウェブベースのGISであり、多くの関係機関がインターネットを経由して直接アクセスし、森林火災リスクに関する情報を同時に受け取ることができる。それにより、関係機関の調整の質は飛躍的に向上することが期待できるため、森林火災を防ぐ実質的な手段だと考えられる。
- (3) しかしながら終了時評価の時点では、MKFFIS (ver.1) が現場の関係職員に十分に活用されているとは言い難く、運用期間の不足からも、その実効性は明確に見えていなかった。MKFFIS (ver.1) は2013年4月から供用されたが、質問票調査によれば、情報提供

の時間帯が限られていたり、関係者がシステムに不慣れであったため森林火災報告が入力されていなかったなど、現時点でのシステムへの信頼性が低く、RCMCの期待に応えるものとなっていないことが判明した。このような状況では、現場レベルでの関係機関の調整が、プロジェクトにより強化されたとは判断できなかった。一方、プロジェクトではこれらの問題について改善を進めており、プロジェクト終了までには内容面での改善が見込まれている。

### 3-3 効率性

〔注：投入と比較して成果が効率的に得られたかに関する詳細の分析は、合同評価報告書（英文）Annex10、11に記述した。〕

プロジェクトの効率性について、以下のとおり、それぞれの投入は成果を達成するために有効であったといえる。一方で、同等の成果はあげられないものの、必要不可欠な機能に絞ったシステムにすることにより効率化を行う余地もあったと判断し「B」と判断した。

- (1) プロジェクトでは、森林インベントリー情報のデジタル化とGISデータベースの導入に多くの人的、資金的資源を投入した。森林インベントリーのデジタル化は、Forest vegetation mapsの作成に必要ではあるものの、デジタル化の項目が極めて多かったため、項目を絞るなどの方法で投入を最低限とし、プロジェクトの効率性を高めることが必要であった。
- (2) プロジェクトでは多くの資金を投入し、AWSを15セット導入した。気象観測地点を増やすとともに、人為的なミスや怠慢を排除した正確な情報をタイムリーに収集できるなど、AWSのメリットは大きいものの、現在HM職員が直接観測している気象情報を集めたり、その正確さを高める努力をするなど、投入を抑えた活動も選択肢とし、一層のプロジェクトの効率性の追求の余地もあったと判断する。
- (3) プロジェクトの求める経歴、能力、経験を備えた日本人専門家が投入された。日本人専門家は与えられた役割に対するコミットメントを持ち精力的に活動した。短期専門家は、システム・デザイン、開発、テストからシステム改善まで、MKFFISの開発に大きな役割を果たした。
- (4) 機材の投入は適切な質・量・タイミングで行われた。品種、スペック、数量などは、日本人専門家がCMC並びに関係各機関と協議して決定した。システムを構成する機材（ハード、ソフト、その他）は、プロジェクトで事前に合意されたシステム・デザインに則って調達された。これは機材を適切かつ計画通りに投入することを可能とし、効率的に成果を得る事につながったと判断される。すべての日本国側の投入は、プロジェクト活動のために適切に利用されていた。

### 3-4 インパクト

以下のとおり、本プロジェクトの成果である統合GISシステムの構築は森林火災にかかる予防・早期警戒システムの能力強化にとどまらず、危機管理政策や、森林の健全性を高め、ひいては持続的な森林管理能力の向上にも寄与することが見込まれるなど、二次的な効果も期待され、プロジェクト実施によるインパクトは「A」と見込まれる。

- (1) 「2-4 上位目標の達成見込み」で示したように、終了時評価の時点では、上位目標の達成見込みを測るには時期尚早だと判断されたが、その一方、上位目標の達成につながるであろう良い影響がいくつか確認できた。

- (2) MKFFIS (ver.1) は、植生の種類、植生の乾燥度、火災の影響を受けやすい地域、インフラストラクチャーや森林火災リスク評価に必要な他の要素など、極めて広範な情報を提供している。また、森林火災にとどまらず、地滑り等、ほかの自然災害についても活用できる拡張性を有しており、本システムは、森林火災の予防・早期警戒にとどまらず、より大きな災害対策に関する枠組みへ発展することが期待される。
- (3) 上位目標を達成するためには、関係機関の職員の協働による森林火災リスク分析を推し進めることや、関係機関のコーディネーション・メカニズムを強固にするための努力が更に必要である。これらが達成されれば、森林火災のリスクを軽減するための関係機関すべての迅速なアクションへとつながることが見込まれる。
- (4) 森林火災の主要な原因は人為によるものであり、その予防のためには、原因の対策にも投入が割り振られるべきである。例えば森林火災を防ぐための地域住民に対する意識啓発は極めて大切であり、そのためにもプロジェクト終了までに地方関係機関との連携強化とMKFFIS (ver.2) による一般への森林火災情報の提供を確実に進めることは重要である。
- (5) プロジェクトは森林インベントリー情報をデジタル化するとともに、GIS データベースを構築した。プロジェクト以前のPEMFでは主に紙ベースで情報を管理していたが、プロジェクトにより森林インベントリー情報や森林境界など、関連情報を集中的に管理し、更に継続的にアップデートできる環境を得た。これはPEMFによる持続可能な森林管理に大きく貢献するものであり、それは森林火災のリスク低減へもつながるものである。

### 3-5 持続性

プロジェクト終了後の持続性の見通しは、本プロジェクトで開発中のシステムを導入することに向けた制度、政策づくりに関する取り組みは、取り組み中ながら、プロジェクト期間中の改定が見込まれ、人材、技術などの面については、プロジェクト終了後も引き続き、MKFFISを維持管理していけるだけの能力を有していると判断される。一方で本プロジェクト期間中の先方政府からのプロジェクト予算はほぼCPと事務スペースの提供にとどまり、プロジェクト終了後の予算確保が現時点では明確になっていないことから、総合的に判断し「B」と見込まれる。

#### 3-5-1 政策・制度・組織面

- (1) 現行の、森林火災の予防・早期警戒に関連する政策・制度は、プロジェクト終了後も継続すると考えられる。
- (2) CMC及び関連機関の業務でMKFFISを正式に位置づけ、効果的に利用するためには、諸制度の改訂が必要だと考えられる。プロジェクトの成果2では、関係機関との協働により現行の諸制度の改訂案を作成することが予定されており、これは制度・組織面の持続性を高めることに繋がると考えられる。
- (3) プロジェクト活動は、TCGを通じたメンバー機関との連携・協力により実施されてきた。プロジェクトにより強化されたこの連携・協力関係は、プロジェクト終了後も続くことが期待される。プロジェクトの成果2では、TCGをマケドニア国の関連法令に基づいて、森林火災の予防・早期警戒に関する正式な会議とする手続きが予定されている。この手続きはプロジェクト終了までに行い、制度・組織面の持続性を高めることが期待される。

- (4) CMC 及び関係機関の職員は、MKFFIS の利用に関する高い技術レベルを既に有しており、彼らはプロジェクト終了後も継続して関係業務に就くことが期待できる。ただし長期的に MKFFIS を安定して利用するためには、知識を継続的にアップデートすることが必要である。

### 3-5-2 体制面

- (1) CMC のプロジェクト関係職員はすべて正規職員であり、今後も雇用が保証されている。また CMC 本庁の関係職員は、今後も継続して関係ポストに就くことが見込まれており、彼らがプロジェクトを通じて得た知識や技能を使って業務を継続的に実施し、更に将来システムの持続性を高めることが期待される。また RCMC、RPEMF、RDPR の現場レベルにおいても、プロジェクト関係職員は継続して業務に関わることが見込まれ、森林火災の予防・早期警戒に関する調整の持続性を高めることが期待される。
- (2) 人員面の持続性を考慮する際に最も重要だと考えられるのは、データ・サーバを管理する 3 つの機関 (CMC、PEMF、HM) におけるシステム・アドミニストレーションのための人員配置である。継続的にシステムの機能を担保するため、各機関は技術面とアドミニストレーション面の両方を考慮して正式に人員を任命することが求められる。

### 3-5-3 財政面

- (1) 関係機関それぞれにおける情報管理は、MKFFIS から発信される情報の質とタイミングに影響を与える。特に MKFFIS の機能の一部として別々の役割を持つデータ・サーバを管理する機関 (CMC、PEMF、HM) は、ソフトウェアのライセンス更新、故障の際の部品交換、予期せぬシステムエラーの修理など、データ・サーバを維持するための予算を確保する必要がある。
- (2) JICA が調達した機材の所有権の譲渡を定め、2012 年 5 月と 2013 年 5 月に CMC と関係機関 (PEMF、HM、DPR、MAFWE) との間でそれぞれ交わされた覚書 (Memorandum of Understandings : MOU) によれば、各機関は機材メーカーの定めた使用方法に従って機材を維持管理することが合意されている。関係各機関は、機材の保証期間を終えた後も、維持管理に必要な予算を確保することが求められる。
- (3) 気象情報を収集するため JICA が調達・譲渡した AWS 15 セットの維持管理コストについて、HM によれば 2014 年度予算で請求したとのことであるが、予算が確保される確かな見通しはいまだない。HM は AWS の維持管理並びに情報管理のための予算を確保することが求められる。
- (4) プロジェクト実施に関連するすべてのコスト (資機材購入費、研修費、旅費・交通費等) はプロジェクト期間を通じて JICA 側が負担した。プロジェクト終了後は、マケドニア側により、活動を継続するために必要なコストが確保される必要がある。

## 第4章 合同評価の結論・提言・教訓

### 4-1 結論

本プロジェクトは、森林火災リスクアセスメントに必要な衛星画像データ、AWS から得られる気象情報や MAFWE の持つ森林簿からの森林情報を統合的に管理するためのツールとして地理情報システム MKFFIS を提供すること、及び中央政府、地方政府を含む多くの関連機関の間で森林火災の予防・早期警戒に必要な情報をオンタイムで共有することができる仕組みを整え、またそのツールを適切に活用できるようマケドニアの森林火災危機管理に対する体制、中でもその中心となる CMC の調整・連携能力を強化し、もって大規模森林火災の発生を抑制することを目的に実施された。構築された MKFFIS の機能は、さまざまな関係機関の持つ情報を一元的に共有・管理することにより、関係機関相互の連携を強化し、森林火災への対応能力の向上に大きな効果を持つものと考察される。

効率性の面に影響が出たものの、本システムについては気象観測や持続的な森林管理への活用も可能であるなど間接的にも大きなインパクトがあることが確認され、マケドニア側からも高い評価を得ている。

一方、プロジェクトの成果を持続的に発現させるためには、プロジェクト終了後におけるマケドニア側の継続的な予算の確保、システム運用のための法的な枠組みの整備等が不可欠であり、一層の努力が求められる。今後プロジェクト終了時まで、システムの活用について、関係機関への能力強化及び周知徹底、研修などを通じた利用者への普及啓発といった活動を継続することにより、プロジェクト目標は達成されると考えられる。

### 4-2 提言

#### (1) 社会への森林火災リスク情報の周知拡大

森林火災の原因の大半を占めるとされる人為による失火を避けるために、一般に公開される MKFFIS ver.2 を活用し、森林火災のリスク情報を社会に周知し、森林火災に対する国民の理解を高めることは、森林火災の減少、ひいては上位目標である大規模火災の減少に寄与することから、今後の情報発信への注力を提言する。

#### (2) 地方関係機関への MKFFIS 活用のフォローアップ研修の実施

地方関係機関に対してはすでに MKFFIS ver.1 公開時に中央での集合研修を実施し、ver.2 公開後も同様の研修が計画されているが、現状以上の活用に向けては十分ではないと判断される。このため、プロジェクトは引き続きプロモーションもかねて現地を訪問し、研修のフォローアップを実施することを提言する。

#### (3) MKFFIS 利用 ID の発給範囲の確定と発給促進

MKFFIS 利用のための ID については研修受講者とその受講者から研修を受けたスタッフへ発給するとされているが、更なる利用促進のため、早急に ID 付与が必要なスタッフの範囲を確定し、速やかにそれらのスタッフへの研修及び ID の発給を実施することを提言する。

#### (4) MKFFIS 運用の持続性確保に向けての組織的枠組みの整備

プロジェクトで構築した MKFFIS を活用した体制の持続性を確保するため、さまざまな機関が行っている情報の入力、管理、提供、利用に関する相互的な義務や権利について明文化した取決めをプロジェクト終了までに作成すること、また、TCG を通じた関係機関の自立発展的な連携・協力を促すため、遅くともプロジェクト終了前には TCG の法的な位置づけが整理されるよう、ロードマップを明らかにし、作業を進めることを提言する。

#### (5) MKFFIS のリスク情報を活用するための緊急時の対応手順書の整備

MKFFIS の構築に伴い、緊急時に即時適切に対応するため、本部及び地方においてこれまでの緊急時の対応手順書等のルールを見直し、例えば Hotspot の発生時の対応などの項目を新たに含めるなど、CMC は MKFFIS からの情報に対応した手順書をプロジェクト終了を目途に、早急に整備することを提言する。

#### (6) 地方関係機関や地方政府の連携強化

上位目標である Social Capacity の強化につなげるためには、実際に現地で対応に当たる地方関係機関や地方政府も巻き込んだ予防・早期警戒に向けた連携の促進が不可欠である。一方、MKFFIS の利用開始が遅れたこともあり、これまで地方における関係機関や地方政府の連携強化に向けた活動は十分に行われていない。このため、プロジェクト終了までに作成する提案書（指標 2c）に基づき、モデルエリアで得られた知見をその他のエリアに広めるなど、効率的な地方関係機関や地方政府の巻き込みの強化を提言する。

#### (7) プロジェクト終了後の予算確保

プロジェクト実施期間中においては JICA が予算を負担しているが、プロジェクト終了後において、プロジェクト成果の継続的な発現及びそれによる上位目標の達成に必要な予算を確実に措置することを強く要望する。特に、HM に供与された AWS や MKFFIS に関する情報技術（Information Technology : IT）機材の維持管理費と共に、MKFFIS の継続的な維持・活用に向けた、定期的な研修などスタッフの能力強化に関する予算が措置されるべきである。

### 4-3 教訓

#### (1) プロジェクトスコープの範囲管理

MKFFIS の構築の過程で、当初想定されていなかった AWS や森林管理のための GIS（森林情報システム）がプロジェクト進捗に伴って、必要に応じて導入された。これにより、MKFFIS は非常に高い能力を有するものとなったが、そのための多大な投入によりプロジェクトの効率性において懸念の残る結果となった。

同様のシステム開発を伴うプロジェクトにおいては、効果を高めるために追加的な投入がプロジェクト途中で求められることが想定されるところ、資金的・人的投入の上限をあらかじめ関係者間で共有するとともに、システムのスコープを当初計画において明確に限定し、その上限内で計画を適切に管理することによりプロジェクト目標の達成に向けた投入量を効率的なものとするについて、関係者間で統一的な認識を共有することが必要である。また、その際には、構築されたシステムがプロジェクト終了後も先方政府の予算を含む能力の範囲内で維持されることも考慮することが求められる。

## (2) 持続可能な森林管理の一環としての森林火災リスク管理

MKFFIS には、森林火災リスクアセスメントのために、樹種、樹齢等の森林情報が取り込まれた。この結果 MKFFIS は、山火事防止のみならず、PEMF による持続可能な森林管理にも活用することができることとなった。

これはプロジェクトの範囲を超えたものではあるが、これにより、森林の健全性を高めるような持続可能な森林管理が行われれば結果的に森林火災発生リスクを抑えることに結びつく。これを踏まえ、今後同様のプロジェクトを検討する際には、森林火災のリスク管理を持続可能な森林経営の一環として考え、包括的なアプローチをとることが求められる。

## (3) 地方自治体やマルチセクトラルな関係機関の巻き込み

本プロジェクトは、主に中央の関係機関を対象とした組織間の連携強化を目的として行われた。一方、実際に災害への“対策”にあたるのは、地方自治体や地方部におけるマルチセクトラルな関係機関であり、これらの果たす役割は大きい。

このため、その役割や責任範囲を検討したうえでこれらの地方政府やマルチセクトラルな関係機関を C/P または準 CP に含めるべきである。

## (4) 季節性を考慮したプロジェクト期間設定

本プロジェクトにおいては活動開始が5月からとなっていたことから、マケドニアにおける森林火災の発生時期にあたる夏期の前に終了することとなり、完成した MKFFIS (ver.2) をプロジェクト期間中に実際に森林火災シーズンに運用することができなかった。

このことから、本来、本プロジェクトは最終的に完成したシステムがプロジェクト期間内の森林火災シーズンに適用されるよう期間を設定することが望ましかったと考えられる。プロジェクトの成果をより十分なものとするためにも、このように活動が季節的な影響を受けるプロジェクトについては、季節性を十分考慮した上で、開始時期を検討する必要がある。

## 第5章 所感

### 5-1 総括コメント

2013年12月2日から14日の日程で、マケドニア国「森林火災危機管理能力向上プロジェクト」の終了時評価を実施した。

評価結果については、マケドニア側評価チームと合意し署名した合同評価報告書（以下「報告書」）のとおりであるが、森林火災についての国家的なリスクアセスメントのシステムの中核をなす統合 GIS（MKFFIS）を開発するなど、目覚ましい成果をあげており、これは日本側・マケドニア側双方のプロジェクト関係者、特に、プロジェクト開始以来長期間にわたって現地でマケドニア側を指導してきた長期専門家の労を多とするものである。

他方、終了時評価の時点では、MKFFIS の改良版（ver.2）の運用の開始、及びこれを活用した関係者間での情報共有・連携の強化が実施の途上であり、2014年5月のプロジェクト終了時までにはプロジェクト目標を達成すべく、引き続き双方の関係者の更なる努力によって、合同調査評価調査団の提言の実現を期待するものである。

以下、特に気づいた点につき、本評価調査の対処方針及び留意事項に沿って所感を記載する。

#### (1) プロジェクト期間延長及びフォローアップの要否

報告書のとおり、合同評価調査団の提言を実施することにより、プロジェクト目標の達成は可能と見込まれ、プロジェクト期間の延長・追加投入やフォローアップ協力は不要であり、マケドニア側からも要望はされていない。

他方、プロジェクト終了後の第三国研修については、終了時評価調査団に対して、国内の関係者の能力の強化も含め、マケドニア側より改めて強く要望され、また JICA バルカン事務所でも必要性が高いことを認識しているところである。

マケドニアの欧州連合（European Union：EU）加盟については、ギリシャとの二国間問題等のために大きな進展はみられていないが、他方、マケドニアは既に欧州森林火災情報システム（European Forest Fire Information System：EFFIS）へ森林火災報告を MAKFFIS を活用して提出している。また、条約交渉が最終段階に差し掛かり、2014年中にも合意が見込まれる欧州森林条約の交渉参加国であることから、周辺諸国との森林火災防止の面での相互協力・交流は一層重要となると考えられ、当該第三国研修の実施は大きな意義があると考えられる。

なお、同第三国研修の実施に当たっては、MKFFIS と同様のシステムを周辺諸国に導入するのでは効率性に問題があること、マケドニアの国内関係者の能力の強化も引き続き必要であることに配慮し、周辺諸国に導入可能な簡易なシステムを開発し、その過程でマケドニア側の能力強化も図ることを考慮すべきである。

#### (2) プロジェクト終了後、上位目標達成への道筋についての確認

上位目標の、「社会的能力の向上」については、マケドニア側は、住民参加の推進や、持続可能な森林管理による山火事に強い森林づくりを図る考えであり、それによって「大規模森林火災の発生が抑制」されるとしている。

したがって、報告書の提言の通り、社会への森林火災リスク情報の周知拡大、地方関係機関や地方政府の連携強化等、更なる努力が必要である。



(3) 国家森林火災危機管理体制における統合 GIS システムの活用の確認

MKFFIS (ver. 1) は 2013 年 4 月より運用が開始されたが、予防・早期警戒機能の活用については、ホット・スポットの発令継続時間が短かった等一部機能の改善が必要であったことや、地方の関係者が森林火災発生情報の入力に不慣れであったことなどから、2013 年夏期の森林火災発生シーズンにおいては、必ずしも十分には活用されてはいなかった。

他方、システムを改善した MKFFIS (ver. 2) の運用開始が 2014 年 1 月中に予定されていることから、報告書の提言の通り、プロジェクト期間内において、地方関係機関への MKFFIS 活用フォローアップ研修の実施、MKFFIS 活用 ID の発給範囲の確定と発給促進等の対応が必要である。

(4) 成果 2 に係る目標達成の確認

上記のとおり、MKFFIS (ver. 1) は運用開始後まだ十分には活用されておらず、MKFFIS (ver. 2) も終了時評価の時点では未完成である。このため、成果②「森林火災の予防・早期警戒に係る国内の関係者間で情報共有・連携を図る (CMC の) 国家的な調整の仕組みが強化される」に係る体制強化の進捗は依然限定的である。

このため、終了時までには成果②を達成するために、報告書の提言の通り、MKFFIS 運用の持続性確保に向けての組織的枠組みの整備、MKFFIS のリスク情報の活用のための緊急時の対応手順書の整備等の対応が必要である。

(5) 統合 GIS の拡大に伴う、プロジェクト進捗の遅れに対する対応

中間評価の指摘を踏まえた短期専門家の追加配置により、上記のとおり MAKFFIS (ver.1) は 2013 年 4 月より運用が開始され、その改良版の MKFFIS (ver.2) も 12 月中に開発が完了し 2013 年 1 月に運用が開始される見込みとなっており、進捗の遅れは一定程度改善されている。しかしながら、成果②にかかる活動については、CMC におけるオペレーション部門との連携の強化については改善が著しいが、地方関係機関との情報共有・連携についてはなお進捗の途上であり、報告書の提言のとおり、プロジェクト終了時までには一層の活動の促進が必要である。

なお、統合 GIS システムの拡大 (AWS の導入や PEMF での持続可能な森林管理に活用できるシステムとなったこと) については、当評価団としては、プロジェクトの実施の過程で、成果を生み出すために追加的に行わざるを得なかったものであると理解しているが、マケドニア側 C/P は、当初から拡大された統合 GIS が必要であると認識していたとしており、本評価を通じて、その認識の溝を埋めることはできなかった。

(6) プロジェクト終了後の持続性確保のための提言

中間評価で提言された、①システムメンテナンス費用に加え、利用スタッフの研修費用の確保に関しては、フリーの GIS ソフトの利用等の工夫がされ、また現時点では保証期間内中の機器も多いことから、マケドニア側の予算確保はなされていない。他方、同じく提言された、②技術者レベルの連絡協議会の立ち上げへの対応として、2013 年 10 月、11 月に関係機関とのワークショップ (workshop : WS) を実施した。

予算の確保については、CMC は、HM や PEMF も含め 2014 年度以降確保する意向を示しており、また、運用開始後のキャリブレーションが不要なシステム設計等の工夫により負担は軽

減されるとは考えられるが、これまでほぼすべての予算を JICA 側が負担していたわけであり、報告書の提言のとおり、プロジェクト終了後の予算確保が確実になされることが必要である。

以上

## 別 添 資 料

別添資料 1. 合同評価報告書（英文）

付属資料 2. プログラム運営委員会（SC） ミニッツ（英文）



The Joint Terminal Evaluation Report for  
the Project on Development of Integrated System for Prevention and Early  
Warning of Forest Fires

December 11th, 2013

The Joint Evaluation Team



---

Mr. Kazuhiro Goseki  
Leader of Japanese Terminal Evaluation Team,  
Japan International Cooperation Agency-JICA



---

Mr. Xheladin Llokmani  
Macedonian Representative,  
Department for Bilateral and Multilateral  
Assistance, Secretariat for European Affairs

## Table of Contents:

Chapter 1: Outline of the Terminal Evaluation		
1.1	Background	1
1.2	Objectives of the Terminal Evaluation	1
1.3	Members of the Terminal Evaluation Team	1
1.4	Schedule of the Mission	2
1.5	Outline of the Project	2
1.6	Methodology of the Terminal Evaluation	2
Chapter 2: Achievements of the Project		
2.1	Results of Inputs	4
2.2	Project Progress	5
2.3	Progress Towards the Project Purpose	6
2.4	Prospect of Achieving the Overall Goal	6
2.5	Implementation Process	7
Chapter 3: Review by the Five Criteria		
3.1	Relevance	7
3.2	Effectiveness	8
3.3	Efficiency	8
3.4	Impact	9
3.5	Sustainability	9
Chapter 4: Results of Terminal Evaluation		
4.1	Conclusions	11
4.2	Recommendations	11
4.3	Lessons Learned	12
Annex		
A.1	PDM	
A.2	PO	
A.3	Study Schedule of the Mission	
A.4	List of Interviewees	
A.5	List of Japanese Experts	
A.6	List of Participants in the Trainings in Japan	
A.7	List of Equipment Supported by JICA	
A.8	Project Cost & Budget	
A.9	List of Counterpart Personnel	
A.10	Accomplishment Grid 1(Accomplishment based on the Indicators)	
A.11	Accomplishment Grid 2 (Accomplishment based on the Activities)	
A.12	Evaluation Grid	

**Abbreviations:**

	English
AWS	Automatic Weather Station
CMS	Crisis Management System
CML	Crisis Management Law
C/P	Counterpart Personnel
DPR	Directorate for Protection and Rescue
EC	European Commission
EU	European Union
GIS	Geographic Information System
GFIS	Geographic Forest Information System
FMU	Forest Management Unit
FWI	Fire Weather Index
HM	Hydro Meteorological Service
HQ	Headquarters
IZZIS	Institute for Earthquake Engineering and Engineering Seismology
JCC	Joint Coordinating Committee
JICA	Japan International Cooperation Agency
JET	JICA Expert Team
LCM	Law on Crisis Management
M/M	Minutes of Meeting
MAFWE	Ministry of Agriculture, Forestry and Water Economy
MKFFIS	Macedonian Forest Fire Information System
MOEPP	Ministry of Environment and Physical Planning
NGO	Non-Governmental Organization
ODA	Official Development Assistance
O & M	Operations and Maintenance
OJT	On-the-Job Training
PD	Project Director
PDM	Project Design Matrix
PE	Public Enterprise
PEMF	Public Enterprise Macedonian Forests
PO	Plan of Operations
PM	Project Manager
QGIS	Quantum GIS (GIS software)
RCMC	Regional Crisis Management Center
R/D	Record of Discussion
RDPR	Regional Directorate for Protection and Rescue
RPEMF	Regional Public Enterprise Macedonian Forests
SC	Steering Committee (of the Project)
SEA	Secretariat for European Affairs
TCGM	Technical Coordination Group Meeting
UNDP	United Nations Development Programme
WS	Workshop

## Chapter 1: Outlines of the Terminal Evaluation

### 1.1 Background

The Republic of Macedonia (hereinafter, referred to as “Macedonia”) is a mountainous landlocked country with a total land area of about 25,000 square kilometers. Due to the hot-dry summer of the Mediterranean climate, loss of forests with frequent massive fires has become a problem in Macedonia. The Crisis Management Center (CMC) of Macedonia is responsible for collecting and analyzing information for providing early warning against various national threats in coordination and cooperation with domestic relevant institutions. CMC has been responsible for providing early warning and preventing forest fires. However, CMC faces the challenge of providing information, which it has collected, stored and analyzed, to relevant agencies and its citizens in order to reduce damage caused by forest fires.

Under such circumstances, the Japan International Cooperation Agency (JICA) has been implementing the Project on Development of Integrated System for Prevention and Early Warning of Forest Fires since May 2011 for three years based on request made by the government of Macedonia.

### 1.2 Objectives of the Terminal Evaluation

The objectives of the terminal evaluation are:

- 1) To confirm the actual inputs and activities, implementation process, the degree of the achievements of the outputs, and the prospects of achieving the project purpose and overall goal according to the Project Design Matrix (PDM);
- 2) To assess the project results from the view of five evaluation criteria - Relevance, Effectiveness, Efficiency, Impact, and Sustainability – based on the JICA’s guideline for project evaluation; and
- 3) To make recommendations on the measures to be taken during and beyond the remaining project period in consultation with agencies concerned, and draw lessons learned for similar technical cooperation projects of JICA in future.

### 1.3 Members of the Evaluation Team

Members of the Joint Evaluation Team are as follows:

<Macedonia side>

Name	Role	Position / Organization
Mr. Xheladin Llokmani	Macedonian Representative	Associate, Department for Bilateral and Multilateral Assistance, Secretariat for European Affairs

<Japan side>

Name	Role	Position / Organization
Mr. Kazuhiro Goseki	Japanese Team Leader	Executive Technical Advisor to the Director General, Global Environmental Department, JICA



Mr. Gen Akahane	Forest Management	Deputy Director, Wood Industry Division, Forestry Agency, Ministry of Agriculture, Forestry and Fisheries
Mr. Shinsaku Fukazawa	Planning Cooperation	Advisor, Forestry and Nature Conservation Division 2, Global Environmental Department, JICA
Mr. Koji Asano	Analysis & Evaluation	Senior Engineer, Environmental Science & Engineering Department, Nippon Koei Co.,LTD.

#### 1.4 Schedule of the Mission

The study schedule of the mission is attached as Annex 3.

#### 1.5 Outline of the Project

According to the PDM Ver.2 approved in the Steering Committee (SC) held on 15 November 2012, the outline of the project is as follows (Annex 1 and 2);

##### < Overall Goal >

The occurrences of massive forest fire are reduced by strengthening the social capacity for prevention and early warning of forest fire.

##### < Project Purpose >

The capacity of CMC for transmitting information to domestic relevant institutions for prevention and early warning of forest fire and coordinating them is strengthened.

##### < Outputs >

1. National system for forest fire risk assessment is developed.
2. National coordination mechanism of information sharing and cooperation among domestic relevant institutions for prevention and early warning of forest fire is reinforced.

##### < Project Target Area >

All over the country (primarily Skopje and areas of selected RCMCs)

#### 1.6 Methodology of the Terminal Evaluation

The terminal evaluation was conducted in accordance with “the JICA New Guideline for Project Evaluation, Ver.1 (June 2010)”, which essentially follows “the Principles for Evaluation of Development Assistance, 1991” issued by OECD/DAC. The PDM Ver.2, which was confirmed on 15 November 2012 at the SC, was used as principle reference for the study.

As a framework to collect relevant data and information as prescribed in the JICA’s evaluation guideline, two types of grid – Accomplishment Grid and Evaluation Grid – were elaborated. Japanese Expert Team (JET) was requested principally to provide information to fill out the two Accomplishment Grids and one Evaluation Grid, while Macedonian counterparts (C/P) were requested to fill out the questionnaire developed by the Japanese

Evaluation Team.

During the stay of the Japanese Terminal Evaluation Team in the Macedonia, the Joint Evaluation Team (hereinafter referred to as “the Team”) interviewed a broad range of stakeholders from CMC to partner governmental institutions who were involved in the project, and collected information (interviewees are listed in Annex 4). Findings from literature surveys, questionnaire surveys, interviews and field observations were analyzed and used for filling out three grids. Finally, the Team concluded the results of terminal evaluation based on the five evaluation criteria, made recommendations, and drew lessons learned.

The criteria used for the evaluation are followings:

Criteria	Brief Explanation
Relevance	To be assessed by considering the validity of the project purpose and overall goal of the PDM, in light of development policies of the Government of Macedonia as well as the Japanese cooperation policy.
Effectiveness	To be assessed by considering what extent the project has achieved its project purpose, clarifying the relationship between the project purpose and outputs in the PDM.
Efficiency	To be assessed by comparing outputs and inputs in terms of timing, quality, and quantity.
Impact	To be assessed in terms of positive/negative and intended/unintended influence caused by the project.
Sustainability	Prospect of sustainability is to be assessed from institutional, financial, technical, and human resource viewpoints by examining the extent to which the achievements of the project will be sustained after the project will be terminated.

KL

Zac

## Chapter 2: Achievements of the Project

### 2.1 Results of Inputs

< Japanese side >

#### 1) Dispatch of Expert

Two long term experts (Chief Advisor/Forest fire Management, Project Coordinator/IT) were dispatched. The entire dispatch period are (will be) totaled for six (6)<sup>1</sup> years (2,190 man-day (MD)) over the three years. To complement works of long-term experts, short-term experts were dispatched 14 times, totaling for 25.17MM (755 MD). Dispatch of the short-term experts was planned in consultation with the Macedonian side. (Please refer to Annex 5)

#### 2) Trainings in Japan

A total of seven counterpart personnel from CMC and PEMF have participated in the training courses in Japan over the project period. In the first training in 2012, trainees were from management level in CMC HQ such as PD and PM, while in the second training in 2013; all four were from operation level (IT staff) in CMC HQ and PEMF. (Please refer to Annex 6)

#### 3) Provision of equipment

To facilitate project activities, equipment including one vehicle, 111 client PCs<sup>2</sup>, 15 AWSs and so on were procured by JICA. Providing the necessary equipment for the system (hardware, software, IT and other equipment) was performed based on previously decided system design by the project. Items, specifications and quantity of the equipment have been determined in consultation with CMC and the relevant organizations. All of the equipment has been utilized for the project implementation. (Please refer to Annex 7)

#### 4) Local Cost

JICA has provided necessary local cost to carry out project activities. The actual disbursement in 2011, 2012 and 2013 (by the end of September) including cost for operation, facilities, equipment, materials, local employment, travel expenses and so on is totaling MKD25,100,080 (approx. JPY41,629,000). (Please refer to Annex 8)

(Macedonian side)

#### 5) Assignment of Counterpart Personnel

Counterpart personnel of the project were assigned to work in their headquarters (HQ) in Skopje as well as in their regional offices. By the time of terminal evaluation, over the past thirty (30) months, two project directors<sup>3</sup>, one project manager, and a total of 7 staff members from CMC HQ and 4 staff members from RCMCs have been

<sup>1</sup> Three (3) years period in each of two long-term experts.

<sup>2</sup> 15 to CMC HQ, 23 to HQs of relevant institutions, and 73 to their regional offices.

<sup>3</sup> Mr. Zulf Adili was in charge from September 2011 till now. Mr. Toni Jakimovski was in charge from May 2011 to September 2011.

assigned. (Please refer to Annex 9)

#### 6) Office Space and Facilities/Materials

Office space (approx. 50m<sup>2</sup>) for the project was provided by CMC in the building of its HQ in Skopje. Expenditures for the maintenance of the JET office (e.g., electricity, heating, cleaning, communication etc.) were borne by CMC.

### 2.2 Project Progress

Achievements and progress of the project were examined using two Accomplishment Grids – one for accomplishment based on the Indicators, and another for accomplishment based on the Activities (Annex 10 and 11). Key achievements are described below.

#### 1) Output 1

- (1) MKFFIS (ver.1) was launched in March 2013. MKFFIS (ver.2) is currently under development, expected to be completed in December 2013. MKFFIS (ver.2) is expected to particularly improve the assessment of one risk element (exposure) and coping capacity with forest fire by enhancing its information. (Indicator 1a)
- (2) Data/information required for constructing MKFFIS (ver.1) were acquired from PEMF, HM, CMC and websites of EUMETSAT and NASA. Data/information were initially stored in the database of MKFFIS (ver.1) in March 2013, subsequently, have been updated. (Indicator 1b)
- (3) Hotspot map, vegetation dryness map, FWI map, which were created in March 2013, cover the entire country, while vegetation map covers 90% of forests in Macedonia. Upcoming suppression resource table and expected damaged forest value are planned to cover the entire country, to be created in December 2013. (Indicator 1c)
- (4) Trainings regarding MKFFIS (ver.1) administration and use of maps (hotspot map, vegetation dryness map, FWI map, vegetation map and forest fire history map) were conducted with participation of 91 CMC officers, 57 PEMF officers and 28 officers from other institutions (a total of 176 participants). (Indicator 1d)
- (5) In March and April 2013, key participants of the training regarding MKFFIS (ver.1) administration and use of maps, were granted ID and password to access MKFFIS (ver.1) (91 CMC officers, 31 PEMF officers, 23 DPR officers and 2 MAFWE officers were granted). Since then, information for prevention and early warning of forest fire has been provided to them. MKFFIS (ver.1) integrates four risk elements (hazard, exposure, vulnerability, and coping capacity) that enable concerned institution to assess the risk of forest fire comprehensively and effectively by using MKFFIS (ver.1). (Indicator 1e)
- (6) At the time of evaluation (December 2013), forest fire risk assessment tools have not yet been available for other institutions (other than PEMF, DPR and MAFWE) and the general public. However, those are planned to be available when MKFFIS (ver.2) will be released. (Indicator 1f)

## 2) Output 2

- (1) In two workshops (29-30 October, and 12-13 November 2013), it was discussed how rulebooks<sup>4</sup> (ministerial ordinance) of MAFWE on forest protection and forest management planning should be modified. MAFWE plans to submit nine (9) modified rulebooks in the beginning of 2014 to Legislation Bureau<sup>5</sup>. (Indicator 2a)
- (2) The process to formalize TCG to be a national level technical coordination meeting will start in April 2014, just before the end of the project. Potential legislative justification of the technical level coordination meeting already exists in several laws, however, actual procedures of formalization in legislative framework is yet to be defined. (Indicator 2b)
- (3) Methodology and procedures to elaborate recommendations for improvement of coordination using MKFFIS are yet to be defined. (Indicator 2c)

## 2.3 Progress towards the Project Purpose

- 1) In order to make MKFFIS and GFIS fit in legislative framework of relevant institutions two workshops were held to draft text of modified rulebooks (ordinance or decree) on 29-30 October and 12-13 November 2013. Based on the outputs of these workshops, MAFWE will start (has started) to modify their rulebooks in the existing government procedures. (Indicator Project Purpose 1)
- 2) Hotspot map, FWI map, vegetation dryness map, forest vegetation map and forest fire history map had created in March 2013, and since then, have been continuously updated in accordance with the data/information provided by sources. Frequency of update is as: 1) SEVIRI hotspot is in every 15 minute, 2) MODIS hotspot is in every 6 hours, 3) FWI map is in every day, 4) vegetation dryness map is in every 8 days, 5) forest vegetation map is in every one year, 6) forest fire history is in every event basis. (Indicator Project Purpose 2)
- 3) Information has been available to the domestic relevant institutions since April 2013 through MKFFIS (ver.1). In July 2013, CMC-HQ sent an official instruction to RCMCs to use MKFFIS (ver.1) for their daily operation. In July 2013, CMC-JICA held an official inauguration ceremony, invited various institutions and mass-media, to disseminate the contents of MKFFIS (ver.1) (79 people participated). (Indicator Project Purpose 3)

## 2.4 Prospect of achieving the Overall Goal

- 1) The overall goal of the project aims at actual reduction of massive forest fire in near future. The reduction depends not only on provision of information by MKFFIS but also the reaction of concerned officers in

<sup>4</sup> "Rulebook" signifies regulation, ordinance or decree in accordance with the circumstances of the use.

<sup>5</sup> Currently, following nine rulebooks are under consideration:

- (1) Rulebook on the content of the special management plans for forests of economic and protective value, as well as the mode of drafting, adoption and approval,
- (2) Rulebook on the content of the special plans for raising and protection of forests in protected areas, as well as the mode of drafting, adoption and approval,
- (3) Rulebook on the content of the special management plans for private forests over 100 ha, as well as the mode of drafting, adoption and approval,
- (4) Rulebook on the criteria for management of private forests for which no special plan or program is required,
- (5) Rulebook on the operational mode of the Reporting-Diagnosis-Prognosis Unit,
- (6) Rulebook on the precaution measures to be taken in setting limestone and charcoal processing facilities and similar facilities which create risks for fires in forests and agricultural areas,
- (7) Rulebook on the special measures for protection of forests against fires,
- (8) Rulebook on the manner of collection of data pertinent to the damages to the forests, the contents and the management of Forest Damage Register, as well as the manner in which data may be used and
- (9) Rulebook on the manner of collection of data, the management of the forest fire registers and the conditions under which data may be used.

charge of fire management as well as local self-governing bodies. Besides, climate conditions may affect occurrence of forest fires. Furthermore, judging actual rate needs a monitoring of a longer period, at least for more than five years. Therefore the prospect of achieving the overall goal cannot be judged at this moment, however, the terminal evaluation team found many positive indications to achieve the overall goal.

- 2) MKFFIS (ver.1) comprehensively consider four risk elements (hazard, exposure, vulnerability, and capacity and measures) by producing eight risk assessment maps. The data/information provided by CMC is astonishingly specialized for prevention and early warning of forest fire that is considered to be remarkably adequate. MKFFIS updates eight risk assessment maps as soon as their data sources (data providers) are updated. The frequency of the update is considered to be particularly prompt and sufficient. (Indicator Overall Goal 1)
- 3) Fundamental and adequate data to identify forest fire risk have been accumulated in MKFFIS (ver.1), and MKFFIS will continue to reinforce itself to be a firm basis for prevention and early warning of forest fire, which shall result actual reduction of massive forest fire in the future. (Indicator Overall Goal 2)

## 2.5 Implementation Process

- 1) The Joint Mid-term Review Team concluded that the PDM and PO (ver.1) was not efficient as a management tool for the project. Through the mid-term review, the drafts of revised PDM (ver.2) and its PO had developed, which was approved by the 4<sup>th</sup> SC on 15 November 2012.
- 2) After the PDM (ver.2) became on use, PO (ver.2) was revised twice to be PO (ver.4) in accordance with the circumstance of the project. Overall, plan became clear and appropriate to all project staff, and the progress became on schedule as described in the PO. PDM (ver.3) was made with more definite numbers in indicators in November 2013. The PDM was approved by the 6<sup>th</sup> SC on 11 December 2013.
- 3) Communication within the project has been sufficient in order to implement the project activities. The results of interview and questionnaire survey to the staff of CMC HQ as well as RCMC showed that communication between CMC staff and the Japanese experts were smooth and efficient. During the project period, CMC and JET had regular communication and coordination on a daily and periodical basis, depending on the needs. In particular during the development of MKFFIS (ver.1), CMC and JET maintained daily meetings (every morning), and thematic meetings with system developers and other users (CMC, PEMF, HM, MAFWE and others.).

## Chapter 3: Review by the Five Criteria

Value judgment from the view points of the five evaluation criteria was rated as: A = High, B = Medium and C = Low.

### 3.1 Relevance

The relevance of the project was evaluated as "A" from the following reasons:

- 1) In the Strategy on Sustainable Development of Forestry (2006), establishment of an efficient system for early warning and suppression of forest fires is a part of its vision. Besides, one of the strategic objectives of the work program of the Government of Macedonia for the period 2011–2015 is investment in information technology.
- 2) The project purpose meets CMC's organizational fundamental requirements. Before the project, there was no database or/and GIS system in CMC. The project had newly introduced centrally managed database and GIS system to specifically work for prevention and early warning of forest fires, to be used by various stakeholders who are involved in prevention and early warning of forest fire in different institutions in different locations.
- 3) Japan's Official Development Assistance Charter addresses global warming and environmental problems as one of the priority issues. Japan's Medium-Term Policy of Official Development Assistance (2005) states environmental sector as one of the most important sectors. Japan's Country Assistance Policy for Macedonia (2012) states that environment issue as one of two priority areas.

### 3.2 Effectiveness

The effectiveness of the project was evaluated as “B” from the following reasons:

- 1) Two outputs are appeared to be reasonably effective to achieve the project purpose (the relation of cause and effect is reasonably appropriate). MKFFIS is an advanced web-based GIS to whom all relevant institutions have direct access, which allows simultaneously and identically sharing the forest fires risk information, thereby greatly increase the quality of inter-institutional coordination and take measures to prevent the risk of forest fires.
- 2) Dedicated efforts have been made towards the achievement of outputs and the progress is presumably as expected in achieving the project purpose. Although their level of achievement of outputs varies at this moment, they will contribute to the achievement of the project purpose. With continuous effort of people in both Macedonian and Japanese sides, the project purpose is most likely to be achieved by the project end.
- 3) At the moment of the terminal evaluation, MKFFIS (ver.1) has not been fully put to use for concerned officers in the field, and therefore achievements are not obvious due to the lack of practical use. From the experience so far, interviewed RCMCs could not confirm their expectations yet, as the system did not indicate information in appropriate timings, while data input regarding forest fire was delayed since officers were not familiar with the system. Thus field level coordination among regional offices of concerned institutions was not yet enhanced by the project.

### 3.3 Efficiency

The efficiency of the project was evaluated as “B” from the following reasons:

- 1) The project had invested a significantly large amount of financial and human resources to digitize forest related information, and to introduce GIS-base information system and database. Although, digitized forest related information was required to create forest vegetation maps, investment for GIS-base information

system and database should have been more economized by minimizing the number of digitized items and by other measures to ensure the efficiency of the project.

- 2) Also, the project had invested significantly to introduce AWSs to increase number of observation points as well as to obtain accurate and timely data by eliminating human errors and negligence. However, investment should have been more economized by considering alternative data collections method and/or enhancing accuracy of existing data to ensure the efficiency of the project.
- 3) Japanese experts with the relevant background, appropriate experiences, and sufficient technical level have been assigned. They were hardworking and committed to their assignment. Short-term experts made a significant contribution to the development of MKFFIS, started from its design, system development, testing and also its improvement.
- 4) The equipment has been procured and delivered in appropriate timing. Items, specifications and quantity of the equipment have been determined in consultation with CMC and the relevant organizations. Providing the necessary equipment for the system (hardware, software, IT and other equipment) was performed based on previously decided system design by the project.

#### 3.4 Impact

The impact of the project was evaluated as “A” from the following reasons:

- 1) As described in “2.4 Prospect of achieving the Overall Goal” of this document, the prospect of achieving the overall goal cannot be judged at this moment, however, the terminal evaluation team found positive indications to achieve the overall goal in future.
- 2) MKFFIS provides an overview of data related to vegetation dryness, vegetation species, areas susceptible to fire, infrastructure and other elements which are necessary in the forest fire risk assessment process. For that reason the system will, in future, provide for a larger development of the national system for forest fire risk assessment.
- 3) More efforts need to be made to ensure a joint approach by the staff from various institutions in assessing forest fire risks, and to provide for a stronger coordination mechanism among relevant institutions, which in its turn should allow for quicker actions by all competent authorities in mitigating forest fire risks.
- 4) Furthermore, resources will have to be directed towards the human factor, because it has the greatest impact of causing forest fires in the field. Raising public awareness to prevent forest fire is essential.
- 5) The project created geospatial database from forest inventory information and boundary information, and centrally accumulated forest related information to be continuously updated. The system enabled sustainable forest management by PEMF which is fundamental for forest fire risk management.

#### 3.5 Sustainability

The prospect of sustainability was evaluated as “B” from the following reasons:

- 1) Prospect from institutional viewpoint:
  - Current legislative framework and policy/strategy for prevention and early warning of forest fires will continue after the termination of the project.



- In order to effectively utilize MKFFIS in the operation of CMC as well as concerned institutions officially, development of draft(s) for necessary modifications of the existing government procedures in collaboration with the relevant institutions envisaged under Output 2 will enhance institutional sustainability in each institute.
  - The project activities have been implemented in collaboration with members of the Technical Coordination Group. The collaborative relationship enhanced through the project is expected to continue as both CMC and member institutions. However, formalization procedures of a periodical coordination meeting at technical level need to be defined. Actual formalization should be realized before the termination of the project.
- 2) Prospect from technical viewpoint:
- Staff members of CMC as well as other relevant institutions are already equipped with high-level technical capacity. It is expected that they would be able to continue the relevant activities by them after the project end.
- 3) Prospect from human resource viewpoint:
- All the project personnel of CMC and RCMCs are permanent staff whose employment will be ensured. Officers of CMC HQ are expected to be continuously assigned to the relevant posts so that they would be able to utilize their knowledge and skills to continue their task and sustain the system in future. Also in regional level at RCMC, RPEMF and RDPR, human resources involved in the project will continue to be the major drivers enabling sustainability of the coordination.
  - In terms of human resources, the greatest challenge is to ensure proper administration of the system in three institutions (CMC, PEMF and HM) where data servers are maintained. It is necessary to officially appoint staff who will care for the functionality of the system of technical and administrative aspects.
- 4) Prospect from financing viewpoint:
- Data maintenance within key service providers gives influence on the quality and regularity of data in MKFFIS. Three institutions (CMC, PEMF and HM) maintain data servers each of which has different function to be a part of MKFFIS system. Those three institutions have limited financial resource to renew necessary software licenses, replace broken parts and corrective maintenance of unexpected system failure.
  - Maintenance of equipment is important for MKFFIS's stability. According to the Memorandum of Understandings (MOU) for ownership transfer signed by CMC and relevant institutions (PEMF, HM, DPR and MAFWE) in May 2012 and in May 2013, the respective institution is obliged to maintain the equipment in accordance with the technical instructions and standards prescribed by the manufacturer. It is expected that each institution will secure necessary budget for maintenance after the warranty period is expired.
  - Fifteen (15) AWSs were donated to HM for the purpose of collecting meteorological information. HM proposed annual budget of 2014 with the cost of AWS maintenance. The cost for technical maintenance (cost for parts replacement) and data maintenance (cost for stable data transfer) in future should be provided by HM.
  - All the cost for project implementation (training, trip, coordination, etc.) has been borne by JICA. After the

termination of the project, cost for continuous activities should be secured by Macedonian side.

## **Chapter 4: Results of Terminal Evaluation**

### **4.1 Conclusions**

The project has been implemented, aiming at to strengthen risk management by constructing and utilization of integrated information management system for forest fire risk assessment – MKFFIS along with other necessary measures. It was concluded that MKFFIS strengthened coordination among relevant institutions, and extraordinary improved their capacity for prevention of forest fires by its functions for integration and transmission of information of various institutions.

Furthermore, additional huge impacts, such as utilization of the system for meteorological observation and sustainable forest management, were confirmed, which are very much positively evaluated by Macedonian side, although it affected the efficiency of the project.

However, more efforts are required to sustainably maintain the results of the project, such as securing necessary budget by Macedonian side after the termination of the project and modifying the existing government procedures to fit the system in legislative framework.

We conclude as that the project purpose will be achieved, by continuously reinforcing the relevant institutions through extension services for and expanding utilization of the system and strengthening capacity of the users through providing trainings, until the termination of the project.

### **4.2 Recommendations (in no particular order)**

#### **1) Dissemination of forest fire risk information to the public.**

The main reason for the forest fire is a human factor. By using MKFFIS (ver.2), information regarding forest fire should be widely disseminated to the public, which leads to actual reduction of massive forest fires as stated in the overall goal of the project. Within the framework of the project, the activities related to information dissemination should be further strengthened.

#### **2) Implementation of follow-up trainings for MKFFIS to regional relevant offices.**

At the time of MKFFIS (ver.1) was released, group trainings were conducted in Skopje to relevant organizations and their regional offices, and similar trainings are planned to be conducted when MKFFIS (ver.2) will be released. However, it is determined that there is still room for further utilization of MKFFIS especially in regional relevant offices. Japanese experts and CMC's project staff are expected to visit as much as possible to the field to promote use and to implement follow-up trainings for MKFFIS.

#### **3) Determination of target group/staff to issue MKFFIS ID and promotion of the issuance.**

Issuance of access ID for MKFFIS was executed to the staff members of relevant institutions who participated in the training(s) conducted by the project. To further promote use of MKFFIS, determination of the target groups/staff that require MKFFIS access ID, and promotion of the issuance are needed.

4) Development of institutional framework for the sustainable operation of MKFFIS.

In order to ensure the sustainability of the coordination with utilizing MKFFIS, before the end of the project, agreements/reciprocity terms that clarify the rights and obligations regarding data input, system administrations, information exchange and utilization should be made. In addition, to ensure sustainable collaboration and cooperation of concerned institutions through TCG, legislative/legal justification of TCG needs to be defined by the end of the project. It is recommended to clarify the road map for formalization of TCG immediately.

5) Definition of emergency procedures in response to risk information from MKFFIS.

In order to adopt MKFFIS in routine of relevant institutions, revision/creation of rules and procedures corresponding various risk information from MKFFIS is needed in both regional and central levels. To take advantage of the information, for example, coping procedures at the time of occurrence of “hotspot” should be defined.

6) Strengthening of cooperation among local governments and regional offices.

In order to strengthen “social capacity”, which is stated in the overall goal of the project, involving the local governments and regional offices of relevant institutions and promotion of cooperation among them for prevention and early warning of forest fire are necessary. However, activities related to strengthen cooperation in the field level have not been done sufficiently until now. Based on the recommendations (indicator 2c of PDM) to be created before the end of the project, spreading the knowledge obtained in the model areas to other areas and involvement of the local governments and regional offices of relevant institutions should be further strengthened.

7) Budget requirement after the termination of the project.

All the cost for project implementation has been borne by JICA during the project period. In order to sustain project results, and to achieve the overall goal in future, necessary budget for continuous activities should be secured by Macedonian side after the termination of the project. In particular, budget for maintenance of AWSs which have been granted to HM, maintenance of IT equipment including MKFFIS and continuous training to sustain technical capacity of staff should be secured.

#### 4.3 Lessons Learned (in no particular order)

1) Management of the range of the project scope.

In the development of functions of MKFFIS, AWS and GIS-base information system for forest management were introduced which were not originally planned. Thus, MKFFIS has equipped advanced functions, but remarkably large amount of its cost negatively affected the efficiency of the project.

In similar projects, it is necessary to clearly predetermine financial and human resource constraints and define the scope of the system in the original plan to be appropriately managed by the stakeholders for economizing inputs to achieve the project purpose.

2) Forest fire risk management as a part of sustainable forest management.

Forest related data such as species, age etc were captured to be a part of MKFFIS database for forest fire risk assessment. As a result, data of MKFFIS became to be utilized not only for forest fire prevention, but for sustainable forest management by PEMF which is beyond the project scope.

However, such sustainable forest management could enhance the health of the forest, and results in reducing the risk of forest fire. Therefore forest fire risk management should be considered as a part of sustainable forest management. Such holistic approach should be taken in designing of similar projects.

3) Involvement of local governments and multi-sectoral local offices.

The project was implemented for the purpose of strengthening the cooperation among mainly central offices of concerned institutions. However, local governments and multi-sectoral local offices have a vital role in actual prevention of forest fires.

Therefore, local governments and local offices of multi-sectoral related institutions should be involved as the project CP or sub-CP in accordance with their role and responsibility.

4) Consideration of seasonality in project period.

Since the project launched in May, it needs to finish in May just before the forest fire season in Macedonia. Therefore the project fails to have an opportunity to practically use MKFIIS (ver.2) in the fire season before its termination.

To have the opportunity, the project should have started after the fire season. For those projects which activities are affected by seasonal conditions, the best start timing should be decided based on seasonality.

(End of Document)

**Annex 1: PDM ver.2 (approved by SC on 15 November 2012)**

Project Title: Project on Development of Integrated System for Prevention and Early Warning of Forest Fires

Duration: From 10 May 2011 to 9 May 2014

Implementing Agency: Crisis Management Center (CMC)

Project Site: Skopje

Target Group: Relevant personnel in charge of prevention, early warning and monitoring of disasters including forest fire of HQ and regional centers of CMC

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p><b>&lt;Overall Goal&gt;</b> The occurrences of massive forest fire are reduced by strengthening the social capacity for prevention (*i) and early warning of forest fire.</p>	<p>1. Data/information provided from CMC to institutions under the Crisis Management System will become more promptly and adequately. 2. Rate of forest fire that reaches massive level will be reduced.</p> <p><u>Note for Indicators: By March 2013, indicators for the Overall Goal, including definition of "more promptly," "more adequately", "rate of forest fire", and "massive level", will be examined by TCGM and proposal on necessary modification will be submitted to the subsequent SC for approval.</u></p>	<p>Regulations, guidelines, reports and documents of CMC and of the government of Macedonia</p>	<p>1. There will be no significant change in crisis management policy against forest fires. 2. Unexpected extreme weather will not occur.</p>
<p><b>&lt;Project Purpose&gt;</b> The capacity of CMC for transmitting information to domestic relevant institutions (*ii) for prevention and early warning of forest fire and coordinating them is strengthened.</p>	<p>1. By the Project end, modifications in the existing government procedures, necessary to fit the integrated GIS, in legislative framework, are adopted by the relevant authorities. 2. By the Project end, information contained in forest fire risk assessment tools of the integrated GIS at CMC is updated with pre-determined frequency for transmission to the relevant institutions. 3. By the Project end, data/information from CMC based on the integrated GIS is utilized by the domestic relevant institutions for prevention and early warning of forest fire.</p>	<p>1. Records of the date of adoption 2. Record of system monitoring 3. ditto</p>	<p>Budget and number of personnel of CMC will not be significantly decreased.</p>
<p><b>&lt;Outputs&gt;</b> 1. National system for forest fire risk assessment (*iii), using the integrated GIS (*iv), is developed.</p>	<p>1a By February 2013, integrated GIS is developed based on the risk assessment methodology developed by the Project (i.e. integrated GIS ver.1); and is improved by December 2013 (i.e. integrated GIS ver.2). 1b From March 2013, all of the data required for forest fire risk assessment with pre-determined time/spatial resolution, provided by PEMF and HM, is received and stored in the integrated GIS. 1c By February 2013, four forest risk assessment tools (i.e. hot spot map and vegetation dryness map, covering all land of Macedonia, as well as forest vegetation map and fire history map, covering 90% of forests in Macedonia) are stored in the integrated GIS; and the other three (i.e. FWI map and suppression resource table, covering all land of Macedonia, as well as damaged forest value table, covering 90% of forests) are stored by December 2013. 1d By March 2013, at least X officers from HQ and regional CMC and X officers from HQ and regional offices of the principal information user institutions (X from PEM, X from MAFWE, X from DPR) are trained in administration and/or utilization of the integrated GIS as well as interpretation of the first 4 forest fire risk assessment tools; and the other four tools by March 2014. 1e By March 2013, information contained in the forest fire risk assessment tools of the integrated GIS is available to the principal information users (*v) through intranet for utilization in prevention and early warning according to the agreed access rights. 1f By April 2013, part of information contained in the forest fire risk assessment tools (ie.X, X, . . .) of the</p>	<p>1a: Inspection report of the system 1b, 1c: Record of system monitoring 1d: Training record 1e, 1f: Record of system monitoring</p>	<p>Necessary cooperation by allocation of sufficient budget, and other resources by relevant institutions is secured according to the PO approved by the SC.</p>

AK

	<p>integrated GIS is published at CMC's website for utilization by other relevant institutions.</p> <p><u>Note for Indicator 1d: Target number (X) shall be specified by December 2012 in consultation with TCG for approval by the subsequent SC.</u></p> <p><u>Note for Indicator 1f: Forest fire risk assessment tools that shall be published through internet shall be identified through consultation with TCG by March 2013. Name of tools to be published (X) shall be specified in the indicator accordingly and modification shall be proposed to the subsequent SC for approval.</u></p>		
2. National coordination mechanism of information sharing and cooperation among domestic relevant institutions for prevention and early warning of forest fire is reinforced.	<p>2a By the Project end, the final draft(s) for necessary modifications of the existing government procedures is (are) submitted by the responsible organizations to the relevant authority/authorities for adoption.</p> <p>2b By the Project end, a technical-level coordination meeting on prevention and early warning is formalized for the post-project period.</p> <p>2c By the Project end, recommendations for improvement of coordination, using the integrated GIS, are made based on monitoring in some model areas within jurisdiction of selected RCMCs for action by CMC.</p>	2a: Date of submission of the final drafts 2b, 2c: M/M of TCG	

42

Activities	Inputs	
<p>1-1 Design risk assessment methodology for forest fire and document the methodology (*vi).</p> <p>1-2 Identify and collect data/information useful for the forest fire risk assessment.</p> <p>1-3 Develop the integrated GIS, including software, hardware and equipment.</p> <p>1-4 Prepare and store GIS risk maps and tables for forest fire in the integrated GIS.</p> <p>1-5 Design methodology on assessment of damages and consequences of forest fire.</p> <p>1-6 Prepare the feasibility study on the technical system for forest fire early detection.</p> <p>1-7 Hold training/workshops on the integrated GIS &amp; forest fire risk assessment tools for system users/administrators at CMC and the relevant institutions.</p> <p>1-8 Share information for forest fire risk assessment from CMC to the relevant institutions through the integrated GIS.</p> <p>2-1 Develop sustainable coordination mechanism of CMC and relevant institutions about information sharing and coordination using the integrated GIS.</p> <p>2-2 Periodically organize Technical Coordination Group Meetings (TCGM).</p> <p>2-3 Confirm the existing state of coordination of information sharing and cooperation on prevention and early warning of forest fire at some model areas.</p> <p>2-4 Assess the effectiveness of the integrated GIS in coordination of CMC and relevant institutions and identify supplementary measures, if necessary, utilizing the results of 2-3.</p>	<p><u>Japanese Side</u></p> <p>1. Experts</p> <p>(1) Chief Advisor/ Forest Fire Management</p> <p>(2) Project Coordinator/ GIS system/database</p> <p>(3) Other fields required</p> <p>2. Training of counterpart personnel in Japan</p> <p>3. Provision of equipment for the Project activities in the followings:</p> <p>(1) Forest fire management</p> <p>(2) GIS system/database</p> <p>(3) Others if necessary</p> <p>4. Operational costs</p> <p><u>Macedonian Side</u></p> <p>1. Government Staff as Project staff as needed for the Project</p> <p>(1) Project Director</p> <p>(2) Project Manager</p> <p>(3) Project staff (Counterpart personnel)</p> <p>(4) Supporting staff</p> <p>2. Administrative and operational costs</p> <p>3. Provision of land, building, facilities and equipment for the Project.</p>	<p>Necessary cooperation such as appointment of users/administrators of the integrated GIS allocation of sufficient budget by relevant institutions is secured according to the PO approved by SC.</p> <p>&lt;Pre-Conditions&gt; Commitment and willingness of project partners in CMC and relevant institutions.</p>

- i. "Prevention" includes risk reduction among others.
- ii. "Domestic relevant institutions" targeted by the Project are MAFWE, PEMF, DPR, municipal government, local fire fighting forces and others as required.
- iii. Concept of "forest fire risk assessment" consists of four elements (hazard, exposure, vulnerability, and capacity and measure) .
- iv. Integrated GIS developed by the Project is known as "Macedonian Forest Fire Information System (MKFFIS)".
- v. "Principal information users" targeted by the Project are the relevant institutions, to which equipment for information users are provided (i.e. PEMF, MAFWE, DPR).
- vi. "Document of the risk assessment methodology for forest fires" means of a set of specific documents that define integrated method and procedures for work on forest fire risk assessment in all relevant institutions such as: (1) Method of collecting information and utilization of proper equipment; and (2) How to make data collection and how to conduct appropriate data processing.

AK

Annex 2: PO ver.4 (approved by SC on 15 November 2012)

	Activities / Year	2011			2012			2013			2014		Responsible Person (Project Staff)
		May-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	
<Output 1> National System for forest fire risk assessment is developed												Head of Dept. for Analysis, Assessment & Strategic Planning (DAASP)	
1-1	Design risk assessment methodology for forest fire and document the methodology.											Head of DAASP	
1.1.1	Review of existing methodology	■										ditto	
1.1.2	Design		■	■								ditto	
1-2	Identify and collect data/information useful for the forest fire risk assessment.											(1) Head of DAASP (2) Head of DOC	
1.2.1	Review of existing data at CMC and relevant institutions	■											
1.2.2	Design of data specification		■	■								n/a	
1.2.3	Data collection & accumulation (initial)				■	■						Head of DAASP Head of DOC	
1.2.4	Further data collection & accumulation							■	■	■		(1) Head of DAASP (2) Head of DOC	
1-3	Develop the integrated GIS, including software, hardware and equipment.											Head of DAASP Head of DOC	
1.3.1	Review of the current CMC System/DB and basic/detailed design for reinforcement	■	■									Asst Head of IT	
1.3.2	Installation of hardware/software to CMC with Data entry				■	■						Asst Head of IT	
1.3.3	System/DB development					■	■					Head of DAASP Asst Head of IT	
1.3.4	System/DB operation and continuous improvement											Head of DAASP Asst Head of IT	
a	Operationalize the initial system/DB							■	■	■		Head of DAASP Asst Head of IT	
b	Improve the initial system/DB continuously							■	■	■		Head of DAASP Asst Head of IT	
c	Enduser assessment							■	■			Head of DAASP Head of DOC	
d	Operationalize the improved system/DB										■	Head of DAASP Head of DOC Asst Head of IT Dept	
1-4	Prepare and store GIS risk maps and tables for forest fire in the integrated GIS.											Head of DAASP Head of DOC Asst Head of IT Dept	
1.4.1	Basic design and detailed specification	■	■									n/a	
1.4.2	Preparation and presentation of hot spot map					■						Head of DAASP Head of DOC	
1.4.3	Preparation and presentation of FWI map											Head of DAASP Head of DOC	
a	Initial map					■	■					Head of DAASP	
b	Establish a small committee for FWI calibration							■	■			Head of DAASP	
c	Workshop on FWI-Learning from Croatian FWI system							■	■			Head of DAASP?	
d	Presentation of the MKFFIS ver1 to EFFIS for comments							■	■			Head of DAASP	
e	Calibration							■	■	■		Head of DAASP	
f	Presentation of the calibrated FWI map by small committee									■		Head of DAASP	
1.4.4	Preparation and presentation of other maps											Head of DAASP Head of DOC	
a	Vegetation dryness map					■	■					Head of DAASP	
b	Forest vegetation map					■	■					Head of DAASP	
c	Forest fire history map					■	■					Head of DAASP Head of DOC	
1.4.5	Integration of CMC's suppression resource table and presentation											Head of DOC Head of DAASP	
a	System improvement design on integration of suppression table							■	■			Head of DOC Head of DAASP	
b	Integration								■	■		Head of DAASP	

1.4.6	Preparation and presentation of a damaged forest value table										Head of DAASP
1-5	Design methodology on assessment of damages and consequences of forest fire.										Head of DAASP Head of DOC Asst Head of IT Dept
1.5.1	Collection of existing documents and desk analysis										Head of DAASP
1.5.2	Design methodology on assessment of damages and consequences										Head of DAASP
1.5.3	System improvement design on damage assessment										Head of DAASP
1-6	Prepare the feasibility study on the technical system for forest fire early detection.										(1) Head of DAASP (2) Head of the Dept. for Financial
1.6.1	Review of existing/applicable detection system										
1-7	Hold training/workshops on the integrated GIS system/database & forest fire risk assessment tools for system users/administrators at CMC and the relevant institutions										Head of DAASP Head of DOC Asst Head of IT Dept
1.7.1	Develop a training plan and materials										Head of DAASP Head of DOC
1.7.2	Training for system administrators (operation and maintenance)										Asst Head of IT Dep
1.7.3	GIS system user training -how to click /GIS system and Fox Pro replacement software user training										Head of DAASP Head of DOC Asst Head of IT Dep
1.7.4	Presentation of the integrated system, training for interpretation of information contained in the forest fire risk assessment tools										Head of DAASP Head of DOC
a	Training (hot spot map, vegetation dryness map, forest vegetation map, forest fire history map )										Head of DAASP Head of DOC
b	Training (above + FWI map, suppression resource table, and damaged forest value table)										Head of DAASP Head of DOC
c	Conduct questionnaire survey at the end of each training for feedback										Head of DAASP Head of DOC
1-8	Share information for forest fire risk assessment from CMC to the relevant institutions through the integrated GIS.										Head of DAASP Head of DOC Asst Head of IT Dep
1.8.1	Make preliminary agreements on the access rights for the data/information stored in the integrated system with user institutions as needed										Head of DAASP Head of DOC
1.8.2	Transmit the information from CMC to the relevant institutions according to the above through MKFFIS										Head of DAASP Head of DOC
1.8.3	Make final agreements on the access rights for the data/information stored in the integrated system with user institutions as needed										Head of DAASP Head of DOC
1.8.4	Transmit the information from CMC to the relevant institutions according to the above through MKFFIS										Head of DAASP Head of DOC
<b>&lt;Output 2&gt; National coordination mechanism of information sharing and cooperation among domestic relevant institutions for prevention and early warning of forest fire is reinforced.</b>											
2-1	Develop sustainable coordination mechanism of CMC and relevant institutions about information sharing and coordination using the integrated GIS.										Head of DAASP Head of DOC
2.1.1	Hold procedure workshops to fit MKFFIS into national legislative framework										Head of DAASP Head of DOC
a	Hold a workshop to identify all necessary modifications to the existing rulebooks, etc.										Head of DAASP Head of DOC
b	Hold a workshop to discuss the initial draft(s) prepared by the responsible organization(s)										Head of DAASP Head of DOC
c	Hold a workshop to discuss & accept the final draft prepared by the responsible organization(s) for submission to the relevant authorities for adoption										Head of DAASP Head of DOC
2-2	Periodically organize Technical Coordination Group Meetings (TCGM).										Head of DAASP
2.2.1	Organize TCGM during the project period	*	*	*	*	*	*				Head of DAASP
2.2.2	Formalize a periodical coordination meeting at technical level for post-project based on lessons/experience from Technical Coordination Group meetings										Head of DAASP
2-3	Confirm the existing state of coordination of information sharing and cooperation on prevention and early warning of forest fire at some model areas.										Head of DAASP Head of DOC
2.3.1	Plan the survey										Head of DAASP Head of DOC
2.3.2	Implementation of the baseline survey										Head of DAASP Head of DOC
2-4	Assess the effectiveness of the integrated GIS in coordination of CMC and relevant institutions and identify supplementary measures, if necessary, utilizing the results of 2-3.										Head of DAASP Head of DOC
2.4.1	Monitoring in the model areas										Head of DAASP Head of DOC
2.4.2	Evaluation on the effectiveness of the integrated GIS in coordination										Head of DAASP Head of DOC
2.4.3	Reporting the results to TCG										Head of DAASP
2.4.4	Action by CMC & relevant institutions as needed										Head of DAASP Head of DOC



## Annex 3: Study Schedule of the Mission

Date, Time	Mr. Asano	Mr. Goseki, Mr. Fukazawa, Mr. Akahane	Stay
Nov 24 Sun	12:50 Departure from Japan (Narita, TK0051, TK1005) 19:45 Arrive at Skopje		Skopje
25 Mon	9:00 Meeting with JET		Skopje
	13:00 Interview at CMC (PM, Mr. Stefanoski)		
	14:00 Interview at CMC (Mr. Karafirovski)		
	15:00 Interview at CMC (PM, Mr. Stefanoski)		
	16:00 Interview to JET		
26 Tue	17:00 Security briefing at JICA Skopje Office		Skopje
	9:00 Interview at CMC (Mr. Petrovski)		
	10:00 Interview at CMC (Mr. Kumanovski)		
27 Wed	12:00 Visit to PEMF		Skopje
	14:00 Visit to HM		
	10:00 Interview to JET		
28 Thu	9:00 Visit to MOEPP		Skopje
	10:00 Visit to RCMC Skopje		
	12:00 Visit to RPEMF Skopje		
	13:00 Interview to JICA Short-term Expert		
29 Fri	15:00 Interview to a specialist of IZZIS		Skopje
	9:00 Visit to PEMF (Protection Section)		
	11:00 Visit to PEMF (Planning Section)		
	12:00 Visit to UNDP		
30 Sat	14:00 Visit to RDPR Skopje		Skopje
	Information collection & analysis, report writing		
1 Sun	Information collection & analysis, report writing		Skopje
2 Mon	10:00 Interview to a staff of MAFWE	13:00 Departure from Japan (Narita, LH715, LH1726)	Skopje
	14:00 Interview to JET	20:40 Arrive at Belgrade	
3 Tue	Interview to JET, information collection & analysis, report writing		Skopje
	Interview to JET, information collection & analysis, report writing	14:00 Departure from Belgrade (JU162)	Belgrade
		14:55 Arrive at Skopje	
4 Wed		17:30 Security briefing at JICA Skopje Office	Skopje
	8:30 Meeting with JET, internal meeting of the Japanese Evaluation Team		
	11:00 Courtesy visit to the Director of CMC (PD of the Project)		
	12:00 Presentation about MKFFIS by CMC C/Ps, interview to CMC C/Ps (PM, Mr. Stefanoski and others)		
	14:00 Visit to MAFWE, interview with officers of MAFWE		
5 Thu	16:00 Interview at CMC (Mr. Petrovski), visit to CMC's Situation Room		Skopje
	7:45 (leave hotel, move to Kichevo)		
	10:20 Visit to RPEMF-Mk.Brod, interview with officers of the RPEMF		
	12:20 Visit to RCMC-Kichevo, interview with officers of the RCMC		
	13:15 Visit to RDPR-Kichevo, interview with officers of the RDPR		
	14:30 Site visit (Burnt area by forest fire, AWS)		
19:30 (arrive at Skopje)			
6 Fri	Internal meeting of the terminal evaluation team, report writing		Skopje
7 Sat	Internal meeting of the terminal evaluation team, report writing		Skopje
8 Sun	Internal meeting of the terminal evaluation team, report writing		Skopje
9 Mon	Public holiday		Skopje
10 Tue	9:00 Internal Meeting of the Joint Evaluation Team		Skopje
	11:00 Meeting with C/P of CMC		
	14:00 Internal Meeting of the Joint Evaluation Team		
11 Wed	11:00 Meeting of the Joint Terminal Evaluation Meeting (sign the Joint Terminal Evaluation Report)		Skopje
	14:00 Steering Committee		
12 Thu	Internal meeting of the terminal evaluation team		Belgrade
	15:35 Departure from Skopje (JU163)		
	16:30 Arrive at Belgrade		
13 Fri	20:20 Departure from Belgrade (TK1084, TK0052)	13:10 Departure from Belgrade (LH1723, LH7202)	On board
14 Sat	Arrive at Japan		-

## Annex 4: List of Interviewees

1. CMC			
	Name	Title and Organization	Date
<b>1) Central Office (HQ)</b>			
1	Mr. Zulfij Adili	Director of Crisis Management Center (CMC)	4/12
2	Mr. Stevko Stefanoski	Head, Department of Analysis, Assessment and Strategic Planning	25/11, 4/12
3	Mr. Dusko Petrovski	Head, Department for Operation and Coordination	26/11, 4/12
4	Mr. Igorce Karafirovski	Assistant Head, IT and Telecommunications	25/11
5	Mr. Vladimir Kuzmanovski	IT staff in charge of MKFFIS	26/11
<b>2) RCMC-Skopje</b>			
1	Mr. Zoran Blazheski	Head	28/11
2	Ms. Ivanka Lazaroska	Advisor	28/11
<b>3) RCMC-Kichevo</b>			
1	Ms. Susana Tasevska	Head	5/12
2	Mr. Ljupco Sofronievski	Advisor	5/12
<b>2. PEMF</b>			
<b>1) Central Office (HQ)</b>			
1	Mr. Blaze Gjorgjievski	Ass. Manager, Department of Roads, Forest Management and Planning	29/11
2	Mr. Igor Lazarovski	Ass. Manager, Department of Nursery Production, Breeding, Raising, Environment and Protection of Forest	29/11
3	Mr. Miroslav Gjrujevski	Forest Engineer, Department of Roads, Forest Management and Planning	26/11
<b>2) RPEMF-Skopje</b>			
1	Mr. Kiro Delov	Forest Engineer	28/11
2	Mr. Zlatko Golubov	Forest Engineer	28/11
<b>3) RPEMF-Mk.Brod</b>			
1	Mr. Bojan Trajkovski	Head	5/12
2	Mr. Aleksandar Maksimovski	Forest Engineer	5/12
3	Mr. Ace Taneski	Forest Engineer	5/12
<b>3. DPR</b>			
<b>1) RDPR-Skopje</b>			
1	Mr. Aleksandar Radosavljevica	Junior Associate	29/11
<b>2) RDPR-Kichevo</b>			
1	Mr. Dragoljub Poposki	Acting Head	5/12
<b>4. HM</b>			
<b>1) Central Office (HQ)</b>			
1	Mr. Zoran Frangovski	In charge of IT	26/11
<b>5. MAFWE</b>			
<b>1) Central Government (HQ)</b>			
1	Mr. Vojo Gogovski	State Advisor for Forestry and Hunting	4/12
2	Mr. Jordan Zdravkovski	Head, Forestry Department	4/12
3	Mr. Jurant Dika	Junior Associate, Forestry Department	2/12, 4/12
<b>6. Other Institutions</b>			
<b>1) Ministry of Environment and Physical Planning (MOEPP)</b>			
1	Ms. Smilka Teneva	Advisor for Protection of Nature, Department of Nature	28/11
<b>2) UNDP</b>			
1	Ms. Anita Kodzoman	Program Officer, Head of Environmental Practice	29/11
2	Mr. Vasko Popovski	Project Manager, Disaster and Climate Risk Reduction	29/11
<b>3) Institute for Earthquake Engineering and Engineering Seismology (IZZIS)</b>			
1	Dr. Zoran Miltinovic	Head, Department of Risk, Disaster Management and Strategic Planning	28/11

7. Japan side			
1) JET			
1	Mr. Eisho Sato	Chief Advisor	25/11-11/12
2	Ms. Yasuyo Honda	Project Coordinator/ Information Management	25/11-11/12
3	Mr. Hiroyuki Kozu	Short-term Expert in Development Management	28/11
2) JICA Balkan Office			
1	Ryuichi Ito	Assistant Resident Representative	11/12
3) JICA Macedonia Office			
1	Mr. Sasho Dimitrov	Technical Coordinator	25/11-11/12

Annex 5: List of Japanese Experts (dispatch period)

As of Dec 2013

	Name	Dispatch Period (departure and arrival date of Japan)													
		2011			2012			2013			2014				
		4-6	7-9	10-12	1-3	4-6	7-9	10-12	1-3	4-6	7-9	10-12			1-3
<b>Long-term Experts</b>												<b>Total: 6 years (2,190 MD)</b>			
1	Mr. Eisho Sato Chief Advisor / Forest Fire Management	■ ■ 10/5/11	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■ 9/5/14	36.5MM (1,095MD)
2	Ms. Yasuyo Honda Project Coordinator/ Information Management	■ ■ 10/5/11	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■ 9/5/14	36.5MM (1,095MD)
<b>Short-term Experts</b>												<b>Total: 25.17MM (755 MD)</b>			
1	Mr. Shiro Makita Basic / Detailed GIS Design			■ ■ 31/10/11 29/12/11	■ 2/2/12 2/3/12										59 29
2	Mr. Masaaki Abe Detailed GIS Design			■ ■ 10/11/11	■ ■ 8/3/12										119
3	Mr. Makoto Takei Network Design			■ 21/11/11 28/12/11											37
4	Mr. Haruo Sawada Vegetation Dryness Map / Hotspot Map				■ 25/2/12 7/3/12										10
5	Mr. Shiro Makita System Development Management (design)							■ 16/8/12 14/9/12							29
6	Mr. Hiroyuki Kozu System Development Management (Management)							■ ■ 16/8/12	■ 14/10/12						59
7	Mr. Shiro Ochi Vegetation Dryness Map / Hotspot Map							■ 27/8/12 9/9/12							13
8	Mr. Shiro Ochi Vegetation Dryness Map / Hotspot Map												■ 15/2/13 25/2/13		10
9	Mr. Yuta Morikawa System Development Management (Data)												■ 8/1/13 20/2/13		43

48

10	Mr. Shiro Makita System Development Management (Design)									9/9/13 25/9/13				16
11	Mr. Hiroyuki Kozu System Development Management (Management)								8/1/13 8/3/13					59
12	Mr. Hiroyuki Kozu System Improvement (Design)								21/4/13 4/7/13					74
13	Mr. Hiroyuki Kozu System Improvement (Development Management)									1/9/13	■■■■	■■■	27/2/14	179
14	Mr. Yuta Morikawa System Development Management (Data)								13/5/13 1/6/13					19
15	Mr. Yuta Morikawa System Improvement Management (Data)											(1/14)		(planned)

49

< List of Local Staff for the JICA Expert Team >

As of Dec 2013

	Name	Contracted Period													
		2011			2012			2013			2014				
		5-6	7-9	10-12	1-3	4-6	7-9	10-12	1-3	4-6	7-9	10-12	1-3		4-5
1	Mr. Gjorgji Koneski Project Assistant		■■ 1/8/11	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■	

**Annex 6: List of Participants in the Trainings in Japan**

As of Dec 2013

Fiscal Year	Name	Position at the time of training	Period	Course Name & Institutions/Lecturers
2012	1 Mr. Zulfi Adili	Director, CMC	29 Jan 2012 ~ 11 Feb 2012	Course name: Forest Fire Management Institutions/Lecturers: JICA, Prefectural Government of Hyogo, Asian Disaster Reduction Center (ADRC), City Government of Kobe, Fukuyama City University, JAXA etc.
	2 Mr. Stevko Stefanoski	Head, Department for Analysis, Assessment and Strategic Planning, CMC		
	3 Mr. Veli Kardi	Assistant Head, Department, Department for Finance, Legal and Common Affairs, CMC		
2013	1 Mr. Berat Ajdari	Assistant head of IT, CMC	15 Apr 2013 ~ 26 Apr 2013	Course name: GIS/Open Source Software Operation Training Institutions/Lecturers: JICA, KKC, Forestry Agency of the Japanese Government, City Government of Hiroshima, Prefectural Government of Hiroshima etc.
	2 Mr. Igorce Karafilovski	Assistant head of IT, CMC		
	3 Mr. Vladimir Kuzumanovski	Assistant for GIS and DMS, CMC		
	4 Mr. Miroslav Orujevski	Independent designer, PEMF		

## Annex 7: List of Equipment Supported by JICA

## 1. Equipment to be used by CMC and relevant institutions

As of Dec 2013

Year of Procurement*	Item Name	Specifications	Quantity	Place of Use
2011	Data Base Server (Rack mount type)	Dell Power Edge R710	1	CMC-HQ
2011	Calculation GIS Server (Rack mount type)	Dell Power Edge R710	1	CMC-HQ
2011	Intranet GIS Server (Rack mount type)	Dell Power Edge R710	1	CMC-HQ
2011	Internet GIS Server (Rack mount type)	Dell Power Edge R710	1	CMC-HQ
2011	Reserve Server (Tower type)	Dell Power Edge T710	1	CMC-HQ
2011	Network Storage (Rack mount type)	Dell Power Vault NX3100	1	CMC-HQ
2011	HUB (Rack mount type)	Dell Power Connect 2824	1	CMC-HQ
2011	UPS (Rack mount type)	Eaton 9135 5000VA	1	CMC-HQ
2011	UPS Battery	APC RBC12-SU5000R51BX120	2	CMC-HQ
2011	Rack	Conteg 19" 42U	1	CMC-HQ
2012	PSU for NAS	For Dell Power Vault NX3100	1	CMC-HQ
2012	Hardware Firewall	Sonic Wall NSA2400	1	CMC-HQ
2012	Workstation for simulation	FUJITSU CELSIUS R920 with B24W-5 monitor	2	CMC-HQ
2012	Laptop PC	FUJITSU LIFEBOOK E782 QM77	1	CMC-HQ
2012	Tape Library	FUJITSU ETERNUS LT40 S2 Library 24 slots	1	CMC-HQ
2012	Client PC	FUJITSU ESPRIMO P400 E85+ with E22W-6 LED monitor	6	CMC-HQ
2012	Windows Server 2008R2 Standard Edition	Reserve Server will have 4 licenses for 4 virtual servers with this.	1	CMC-HQ
2012	Host Bus Adapter	Dual Channel 8Gb for Dell Power Vault	1	CMC-HQ
2013	Memory 16GB	128GB each for 4 Servers: Internet/Intranet/Forest/Database	32	CMC-HQ
2013	CPU Additional For Database server	E5620	1	CMC-HQ
2013	OS upgrade including installation fee of CPU+memory+OS	Windows Server Std. 2013 with downgrade rights to 2008R2 Enterprise edition	4	CMC-HQ
2013	Smart board	SMART Board SB660i5	1	CMC-HQ
2013	Monitor 24"	Dell U2412M	2	CMC-HQ
2013	Client PC for viewing	Dell Optiplex 7010 Desktop i7, 8GB, HD500GB, 21" monitor	2	CMC-HQ
2011	Satellite Server (Tower type)	Dell Precision T5500	1	HM
2011	AWS Server	Dell Power Edge T110-II	1	HM
2011	AWS	Campbell CR-1000XT and AM16/32XT set with sensors Anemometar ultrasonic 2D, HC2S3, 41003-5, MR3H FC on 3 guy mast	5	HM
2011	AWS Data Collection System	Campbell Software Loggernet, LNDB RTMCPPro, RTDAQ, RTMCWeb. CUSSCFG, and customization	1	HM
2012	AWS	Campbell CR-1000XT and AM16/32XT set with sensors Anemometar ultrasonic 2D, HC2S3, 41003-5, MR3H FC on 3 guy mast, 4 locations with solar/wind generator, 6 location with GPRS	8	HM
2012	AWS	Campbell Software Loggernet, LNDB RTMCPPro, RTDAQ, RTMCWeb. CUSSCFG, and customization	2	HM
2012	Router	Mikrotik RB1100AHx2 Router-BOARD 1100AHx2 with Power PC	1	HM
2012	Switch	DCS-4500-50T Full Gigabit Intelligent L2 Aggregation Switch	1	HM
2011	Forest Server	Dell Power Edge T710	1	PEMF
2011	NAS	Synology DS2411+NAS Server	1	PEMF
2011	UPS	Eaton PW5130i 3000VA/2700W XL2U	1	PEMF
2011	PDA	Apple iPad2 WiFi + 3G (Assisted GPS)	3	PEMF
2012	PDA	Apple iPad3 WiFi	9	PEMF
2011	Client PC	Dell Optiplex 390 Desktop	10	PEMF
2012	Hardware Firewall	Sonic Wall TZ 210	1	PEMF

2013	Client PC for viewing	Dell Optiplex 3010 Desktop i5, 8GB, HD500GB, 21"monitor	2	PEMF
2013	Client PC for map data capturing	Dell Optiplex 7010 Desktop i7, 16GB, HD1TB, 21"monitor	1	PEMF
2011	Client PC	Dell Optiplex 390 Desktop	4	MAFWE
2011	Client PC	Dell Optiplex 390 Desktop	4	MAFWE
2012	Client PC	FUJITSU ESPRIMO P400 E85+ with SL23T-1 LED monitor	35	RCMC
2012	Client PC	FUJITSU ESPRIMO P400 E85+ with SL23T-1 LED monitor	2	DPR
2012	Client PC	FUJITSU ESPRIMO P400 E85+ with SL23T-1 LED monitor	8	RDPR
2012	Client PC	FUJITSU ESPRIMO P400 E85+ with SL23T-1 LED monitor	30	RPEMF

\*The period of Japanese fiscal year is from April to March

## 2. Equipment to be used by JET

Year of Procurement*	Item Name	Specifications	Quantity	Responsible Institutions
2011	Vehicle	Mitsubishi Pejero, 3.2 L, 4×4	1	JET Office
2011	HUB (Rack mount type)	Dell Power Connect 2824	1	JET Office
2011	Printer-Laser	RICOH SP 232sf	1	JET Office
2011	PC-Desktop	Dell Optiplex 380MT (E5800, OS)	1	JET Office
2011	Projector	BenQ EP4227 Type MX660P	1	JET Office
2011	PC-Desktop	Dell Precision t350	2	JET Office
2011	PC-Notebook	ASUS Zenbook	1	JET Office
2011	PC-Notebook	Asus N55SF-S2481	1	JET Office
2011	Camera	Nikon D5100	1	JET Office
2012	Projector	BenQ W1060	1	JET Office
2012	PC-Desktop	Custom made	1	JET Office
2012	PDA	Apple iPad 3 WiFi	1	JET Office
2012	Network Access Storage	Synology DS212J	1	JET Office

\*The period of Japanese fiscal year is from April to March.



## Annex 8: Project Cost &amp; Budget

Japanese side (unit: thousand JPY)

## 1) Disbursement of Local Activity Cost (as of September 30, 2013)

Unit=MKD

	Budget Item	JFY*2011	JFY*2012	JFY*2013			Total in MKD
				Apr-Sep	Oct-Dec	Jan-Mar, 2014	
1	Professional Fee	770,969.50	779,316.00	338,141.00	282,946.20	212,209.65	2,383,582.35
2	Consultancy Service	2,695,700.00	674,664.00	-	61,350.00	92,025.00	3,523,739.00
3	System Development	-	15,389,006.00	-	-	2,760,750.00	18,149,756.00
4	Facility Maintenance	-	143,559.00	-	381,535.65	-	525,094.65
5	Equipment Maintenance	93,762.50	48,994.50	17,530.00	7,362.00	-	167,649.00
6	Purchase of Materials and Small Equipment	955,445.50	337,198.50	-	-	61,350.00	1,353,994.00
7	Consumables	111,240.50	174,723.00	25,042.00	19,018.50	19,141.20	349,165.20
8	Transportation - Air	228,536.00	115,298.00	104,720.00	12,270.00	-	460,824.00
9	Travel cost - Domestic	164,738.00	70,085.00	41,935.00	1,472.40	-	278,230.40
10	Travel cost - International	293,159.25	75,512.00	68,661.00	10,061.40	-	447,393.65
11	Communication	73,443.00	117,980.50	69,336.00	10,429.50	-	271,189.00
12	Documentation	-	164,100.00	81,348.00	-	171,780.00	417,228.00
13	Rental	-	124,518.00	-	41,104.50	-	165,622.50
14	Seminar (rent space, food etc.)	68,091.00	149,904.00	90,322.00	192,332.25	591,598.05	1,092,247.30
15	Custom-Agent fee	-	-	9,888.06	-	-	9,888.06
16	Others	120,679.91	190,141.80	122,392.00	336,750.15	81,534.15	851,498.00
Total in MKD		5,575,765.16	18,555,000.30	969,315.06	1,356,632.55	3,990,388.05	30,447,101.11
Total in JPY (JFY2011-2012: 1 MKD = 1.64JPY, JFY2013: 1 MKD = 2.12JPY)		9,144,254.86	30,430,200.48	2,054,947.92	2,876,061.01	8,459,622.67	52,965,086.93
Total in EUR (1EUR = 61.35MKD)		90,884.52	302,444.99	15,799.76	22,113.00	65,043.00	496,285.27

\*The period of Japanese fiscal year is from April to March

\*\*For the JFY 2013, Apr-Sep figures are based on actual expenditure, while Oct 2013 - Mar 2014 figures are based on the budget.

## 2) Disbursement for Purchasing Equipment

JFY*2011		JFY*2012		JFY*2013		Total	
EUR(€)	JPY(¥)	EUR(€)	JPY(¥)	EUR(€)	JPY(¥)	EUR(€)	JPY(¥)
€	JPY	€	JPY	€	JPY	€	JPY
192,346.00	19,819,331	311,878.69	32,135,981	17,457.39	2,233,150	521,682.08	54,188,462

\*The period of Japanese fiscal year is from April to March

\*JPY/EUR conversion rate was "1EUR = JPY103.04" for JFY2011-2012 (JICA official rate of Nov.2012)

\*JPY/EUR conversion rate was "1EUR = JPY127.92" for JFY2013 (JICA official rate of Nov.2013)

\* Equipment purchased in operational budget items is not included.

## Annex 9: List of Counterpart Personnel

### 1. CMC

	Name	Title and Organization	Period
1)	<b>Central Office (HQ)</b>		
1	Mr. Zulfi Adili	Director of Crisis Management Center (CMC)	September 2011 to May 2014
2	Mr. Toni Jakimovski	Former Director of Crisis Management Center (CMC)	May 2011 to September 2011
3	Mr. Stevko Stefanoski	Head, Department of Analysis, Assessment and Strategic Planning	May 2011 to May 2014
4	Mr. Dusko Petrovski	Head, Department for Operation and Coordination	May 2011 to May 2014
5	Mr. Igorce Karafirovski	Assistant Head, IT and Telecommunications	May 2011 to May 2014
6	Mr. Vladimir Kuzmanovski	IT staff in charge of MKFFIS	May 2011 to May 2014
7	Mr. Dragi Tarcugovski	Assistant Head of the Department for Analysis, Assessment and Strategic Planning (DAASP)	November 2012 to May 2014
8	Mr. Berat Ajdari	Assistant head in IT	November 2012 to May 2014
9	Mr. Vladimir Novacev	Section Head in IT	May 2011 to May 2014
10	Mr. Ivan Medarski	Section Head in DAASP	May 2011 to May 2014
2)	<b>RCMC-Strumica</b>		
1	Mr. Milan Rusev	Manager	March 2013 to May 2014
2	Mr. Dimitar Stojovski	Junior Assistant	March 2013 to May 2014
3)	<b>RCMC-Kichevo</b>		
1	Ms. Susana Tasevska	Manager	March 2013 to May 2014
2	Mr. Ljupco Sofronievski	Advisor	March 2013 to May 2014

### 2. Quasi Counterparts in Relevant Institutions

#### (1) PEMF

1)	<b>Central Office (HQ)</b>		
1	Mr. Blaze Gjorgjievski	Ass. Manager, Department of Roads, Forest Management and Planning	May 2011 to May 2014
2	Mr. Igor Lazarovski	Ass. Manager, Department of Nursery Production, Breeding, Raising, Environment and Protection of Forest	February 2012 to May 2014
3	Mr. Miroslav Gjruvski	Forest Engineer, Department of Roads, Forest Management and Planning	May 2011 to May 2014
4	Jovan Chakovski	Chief of Protection, Department of Nursery Production, Breeding, Raising, Environment and Protection of Forest (fmr. Assistant Manager of above Dept.)	May 2011 to May 2014
2)	<b>RPEMF-Skopje</b>		
1	Mr. Kiro Delov	Forest Engineer, RPEMF Skopje	March 2012 to May 2014
2	Mr. Zlatko Golubov	Forest Engineer, RPEMF Skopje	March 2012 to May 2014
(2) DPR			
1)	<b>RDPR-Skopje</b>		
1	Mr. Aleksandar Radosavljevic	Junior Associate, RDPR Skopje	March 2012 to May 2014
(3) HM			
1)	<b>Central Office (HQ)</b>		
1	Ms. Rada Avramovska	Authorized Representative, Meteorological Department, forecast	May 2011 to November 2013
2	Mr. Zoran Frangovski	In charge of IT	May 2011 to May 2014
(4) MAFWE			
1)	<b>Central Office (HQ)</b>		
1	Mr. Vojo Gogovski	State Advisor for Forestry and Hunting	May 2011 to May 2014
2	Mr. Jordan Zdravkovski	Head, Forestry Department	May 2011 to May 2014
3	Mr. Jurant Dika	Staff of Forestry Department	May 2011 to May 2014
(5) MOEPP			
1)	<b>Central Office (HQ)</b>		
1	Ms. Smilka Teneva	Advisor for Protection of Nature, Department of Nature	May 2011 to May 2014

Annex 10: Accomplishment Grid 1 (Accomplishment based on the Indicators)

As of Dec 2013

Narrative Summary	Indicators	Current Status Scale: Achieved, Almost achieved, Under progress, Not achieved yet
<p><b>[Overall Goal]</b> The occurrences of massive forest fire are reduced by strengthening the social capacity for prevention (*i) and early warning of forest fire.</p>	<p>1. Data/information provided from CMC to institutions under the Crisis Management System will become more promptly and adequately.</p>	<p>Not achieved yet.</p> <ul style="list-style-type: none"> <li>- MKFFIS comprehensively integrates four risk elements (hazard, exposure, vulnerability, capacity and measures) to produce eight risk assessment maps. The data/information provided by CMC is significantly specialized for prevention and early warning of forest fire that is considered to be adequate.</li> <li>- MKFFIS (ver.1) updates eight risk assessment maps as soon as their data sources (data providers) are updated. The frequency of the update is considered to be prompt and sufficient.</li> </ul>
<p><b>[Project Purpose]</b> The capacity of CMC for transmitting information to domestic relevant institutions (*ii) for prevention and early warning of forest fire and coordinating them is strengthened.</p>	<p>1. By the Project end, modifications in the existing government procedures, necessary to fit the integrated GIS, in legislative framework, are adopted by the relevant authorities.</p>	<p>Under progress.</p> <ul style="list-style-type: none"> <li>- In order to make MKFFIS and GFIS fit in legislative framework of relevant institutions two WSs were held to draft text of modified rulebooks*(ordinance or decree) in 29-30 October and 12-13 November of 2013.</li> <li>- Based on the outputs of above mentioned WSs, MAFWE will start (has started) to modify their rulebooks in the existing government procedures.</li> </ul>
	<p>2. By the Project end, information contained in forest fire risk assessment tools of the integrated GIS at CMC is updated with pre-determined frequency for transmission to the relevant institutions.</p>	<p>Almost achieved.</p> <ul style="list-style-type: none"> <li>- Hotspot map, FWI map, vegetation dryness map, forest vegetation map, and forest fire history map had created in March 2013, and since then, those maps have been continuously updated in accordance with the data/information provided by sources.</li> <li>- Frequency of update is as: 1)SEVIRI hotspot is in every 15 minute, 2)MODIS hotspot is in every 6 hours, 3)FWI map is in every day, 4)vegetation dryness map is in every 8 days, 5)forest vegetation map is in every one year, 6)forest fire history is in every event basis.</li> <li>- Suppression resource table and expected damaged forest value are planned to be generated, to be added to MKFFIS, by December 2013, and subsequently, the value will be updated with pre-determined frequency.</li> </ul>
	<p>3. By the Project end, data/information from CMC based on the integrated GIS is utilized by the domestic relevant institutions for prevention and early warning of forest fire.</p>	<p>Almost achieved.</p> <ul style="list-style-type: none"> <li>- Information has been available to the domestic relevant institutions since April 2013 through MKFFIS (ver.1).</li> <li>- In July 2013, CMC-HQ sent an official instruction to RCMCs to use MKFFIS (ver.1) for their daily operation.</li> <li>- In July 2013, CMC-JICA held an official inauguration ceremony, invited various institutions and mass-media, to disseminate the contents of MKFFIS (ver.1) (79 people participated).</li> <li>- Helicopter Administrative Division in the Ministry of Interior had started utilization of MKFFIS (ver.1) for their operation, since CMC provided them IDs and passwords to access MKFFIS (ver.1).</li> </ul>
<p><b>[Outputs]</b> 1. National system for forest fire risk assessment (*iii), using the integrated GIS (*iv), is developed.</p>	<p>1a By February 2013, integrated GIS is developed based on the risk assessment methodology developed by the project (i.e. integrated GIS ver.1); and is improved by December 2013 (i.e. integrated GIS ver.2).</p>	<p>Almost achieved.</p> <ul style="list-style-type: none"> <li>- MKFFIS (ver.1) was launched in March 2013. MKFFIS (ver.2) is currently under development, expected to be completed in December 2013.</li> <li>- MKFFIS (ver.2) is expected to particularly improve the assessment of two risk elements (exposure and coping capacity) with more detailed information.</li> </ul>

56

	1b	From March 2013, all of the data required for forest fire risk assessment with pre-determined time/spatial resolution, provided by PEMF and HM, is received and stored in the integrated GIS.	Achieved. - Data/information required for constructing MKFFIS (ver.1) were initially acquired from PEMF, HM, CMC and websites of EUMETSAT and NASA. Data/information were stored in the database of MKFFIS (ver.1) in March 2013, subsequently, have been updated.
	1c	By February 2013, four forest risk assessment tools (i.e. hot spot map and vegetation dryness map, covering all land of Macedonia, as well as forest vegetation map and fire history map, covering 90% of forests in Macedonia) are stored in the integrated GIS; and the other three (i.e. FWI map and suppression resource table, covering all land of Macedonia, as well as damaged forest value table, covering 90% of forests) are stored by December 2013.	Almost achieved. - Hotspot map, vegetation dryness map, FWI map, which were created in March 2013, cover the entire country. - Vegetation map covers 90% of forests in Macedonia. - Suppression resource table and expected damaged forest value are planned to cover the entire country, to be created in December 2013.
	1d	By March 2013, at least 90 officers from HQ and regional CMC and 39 officers from HQ and regional offices of the principal information user institutions (29 from PEMF, 1 from MAFWE, 9 from DPR) are trained in administration and/or utilization of the integrated GIS as well as interpretation of the first 4 forest fire risk assessment tools; and the other four tools by March 2014.	Achieved. - Trainings regarding MKFFIS (ver.1) administration and use of maps (hotspot map, vegetation dryness map, FWI map, vegetation map and forest fire history map) were conducted with participation of 91 CMC officers, 57 PEMF officers and 28 officers from other institutions (a total of 176 participants).
	1e	By March 2013, information contained in the forest fire risk assessment tools of the integrated GIS is available to the principal information users (*v) through intranet for utilization in prevention and early warning according to the agreed access rights.	Achieved. - In March and April 2013, key participants of the training regarding MKFFIS (ver.1) administration and use of maps, were granted ID and password to access MKFFIS (ver.1) (91 CMC officers, 31 PEMF officers, 23 DPR officers, and 2 MAFWE officers were granted). Since then, information for prevention and early warning of forest fire has been provided to them. - MKFFIS (ver.1) integrates four risk elements (hazard, exposure, vulnerability, and coping capacity) that enable concerned institution to assess the risk of forest fire comprehensively and effectively by using MKFFIS (ver.1).
	1f	By April 2013, part of information contained in the forest fire risk assessment tools (i.e., Hot Spot map, FWI map, Vegetation Dryness map) of the integrated GIS is published at CMC's website for utilization by other relevant institutions.	Not achieved yet. - At the time of evaluation (December 2013), forest fire risk assessment tools have not yet been available for other relevant institutions and the general public. However, those are planned to be available when MKFFIS (ver.2) will be released.
2. National coordination mechanism of information sharing and cooperation among domestic relevant institutions for prevention and early warning of forest fire is reinforced.	2a	By the project end, the final draft(s) for necessary modifications of the existing government procedures is(are) submitted by the responsible organizations to the relevant authority/authorities for adoption.	Under progress. - In WS1 (29-30 October 2013) and WS2 (12-13 November 2013), it was discussed how rulebooks*(ministerial ordinance) of MAFWE on forest protection and forest management planning should be modified. - MAFWE plans to submit nine (9) modified rulebooks*(ministerial ordinances) in the beginning of 2014 to Legislation Bureau (please refer notes in the margin).
	2b	By the project end, a technical-level coordination meeting on prevention and early warning is formalized for the post-project period.	Not achieved yet. - The process to formalize TCG to be a national level technical coordination meeting will start in April, just before the end of the Project. - Potential legislative justification of the technical level coordination meeting already exists in several laws, however actual procedures of formalization in legislative framework is yet to be defined.

56

56

57

	<p>2c By the project end, recommendations for improvement of coordination, using the integrated GIS, are made based on monitoring in some model areas within jurisdiction of selected RCMCs for action by CMC.</p>	<p>Not achieved yet. - Methodology and procedures to elaborate recommendations for improvement of coordination using MKFFIS are yet to be defined.</p>
--	--	--

- i. "Prevention" includes risk reduction among others.
- ii. " Domestic relevant institutions" targeted by the project are MAFWE, PEMF, DPR, municipal government, local fire fighting forces and others as required.
- iii. Concept of "forest fire risk assessment" consists of four elements (hazard, exposure, vulnerability, and capacity and measure).
- iv. Integrated GIS developed by the project is known as "Macedonian Forest Fire Information System (MKFFIS) "
- v. "Principal information users" targeted by the project are the relevant institutions, to which equipment for information users are provided (i.e. PEMF, MAFWE, DPR).
- vi. "Document of the risk assessment methodology for forest fires" means of a set of specific documents that define integrated method and procedures for work on forest fire risk assessment in all relevant institutions such as:  
(1) Method of collecting information and utilization of proper equipment; and (2) How to make data collection and how to conduct appropriate data processing.

<Notes>

\*"Rulebook" signifies regulation, ordinance or decree in accordance with the circumstances of the use.

\*Currently, following nine rulebooks are under consideration:

1. Rulebook on the content of the special management plans for forests of economic and protective value, as well as the mode of drafting, adoption and approval,
2. Rulebook on the content of the special plans for raising and protection of forests in protected areas, as well as the mode of drafting, adoption and approval,
3. Rulebook on the content of the special management plans for private forests over 100 ha, as well as the mode of drafting, adoption and approval,
4. Rulebook on the criteria for management of private forests for which no special plan or program is required,
5. Rulebook on the operational mode of the Reporting-Diagnosis-Prognosis Unit,
6. Rulebook on the precaution measures to be taken in setting limestone and charcoal processing facilities and similar facilities which create risks for fires in forests and agricultural areas,
7. Rulebook on the special measures for protection of forests against fires,
8. Rulebook on the manner of collection of data pertinent to the damages to the forests, the contents and the management of Forest Damage Register, as well as the manner in which data may be used and
9. Rulebook on the manner of collection of data, the management of the forest fire registers and the conditions under which data may be used.

57

57

Annex 11: Accomplishment Grid 2 (Accomplishment based on the Activities)

As of Dec 2013

Narrative Summary	Activities	Current Status	List of Tangible Products																																				
<p>[Outputs] 1. National system for forest fire risk assessment (*iii), using the integrated GIS (*iv), is developed.</p>	<p>1-1 Design risk assessment methodology for forest fire and document the methodology (*vi).</p>	<p>- Theory and methodology for forest fire risk assessment was documented in the technical report. - After a series of discussions, SC3, held on 9 May 2012, had authorized four risk elements and eight risk assessment tools to be used. &lt; Forest Fire Disaster Risk &gt;</p> <table border="1" data-bbox="725 427 1323 619"> <thead> <tr> <th>Risk Element</th> <th>Risk Assessment Tool</th> </tr> </thead> <tbody> <tr> <td>1. Hazard</td> <td>- Hot Spot Map - Fire History Map</td> </tr> <tr> <td>2. Exposure</td> <td>- Forest Vegetation Map - Damaged Forest Value</td> </tr> <tr> <td>3. Vulnerability</td> <td>- Vegetation Dryness Map - Canadian Fire Weather Index Map</td> </tr> <tr> <td>4. Capacity and Measures</td> <td>- Topographic Map - Suppression Resource</td> </tr> </tbody> </table>	Risk Element	Risk Assessment Tool	1. Hazard	- Hot Spot Map - Fire History Map	2. Exposure	- Forest Vegetation Map - Damaged Forest Value	3. Vulnerability	- Vegetation Dryness Map - Canadian Fire Weather Index Map	4. Capacity and Measures	- Topographic Map - Suppression Resource	<p>- Technical Report: "Methodology for Forest Fire Risk Assessment". Zoran Milutinovic, March 2012</p>																										
Risk Element	Risk Assessment Tool																																						
1. Hazard	- Hot Spot Map - Fire History Map																																						
2. Exposure	- Forest Vegetation Map - Damaged Forest Value																																						
3. Vulnerability	- Vegetation Dryness Map - Canadian Fire Weather Index Map																																						
4. Capacity and Measures	- Topographic Map - Suppression Resource																																						
	<p>1-2 Identify and collect data/information useful for the forest fire risk assessment.</p>	<p>- After a series of discussions, necessary data for forest fire risk assessment were identified in SC3, held on 9 May 2012. - Names of maps, necessary data to generate maps, data providers and the frequency of the update are described in the following table:</p> <table border="1" data-bbox="725 715 1704 1161"> <thead> <tr> <th>Names of Maps</th> <th>Necessary Data</th> <th>Data Provider (data sources)</th> <th>Frequency of update / Spatial Resolution</th> </tr> </thead> <tbody> <tr> <td>1) Hot Spot Map</td> <td>3,900 and 10,800 nm channel of MSG-SEVIRI (-IR039*, -IR108*, -PRO*) Fire Products of Terra/Aqua-MODIS (MOD14*, MYD14*)</td> <td>ftp://ftp.eumetsat.int/pub/OPS/out/simon/FIRE/ EUMETSAT through HM ftp://nrt2.modaps.eosdis.nasa.gov</td> <td>every 15 min./ 3 km by 3 km 2 to 4 times a day/ 1 km by 1 km</td> </tr> <tr> <td>2) Vegetation Dryness Map</td> <td>Vegetation Index and Water Index that are collected by Terra/Aqua-MODIS</td> <td>Through web site of a specific US agency.</td> <td>once a week</td> </tr> <tr> <td>3) Canadian Fire Weather Index Map</td> <td>temperature, moisture, wind speed, rain fall</td> <td>AWS through HM</td> <td>once a day</td> </tr> <tr> <td>4) Forest Vegetation Map</td> <td>species, age, etc.</td> <td>PEMF</td> <td>once a year</td> </tr> <tr> <td>5) Fire History Map</td> <td>fire report</td> <td>PEMF, CMC</td> <td>by event basis</td> </tr> <tr> <td>6) Topographic Map</td> <td>1/25,000 digital map</td> <td>AREC</td> <td>-</td> </tr> <tr> <td>7) Suppression Resource</td> <td>fire suppression equipment, fire fighter</td> <td>PEMF, DPR, CMC, Fire Brigade</td> <td>-</td> </tr> <tr> <td>8) Expected Damaged Forest Value</td> <td>value of wood written in Form 9</td> <td>PEMF</td> <td>by event basis</td> </tr> </tbody> </table>	Names of Maps	Necessary Data	Data Provider (data sources)	Frequency of update / Spatial Resolution	1) Hot Spot Map	3,900 and 10,800 nm channel of MSG-SEVIRI (-IR039*, -IR108*, -PRO*) Fire Products of Terra/Aqua-MODIS (MOD14*, MYD14*)	ftp://ftp.eumetsat.int/pub/OPS/out/simon/FIRE/ EUMETSAT through HM ftp://nrt2.modaps.eosdis.nasa.gov	every 15 min./ 3 km by 3 km 2 to 4 times a day/ 1 km by 1 km	2) Vegetation Dryness Map	Vegetation Index and Water Index that are collected by Terra/Aqua-MODIS	Through web site of a specific US agency.	once a week	3) Canadian Fire Weather Index Map	temperature, moisture, wind speed, rain fall	AWS through HM	once a day	4) Forest Vegetation Map	species, age, etc.	PEMF	once a year	5) Fire History Map	fire report	PEMF, CMC	by event basis	6) Topographic Map	1/25,000 digital map	AREC	-	7) Suppression Resource	fire suppression equipment, fire fighter	PEMF, DPR, CMC, Fire Brigade	-	8) Expected Damaged Forest Value	value of wood written in Form 9	PEMF	by event basis	
Names of Maps	Necessary Data	Data Provider (data sources)	Frequency of update / Spatial Resolution																																				
1) Hot Spot Map	3,900 and 10,800 nm channel of MSG-SEVIRI (-IR039*, -IR108*, -PRO*) Fire Products of Terra/Aqua-MODIS (MOD14*, MYD14*)	ftp://ftp.eumetsat.int/pub/OPS/out/simon/FIRE/ EUMETSAT through HM ftp://nrt2.modaps.eosdis.nasa.gov	every 15 min./ 3 km by 3 km 2 to 4 times a day/ 1 km by 1 km																																				
2) Vegetation Dryness Map	Vegetation Index and Water Index that are collected by Terra/Aqua-MODIS	Through web site of a specific US agency.	once a week																																				
3) Canadian Fire Weather Index Map	temperature, moisture, wind speed, rain fall	AWS through HM	once a day																																				
4) Forest Vegetation Map	species, age, etc.	PEMF	once a year																																				
5) Fire History Map	fire report	PEMF, CMC	by event basis																																				
6) Topographic Map	1/25,000 digital map	AREC	-																																				
7) Suppression Resource	fire suppression equipment, fire fighter	PEMF, DPR, CMC, Fire Brigade	-																																				
8) Expected Damaged Forest Value	value of wood written in Form 9	PEMF	by event basis																																				
	<p>1-3 Develop the integrated GIS, including software, hardware and equipment.</p>	<p>&lt;A. Software&gt; - A private company (Edusoft) was contracted to develop MKFFIS (ver.1) in August 2012. Their work was completed in March 2013. - MKFFIS (ver.1) has seven modules: 1)acquiring data form AWS, 2)acquiring data from forest inventory, 3)creating forest fire risk information, 4)disseminating forest fire risk information, 5)accumulating forest fire history, 6)updating forest inventory, and 7)acquiring information on burnt area. - Same company (Edusoft) was contracted to develop MKFFIS (ver.2) in August 2013, expected to finish developing MKFFIS (ver.2) in December 2013. - Major improvement in MKFFIS (ver.2) is: 1)improving interface, 2)adding new layers, 3)adding new functions,</p>	<p>- Macedonian Forest Fire Information System (MKFFIS) (ver.1) - Final Critical Design Documents (ver.8) - Program Level Document (ver.2) - Manuals for system end users (3 types in Eng and MK)</p>																																				

	<p>4)adding new function to GFIS, 5)improving fire report function, and 6)improving performance.</p> <ul style="list-style-type: none"> <li>- Critical design document for MKFFIS (ver.2) was completed in September 2013.</li> </ul> <p>&lt;B. Hardware and Equipment&gt;</p> <ul style="list-style-type: none"> <li>- A total of 111 client computers and other equipment were procured to be used by CMC and seven relevant institutions as described in the following table:</li> </ul> <table border="1"> <thead> <tr> <th>Institution</th> <th>Server</th> <th>Network Equipment</th> <th>NAS</th> <th>Client Computer</th> <th>PDA</th> </tr> </thead> <tbody> <tr> <td>CMC-HQ</td> <td>7</td> <td>1</td> <td>1</td> <td>9</td> <td></td> </tr> <tr> <td>CMC-HQ (Project)</td> <td></td> <td></td> <td>1</td> <td>6</td> <td>1</td> </tr> <tr> <td>DPR</td> <td></td> <td></td> <td></td> <td>2</td> <td></td> </tr> <tr> <td>HM</td> <td>2</td> <td>2</td> <td></td> <td></td> <td></td> </tr> <tr> <td>MAFWE</td> <td></td> <td></td> <td></td> <td>8</td> <td></td> </tr> <tr> <td>PEMF</td> <td>1</td> <td>1</td> <td>1</td> <td>13</td> <td>12</td> </tr> <tr> <td>RCMC</td> <td></td> <td></td> <td></td> <td>35</td> <td></td> </tr> <tr> <td>RDPR</td> <td></td> <td></td> <td></td> <td>8</td> <td></td> </tr> <tr> <td>RPEMF</td> <td></td> <td></td> <td></td> <td>30</td> <td></td> </tr> <tr> <td><b>Total</b></td> <td><b>10</b></td> <td><b>4</b></td> <td><b>3</b></td> <td><b>111</b></td> <td><b>13</b></td> </tr> </tbody> </table> <ul style="list-style-type: none"> <li>- A total of fifteen (15) AWSs were procured to be donated to HM in FY2011-12.</li> <li>- Servers were upgraded with additional memories and CPUs in FY2013.</li> <li>- An inter-active whiteboard was procured to be used in the situation room of CMC.</li> </ul>	Institution	Server	Network Equipment	NAS	Client Computer	PDA	CMC-HQ	7	1	1	9		CMC-HQ (Project)			1	6	1	DPR				2		HM	2	2				MAFWE				8		PEMF	1	1	1	13	12	RCMC				35		RDPR				8		RPEMF				30		<b>Total</b>	<b>10</b>	<b>4</b>	<b>3</b>	<b>111</b>	<b>13</b>	
Institution	Server	Network Equipment	NAS	Client Computer	PDA																																																															
CMC-HQ	7	1	1	9																																																																
CMC-HQ (Project)			1	6	1																																																															
DPR				2																																																																
HM	2	2																																																																		
MAFWE				8																																																																
PEMF	1	1	1	13	12																																																															
RCMC				35																																																																
RDPR				8																																																																
RPEMF				30																																																																
<b>Total</b>	<b>10</b>	<b>4</b>	<b>3</b>	<b>111</b>	<b>13</b>																																																															
1-4 Prepare and store GIS risk maps and tables for forest fire in the integrated GIS.	<ul style="list-style-type: none"> <li>- Hotspot map, vegetation dryness map, Canadian Fire Weather Index (FWI) map, forest vegetation map, fire history map, and topographic map were created in March 2013.</li> <li>- Suppression resource table and expected damaged forest value table will be created in December 2013.</li> </ul>	<ul style="list-style-type: none"> <li>- Hot spot map</li> <li>- Vegetation dryness map</li> <li>- Canadian Fire Weather Index map</li> <li>- Forest vegetation map</li> <li>- Fire history map</li> <li>- Topographic map</li> <li>- Suppression resource tables</li> <li>- Expected damaged forest values</li> </ul>																																																																		
1-5 Design methodology on assessment of damages and consequences of forest fire.	<ul style="list-style-type: none"> <li>- Study on methodology on assessment of damages and consequence of forest fire was completed in March 2013 by a local consultant.</li> <li>- Considering the study, the Project decided:           <ol style="list-style-type: none"> <li>1) To use forest value table in Form 9 (existing form of PEMF) to be utilized for calculation of expected damaged forest value.</li> <li>2) To consider Zone 1, which is categorized by MOEPP as the environmentally most vulnerable areas, to be the "area of serious consequence" caused by fire.</li> </ol> </li> </ul>	<ul style="list-style-type: none"> <li>- Technical report: "Forest Fire Damage and Consequence Assessment Methodology," Nikola Nikolov, March 2013</li> </ul>																																																																		
1-6 Prepare the feasibility study on the technical system for forest fire early detection.	<ul style="list-style-type: none"> <li>- Feasibility study was cancelled as it was concluded to be not necessary by the technical report on methodology for forest fire risk assessment prepared by Dr. Zoran Milutinovic (March 2012). The cancellation was authorized by the SC.</li> </ul>																																																																			
1-7 Hold training/workshops on the integrated GIS & forest fire risk assessment tools for system users/administrators at CMC and the relevant institutions.	<ul style="list-style-type: none"> <li>- Various training/workshop for administration and/or utilization of MKFFIS for staff from CMC and other relevant institutions were conducted:</li> </ul> <p>&lt;Training in administration and/or utilization of MKFFIS&gt;</p> <table border="1"> <thead> <tr> <th rowspan="2">Date</th> <th rowspan="2">Name of training/workshop</th> <th rowspan="2">Objectives</th> <th colspan="2">Participants</th> </tr> <tr> <th>Institution</th> <th>No.</th> </tr> </thead> <tbody> <tr> <td>25-Dec-12</td> <td>QGIS pre training</td> <td>To evaluate the technical level</td> <td>PEMF Planning section</td> <td>4</td> </tr> <tr> <td>28 Jan - 1 Feb 13</td> <td>QGIS training</td> <td>To equip users with the skills to maintain forest maps with QGIS</td> <td>PEMF Planning section</td> <td>21</td> </tr> <tr> <td>11-14 Feb 13</td> <td>QGIS post training</td> <td>To follow up trainees to create/modify FMU maps</td> <td>PEMF Planning section</td> <td>20</td> </tr> <tr> <td>4-Mar-13</td> <td>TOT on MKFFIS</td> <td>To train CMC HQ staff as trainers for</td> <td>CMC Operation /</td> <td>21</td> </tr> </tbody> </table>	Date	Name of training/workshop	Objectives	Participants		Institution	No.	25-Dec-12	QGIS pre training	To evaluate the technical level	PEMF Planning section	4	28 Jan - 1 Feb 13	QGIS training	To equip users with the skills to maintain forest maps with QGIS	PEMF Planning section	21	11-14 Feb 13	QGIS post training	To follow up trainees to create/modify FMU maps	PEMF Planning section	20	4-Mar-13	TOT on MKFFIS	To train CMC HQ staff as trainers for	CMC Operation /	21	<ul style="list-style-type: none"> <li>- Training reports made by system developer in March 2013</li> <li>- User Manual to Utilize MKFFIS, March 2013</li> <li>- Training plans and the materials for each training</li> </ul>																																							
Date	Name of training/workshop				Objectives	Participants																																																														
		Institution	No.																																																																	
25-Dec-12	QGIS pre training	To evaluate the technical level	PEMF Planning section	4																																																																
28 Jan - 1 Feb 13	QGIS training	To equip users with the skills to maintain forest maps with QGIS	PEMF Planning section	21																																																																
11-14 Feb 13	QGIS post training	To follow up trainees to create/modify FMU maps	PEMF Planning section	20																																																																
4-Mar-13	TOT on MKFFIS	To train CMC HQ staff as trainers for	CMC Operation /	21																																																																

		<table border="1"> <tr> <td></td> <td></td> <td>regional trainings on MKFFIS</td> <td>Analysis / IT section</td> <td></td> </tr> <tr> <td>5, 11-19 Mar 13</td> <td>Regional training on MKFFIS</td> <td>To utilize MKFFIS for prevention and early warnings of forest fire</td> <td>RCMC / RPEMF / RDPR / HM / DPR / PEMF / UNDP / MAFWE</td> <td>155</td> </tr> <tr> <td>6-8 Mar 13</td> <td>Training on forest data maintenance on MKFFIS (GFIS)</td> <td>To maintain forest data using MKFFIS (GFIS) To use MKFFIS for forest fire reporting</td> <td>PEMF HQ Planning Section</td> <td>21</td> </tr> <tr> <td>11-Mar-13</td> <td>Training on MKFFIS for MAFWE</td> <td>To approve forest management plan including maps To inspect forest fire reports and damaged area maps</td> <td>MAFWE Inspectorate MAFWE Forester</td> <td>2</td> </tr> <tr> <td>26-Feb-13</td> <td>CMC system administrator training</td> <td>To install and configure Postgre SQL (software)</td> <td>CMC IT staff</td> <td>9</td> </tr> <tr> <td>15-28 May 13</td> <td>QGIS booster training-OJT</td> <td>To find out the common mistakes by PEMF users in QGIS operations</td> <td>PEMF intermediate users</td> <td>3</td> </tr> <tr> <td>20-21 Mar 13</td> <td>PEMF system administrator training</td> <td>To equip PEMF staff for GFIS administration skills and knowledge</td> <td>PEMF</td> <td>1</td> </tr> <tr> <td>7-Jun-13</td> <td>FF Report Refresher - RPEMF</td> <td>To reinforce the skills to submit forest fire report by RPEMF using GFIS</td> <td>RPEMF</td> <td>34</td> </tr> <tr> <td>18-Jun-13</td> <td>FF Report Refresher-RCMC</td> <td>To reinforce the skills to submit forest fire P2 report by RCMC using GFIS</td> <td>RCMC</td> <td>34</td> </tr> </table> <p>- Various training/workshop to complement use of MKFFIS or to discuss about alternation of national legislative procedures were conducted: &lt;Other trainings/workshops &gt;</p> <table border="1"> <thead> <tr> <th rowspan="2">Date</th> <th rowspan="2">Name of training/workshop</th> <th rowspan="2">Objectives</th> <th colspan="2">Participants</th> </tr> <tr> <th>Institution</th> <th>No.</th> </tr> </thead> <tbody> <tr> <td>25-26 Oct 11</td> <td>Data and data sources for the needs of the system</td> <td>To identify necessary data and data sources for the development of MKFFIS, and to define the data sharing within the crisis management system.</td> <td>CMC, HM, PEMF, MAFWE, DPR, MOEPP, SEA</td> <td>16</td> </tr> <tr> <td>18-Jul-13</td> <td>Informative meeting</td> <td>To fit MKFFIS into national legislative framework</td> <td>Public</td> <td>69</td> </tr> <tr> <td>1-Oct-13</td> <td>Procedure WS1</td> <td>To fit MKFFIS into national legislative framework</td> <td>MAFWE, PEMF, MOEPP, DPR, etc.</td> <td>15</td> </tr> <tr> <td>1-Nov-13</td> <td>Procedure WS2</td> <td>To fit MKFFIS into national legislative framework</td> <td>MAFWE, PEMF, MOEPP, DPR, etc.</td> <td>15</td> </tr> </tbody> </table>			regional trainings on MKFFIS	Analysis / IT section		5, 11-19 Mar 13	Regional training on MKFFIS	To utilize MKFFIS for prevention and early warnings of forest fire	RCMC / RPEMF / RDPR / HM / DPR / PEMF / UNDP / MAFWE	155	6-8 Mar 13	Training on forest data maintenance on MKFFIS (GFIS)	To maintain forest data using MKFFIS (GFIS) To use MKFFIS for forest fire reporting	PEMF HQ Planning Section	21	11-Mar-13	Training on MKFFIS for MAFWE	To approve forest management plan including maps To inspect forest fire reports and damaged area maps	MAFWE Inspectorate MAFWE Forester	2	26-Feb-13	CMC system administrator training	To install and configure Postgre SQL (software)	CMC IT staff	9	15-28 May 13	QGIS booster training-OJT	To find out the common mistakes by PEMF users in QGIS operations	PEMF intermediate users	3	20-21 Mar 13	PEMF system administrator training	To equip PEMF staff for GFIS administration skills and knowledge	PEMF	1	7-Jun-13	FF Report Refresher - RPEMF	To reinforce the skills to submit forest fire report by RPEMF using GFIS	RPEMF	34	18-Jun-13	FF Report Refresher-RCMC	To reinforce the skills to submit forest fire P2 report by RCMC using GFIS	RCMC	34	Date	Name of training/workshop	Objectives	Participants		Institution	No.	25-26 Oct 11	Data and data sources for the needs of the system	To identify necessary data and data sources for the development of MKFFIS, and to define the data sharing within the crisis management system.	CMC, HM, PEMF, MAFWE, DPR, MOEPP, SEA	16	18-Jul-13	Informative meeting	To fit MKFFIS into national legislative framework	Public	69	1-Oct-13	Procedure WS1	To fit MKFFIS into national legislative framework	MAFWE, PEMF, MOEPP, DPR, etc.	15	1-Nov-13	Procedure WS2	To fit MKFFIS into national legislative framework	MAFWE, PEMF, MOEPP, DPR, etc.	15	
		regional trainings on MKFFIS	Analysis / IT section																																																																								
5, 11-19 Mar 13	Regional training on MKFFIS	To utilize MKFFIS for prevention and early warnings of forest fire	RCMC / RPEMF / RDPR / HM / DPR / PEMF / UNDP / MAFWE	155																																																																							
6-8 Mar 13	Training on forest data maintenance on MKFFIS (GFIS)	To maintain forest data using MKFFIS (GFIS) To use MKFFIS for forest fire reporting	PEMF HQ Planning Section	21																																																																							
11-Mar-13	Training on MKFFIS for MAFWE	To approve forest management plan including maps To inspect forest fire reports and damaged area maps	MAFWE Inspectorate MAFWE Forester	2																																																																							
26-Feb-13	CMC system administrator training	To install and configure Postgre SQL (software)	CMC IT staff	9																																																																							
15-28 May 13	QGIS booster training-OJT	To find out the common mistakes by PEMF users in QGIS operations	PEMF intermediate users	3																																																																							
20-21 Mar 13	PEMF system administrator training	To equip PEMF staff for GFIS administration skills and knowledge	PEMF	1																																																																							
7-Jun-13	FF Report Refresher - RPEMF	To reinforce the skills to submit forest fire report by RPEMF using GFIS	RPEMF	34																																																																							
18-Jun-13	FF Report Refresher-RCMC	To reinforce the skills to submit forest fire P2 report by RCMC using GFIS	RCMC	34																																																																							
Date	Name of training/workshop	Objectives	Participants																																																																								
			Institution	No.																																																																							
25-26 Oct 11	Data and data sources for the needs of the system	To identify necessary data and data sources for the development of MKFFIS, and to define the data sharing within the crisis management system.	CMC, HM, PEMF, MAFWE, DPR, MOEPP, SEA	16																																																																							
18-Jul-13	Informative meeting	To fit MKFFIS into national legislative framework	Public	69																																																																							
1-Oct-13	Procedure WS1	To fit MKFFIS into national legislative framework	MAFWE, PEMF, MOEPP, DPR, etc.	15																																																																							
1-Nov-13	Procedure WS2	To fit MKFFIS into national legislative framework	MAFWE, PEMF, MOEPP, DPR, etc.	15																																																																							
	1-8 Share information for forest fire risk assessment from CMC to the relevant institutions through the integrated GIS.	<ul style="list-style-type: none"> <li>- A total of 176 participants of the training, held in February and March 2013 regarding MKFFIS (ver.1) administration and use of maps, were granted ID and password to access MKFFIS (91 CMC officers, 57 PEMF officers, 28 officers from other institutions)</li> <li>- Forest fire information for prevention and early warning has been shared since April 2013 to the people who have ID and password to access MKFFIS (ver.1).</li> </ul>																																																																									
3) National coordination mechanism of information sharing and cooperation among	2-1 Develop sustainable coordination mechanism of CMC and relevant institutions about information sharing and coordination using the integrated GIS.	<ul style="list-style-type: none"> <li>- It was identified that in order to secure sustainable coordination mechanism, rulebooks*(ordinance or decree) of MAFWE need to be modified.</li> <li>- In 29-30 October and 12-13 November of 2013, two WSs were held, and drafted modified rulebooks*.</li> <li>- Based on the outputs of above mentioned WSs, modifications in the existing government procedures is planned to start soon.</li> </ul>	<ul style="list-style-type: none"> <li>- Draft rulebooks:</li> <li>1) Rulebook* on special measures for protection of forest from forest fire</li> <li>2) Rulebook* on forest fire data collection</li> <li>3) Rulebook* on preparation of 10</li> </ul>																																																																								



domestic relevant institutions for prevention and early warning of forest fire is reinforced.	2-2 Periodically organize Technical Coordination Group Meetings (TCGM).	<ul style="list-style-type: none"> <li>- TCG was formed with eight regular members from six regular institutions (CMC, MAFWE, PEMF, HM, DPR and JICA) in June 2011.</li> <li>- TCGMs have been held five times as:</li> </ul> <table border="1"> <thead> <tr> <th>TCG</th> <th>Date</th> <th>Major Agenda</th> </tr> </thead> <tbody> <tr> <td>TCGM 1</td> <td>8 June 2011</td> <td> <ul style="list-style-type: none"> <li>- Explanation of PDM and PO</li> <li>- Example of methodology of forest fire risk assessment, etc.</li> </ul> </td> </tr> <tr> <td>TCGM 2</td> <td>2 December 2011</td> <td> <ul style="list-style-type: none"> <li>- Conceptual design of the "Integrated system for prevention and early warning of forest fires.</li> <li>- Memorandum on cooperation between CMC and the Ministry of Agriculture, Forestry and Water Economy, the National Hydro Meteorological Service and the P.E. Macedonian Forests, etc.</li> </ul> </td> </tr> <tr> <td>TCGM 3</td> <td>4 May 2012</td> <td> <ul style="list-style-type: none"> <li>- The expected outputs (products) of the MKFFIS</li> <li>- Memorandum on Equipment Ownership Transfer.</li> <li>- Project activities and expected results for 2012, etc.</li> </ul> </td> </tr> <tr> <td>TCGM 4</td> <td>15 November 2012</td> <td> <ul style="list-style-type: none"> <li>- Adoption of the Mid-Term Evaluation Report for the Project.</li> </ul> </td> </tr> <tr> <td>TCGM 5</td> <td>9 May 2013</td> <td> <ul style="list-style-type: none"> <li>- Presentation of the Forest Fire Damage Assessment Methodology</li> <li>- Presentation of MKFFIS (ver.1)</li> <li>- Memorandum on Equipment Ownership Transfer.</li> <li>- Project activities and expected results for 2013, etc.</li> </ul> </td> </tr> <tr> <td>TCGM 6</td> <td>Planned (11 Dec 2013)</td> <td> <ul style="list-style-type: none"> <li>- Adoption of the Final Evaluation Report for the project, etc.</li> </ul> </td> </tr> </tbody> </table>	TCG	Date	Major Agenda	TCGM 1	8 June 2011	<ul style="list-style-type: none"> <li>- Explanation of PDM and PO</li> <li>- Example of methodology of forest fire risk assessment, etc.</li> </ul>	TCGM 2	2 December 2011	<ul style="list-style-type: none"> <li>- Conceptual design of the "Integrated system for prevention and early warning of forest fires.</li> <li>- Memorandum on cooperation between CMC and the Ministry of Agriculture, Forestry and Water Economy, the National Hydro Meteorological Service and the P.E. Macedonian Forests, etc.</li> </ul>	TCGM 3	4 May 2012	<ul style="list-style-type: none"> <li>- The expected outputs (products) of the MKFFIS</li> <li>- Memorandum on Equipment Ownership Transfer.</li> <li>- Project activities and expected results for 2012, etc.</li> </ul>	TCGM 4	15 November 2012	<ul style="list-style-type: none"> <li>- Adoption of the Mid-Term Evaluation Report for the Project.</li> </ul>	TCGM 5	9 May 2013	<ul style="list-style-type: none"> <li>- Presentation of the Forest Fire Damage Assessment Methodology</li> <li>- Presentation of MKFFIS (ver.1)</li> <li>- Memorandum on Equipment Ownership Transfer.</li> <li>- Project activities and expected results for 2013, etc.</li> </ul>	TCGM 6	Planned (11 Dec 2013)	<ul style="list-style-type: none"> <li>- Adoption of the Final Evaluation Report for the project, etc.</li> </ul>	<p>years forest management plan by FMU</p> <ul style="list-style-type: none"> <li>- Minutes of the TCGM meetings</li> </ul>
	TCG	Date	Major Agenda																					
	TCGM 1	8 June 2011	<ul style="list-style-type: none"> <li>- Explanation of PDM and PO</li> <li>- Example of methodology of forest fire risk assessment, etc.</li> </ul>																					
TCGM 2	2 December 2011	<ul style="list-style-type: none"> <li>- Conceptual design of the "Integrated system for prevention and early warning of forest fires.</li> <li>- Memorandum on cooperation between CMC and the Ministry of Agriculture, Forestry and Water Economy, the National Hydro Meteorological Service and the P.E. Macedonian Forests, etc.</li> </ul>																						
TCGM 3	4 May 2012	<ul style="list-style-type: none"> <li>- The expected outputs (products) of the MKFFIS</li> <li>- Memorandum on Equipment Ownership Transfer.</li> <li>- Project activities and expected results for 2012, etc.</li> </ul>																						
TCGM 4	15 November 2012	<ul style="list-style-type: none"> <li>- Adoption of the Mid-Term Evaluation Report for the Project.</li> </ul>																						
TCGM 5	9 May 2013	<ul style="list-style-type: none"> <li>- Presentation of the Forest Fire Damage Assessment Methodology</li> <li>- Presentation of MKFFIS (ver.1)</li> <li>- Memorandum on Equipment Ownership Transfer.</li> <li>- Project activities and expected results for 2013, etc.</li> </ul>																						
TCGM 6	Planned (11 Dec 2013)	<ul style="list-style-type: none"> <li>- Adoption of the Final Evaluation Report for the project, etc.</li> </ul>																						
2-3 Confirm the existing state of coordination of information sharing and cooperation on prevention and early warning of forest fire at some model areas.	<ul style="list-style-type: none"> <li>- Two model areas were selected in Kichevo and Strumica after consultation within CMC.</li> <li>- In March 2013, baseline surveys were conducted to verify the baseline situation of before the introduction of MKFFIS (ver.1) in two model areas.</li> <li>- The questionnaire of the baseline survey was consisted of two parts: 1)how to identify forest fire risk and 2)how counter measures should be taken.</li> <li>- 13 out of 25 respondents answered that they use phone to inform fire alert.</li> </ul>	<ul style="list-style-type: none"> <li>- Baseline survey report, March 2013</li> </ul>																						
2-4 Assess the effectiveness of the integrated GIS in coordination of CMC and relevant institutions and identify supplementary measures, if necessary, utilizing the results of 2-3.	<ul style="list-style-type: none"> <li>- Interim survey to assess the effectiveness of MKFFIS (ver.1) was conducted in the end of October 2013 with MKFFIS (ver.1) users in RCMC and RPEMF in two model areas (Kichevo and Strumica). The same questionnaire of the baseline survey was used.</li> <li>- After MKFFIS (ver.2) will be released, final survey to assess the effectiveness of MKFFIS (ver.2) will be conducted.</li> <li>- The final survey will be conducted with not only users of concerned institutions, but also users in municipal governments.</li> </ul>	<ul style="list-style-type: none"> <li>- Analysis table for effectiveness survey (interim survey), November 2013.</li> <li>- Analysis table for effectiveness survey (final survey), planned to be made in March 2014</li> </ul>																						

A

## Annex 12: Evaluation Grid (Evaluation based on the Five Criteria)

Scale of Evaluation: A= High, B=Medium, C=Low

Criteria	Evaluation Question	Source	Information and data obtained from literature surveys, questionnaire surveys, interviews etc.
1 Relevance  The relevance of the project is A.	1-1 (New) Laws, national policies, strategies and other relevant documents associated with forest fire management in the Republic of Macedonia.	JET	<ul style="list-style-type: none"> <li>- In the Strategy on Sustainable Development of Forestry (2006), establishment of an efficient system for early warning and suppression of forest fires is a part of its vision.</li> <li>- One of the strategic objectives of the work program of the Government of Macedonia for the period 2011–2015 is investment in information technology.</li> </ul>
	1-2 Change of mandate/structure of implementing agency (CMC).	CMC	<ul style="list-style-type: none"> <li>- There was no change of mandate/structure of implementing agency (CMC).</li> </ul>
	1-3 Alignment of the project with the needs and expectation of implementing agency (CMC).	CMC	<ul style="list-style-type: none"> <li>- The project purpose; strengthening of capacity of CMC for transmitting information to domestic relevant institutions for prevention and early warning for forest fire, meets CMC's organizational fundamental requirements.</li> <li>- Before the Project, there was no database or/and GIS system in CMC. The Project had newly introduced centrally managed database and GIS system to specifically work for prevention and early warning of forest fires, to be used by various stakeholders whom involved in prevention and early warning of forest fire in different institutions in different locations.</li> </ul>
	1-4 Demands for the implementation of the project among relevant institution/personnel in charge of prevention, early warning and monitoring of forest fire.	CMC, PEMF, DPR, HM  PEMF	<ul style="list-style-type: none"> <li>- Alignment of the Project meets the needs and expectation of relevant institution/personnel in charge of prevention, early warning and monitoring of forest fire.</li> </ul>
			<ul style="list-style-type: none"> <li>- The Project introduced GIS-base information system and database using various forest related information. Before the Project, data/information was mostly paper-based, and managed by individuals in PEMF. The Project enables PEMF to manage data/information centrally in consistent format to be utilized by all PEMF staff in different locations.</li> <li>- Especially in terms of natural parameters that influence the occurrence of forest fires, the Project mostly meets expectations of staff in charge of prevention, early warning and monitoring of forest fires in Macedonia, principally in PEMF.</li> </ul>
1-5 Priority areas of the Government of Japan for the development assistance to Republic of Macedonia.	JET	<ul style="list-style-type: none"> <li>- Japan's Official Development Assistance Charter addresses global warming and environmental problems as one of the priority issues.</li> <li>- Japan's Medium-Term Policy of Official Development Assistance (2005) states environmental sector as one of the most important sectors.</li> <li>- Japan's Country Assistance Policy for Macedonia (2012) states that environment issue as one of two priority areas.</li> </ul>	
2 Effectiveness  The effectiveness of the project is B.	2-1 Attainment level of the Output 1. (National system for fire risk assessment is developed.)	CMC, JET	(Please refer to Annex 10 & 11) <ul style="list-style-type: none"> <li>- Theory and methodology for forest fire risk assessment was discussed, decided and documented in the technical report.</li> <li>- MKFFIS (ver.1) was launched in March 2013. MKFFIS (ver.1) integrates four risk elements (hazard, exposure, vulnerability, and capacity &amp; measures) that enable concerned institution to assess the risk of forest fire comprehensively and effectively.</li> <li>- MKFFIS (ver.2) is currently under development, expected to be released in December 2013.</li> <li>- Hotspot map, vegetation dryness map, FWI map, forest vegetation map, fire history map, and topographic map were created in March 2013.</li> <li>- Trainings regarding MKFFIS (ver.1) administration and use of maps (hotspot map, vegetation dryness map, FWI map, vegetation map and forest fire history map) were conducted with participation of 176 officers from various institutions.</li> <li>- In March and April 2013, key participants of the training regarding MKFFIS (ver.1) administration and use of maps, were granted ID and password to access MKFFIS (ver.1). Since then, information for prevention and early warning of forest fire has been provided to them.</li> </ul>
	2-2 Attainment level of the Output 2. (National coordination mechanism of information sharing and	CMC, JET	(Please refer to Annex 10 & 11) <ul style="list-style-type: none"> <li>- Necessary modifications of the existing government procedures are under discussion.</li> <li>- MAFWE plans to submit modified rulebooks*(ministerial ordinances) in the beginning of 2014 to Legislation Bureau.</li> </ul>

62

X

A

		cooperation is reinforced.)		<ul style="list-style-type: none"> <li>- Potential legislative justification of the technical level coordination meeting already exists in several laws, however actual procedures of formalization in legislative framework is yet to be defined.</li> <li>- Methodology and procedures to elaborate recommendations for improvement of coordination using MKFFIS are yet to be defined.</li> </ul>
		2-3 Effectiveness of outputs (National risk assessment system and national coordination mechanism) to achieve the Project Purpose (the relation of cause and effect appropriate?)	CMC, JET	<ul style="list-style-type: none"> <li>- Two outputs are appeared to be reasonably effective to achieve the project purpose (the relation of cause and effect is reasonably appropriate).</li> <li>- MKFFIS is an advanced web-based GIS to whom all relevant institutions have direct access, which allows simultaneously and identically sharing the forest fires risk information, thereby greatly increase the quality of inter-institutional coordination and take measures to prevent the risk of forest fires.</li> </ul>
			CMC	<ul style="list-style-type: none"> <li>- The Project needs to promote and practically demonstrate its usability of MKFFIS to the wider public, state institutions, mass-media and so on to ensure effectiveness of outputs.</li> </ul>
			JET	<ul style="list-style-type: none"> <li>- By the Joint Mid-term Review Team, the PDM and PO (ver.1) was concluded to be not effective as a management tool for the Project; description of activities was vague, indicators of the outputs were not objectively verifiable and not directly linked to their activities, in November 2012.</li> <li>- Through a series of discussions with the team and concerned people, revised PDM and PO were drafted, which was approved by the 4<sup>th</sup> SC meeting in 15 November 2012. Since then, effectiveness of outputs (national risk assessment system and national coordination mechanism) to achieve the project purpose became higher.</li> </ul>
		2-4 Prospect of the Project Purpose to be achieved by the end of the project period. (CMC's capacity for transmitting information to domestic relevant institutions for prevention and early warning of forest fire and coordinating them is strengthened.)	CMC, JET	<ul style="list-style-type: none"> <li>- Dedicated efforts have been made towards the achievement of outputs and the progress is presumably as expected in achieving the project purpose. With continuous effort of people in both Macedonian and Japanese sides, the project purpose is most likely to be achieved by the project end.</li> <li>- Although their level of achievement of outputs varies at this moment (December 2013), they will contribute to the achievement of the project purpose before the end of the Project.</li> </ul>
			CMC	<ul style="list-style-type: none"> <li>- At this moment, MKFFIS is not fully put to use and therefore achievements are not obvious due to the lack of practical use of the project outputs so far.</li> <li>- Nonetheless, I believe that before project termination there needs to be another practical training for all RCMCs and at least two officers from each RCMC to be given a training completion certificate.</li> </ul>
		2-5 Demonstrated case of development of national level risk assessment and management regarding forest fire.	CMC	<ul style="list-style-type: none"> <li>- Provision of a quick data exchange and sharing between the competent authorities which provides for a realistically successful coordination of activities related to prevention, early warning and mitigation of forest fire risks.</li> </ul>
			RCMC	<ul style="list-style-type: none"> <li>- From the experience so far, RCMC Kichevo cannot confirm their expectations yet, as the system did not register two major forest fires in 2013 in the area of RCMC Kichevo – fire at Ivandol between 24/August/2013 and 26/August/2013 and the fire at Bukojchani between 02/September/2013 and 07/September/2013.</li> <li>- However, the system provides with material to produce good analysis of the fires, as well as reporting options as required by the competent institutions.</li> </ul>
3 Efficiency		3-1 Dispatch of experts	JET	<p>(please refer to Annex 5)</p> <ul style="list-style-type: none"> <li>- In accordance with the R/D, which was acknowledged in January 2011 by Macedonian and Japanese authorities concerned, the Project was officially launched upon the arrival of two long-term experts (10/May/2011).</li> <li>- Two long term experts (Chief Advisor/Forest fire Management, Project Coordinator/IT) were dispatched. The entire dispatch period of two long term experts are (will be) totaled for 73 man-month (MM) (2190 man-day (MD)) over the three years.</li> <li>- To complement works of long-term experts, short-term experts were dispatched 14 times, totaling for 24.17MM (725 MD). Dispatch of the short-term experts was planned in consultation with the Macedonian side.</li> <li>- Besides, the JET has hired local staff and local consultants, who have facilitated JET for various aspects of project implementation.</li> <li>- Since the contents of the integrated GIS have been expanded to a larger extent in 2012, the duration and number of short-term experts were enhanced.</li> </ul>
The Efficiency of the project is B.	Input of Japanese side (quality, quantity and timing)			

63

	3-2 Training in Japan	JET	(please refer to Annex 6) <ul style="list-style-type: none"> <li>- A total of seven counterparts from CMC and PEMF have participated in the training courses in Japan over the project period. In the first training in 2012, trainees were from management level in CMC HQ such as PD and PM, while in the second training in 2013; all four were from operation level (IT staff) in CMC HQ and PEMF.</li> <li>- All of the training participants have been directly involved in the Project.</li> </ul>	
		CMC	- The training which was primarily for IT staff (CMC and PEMF) had a great importance for the sustainability of the system. The system is based on open source software that requires ability of self maintenance.	
		JET	(please refer to Annex 7) <ul style="list-style-type: none"> <li>- To facilitate project activities, equipment including one vehicle, 111 client PCs, 15 AWSs and so on were procured by JICA.</li> <li>- The equipment has been procured and delivered as planned in 2011-2013.</li> <li>- Items, specifications and quantity of the equipment have been determined in consultation with CMC and the relevant organizations.</li> <li>- All of the equipment has been utilized for the project implementation.</li> </ul>	
	3-3 Provision of equipment & facilities	CMC	- Providing the necessary equipment for the system (hardware, software, IT and other equipment) was performed in accordance with the PO and based on previously adopted methodology and system design.	
		JET	(please refer to Annex 8) <ul style="list-style-type: none"> <li>- JICA has provided necessary local cost to carry out project activities. The actual disbursement in 2011, 2012 and 2013 (by the end of September) including cost for operation, facilities, equipment, materials, local employment, travel expenses and so on is totaling MKD25,100,080 (approx.JPY41,629,000).</li> </ul>	
	3-4 Local cost	JET	(please refer to Annex 8) <ul style="list-style-type: none"> <li>- JICA has provided necessary local cost to carry out project activities. The actual disbursement in 2011, 2012 and 2013 (by the end of September) including cost for operation, facilities, equipment, materials, local employment, travel expenses and so on is totaling MKD25,100,080 (approx.JPY41,629,000).</li> </ul>	
	Input of Macedonian side (quality, quantity and timing)	3-5 Assignment of counterpart personnel	CMC, JET	(please refer to Annex 9) <ul style="list-style-type: none"> <li>- Counterpart personnel of the Project were assigned to work in their HQ in Skopje as well as in their regional offices. By the time of terminal evaluation, over the past thirty (30) months, two project directors, one project manager, and a total of 7 staff members from CMC HQ and 4 staff members from RCMCs have been assigned.</li> <li>- New project director was assigned in September 2011.</li> <li>- The Head of the Department for Operation and Coordination, CMC (Mr.Dusko Petrovski) became more involved in the Project in response to the recommendations made by the Joint Mid-term Review Team in November 2012.</li> </ul>
		3-6 Disbursement for the project operation	CMC, JET	- Office space (approx. 50m <sup>2</sup> ) for the Project was provided by CMC in the building of its HQ in Skopje. <ul style="list-style-type: none"> <li>- Expenditures for the maintenance of the JET office (e.g., electricity, heating, cleaning) were borne by CMC.</li> </ul>
	3-7 Exchange of information/data between/among CMC and relevant organizations (DPR, HM, MAFWE, PEMF and their local offices).	RCMC	- Communication with relevant organizations in the field was smooth and efficient. Provision of a quick data exchange and sharing between the competent authorities which provides for a realistically successful coordination of activities related to prevention, early warning and mitigation of forest fire risks.	
CMC, PEMF, MOEPP, DPR, HM		- Technical Coordination Group holds regular meetings also special thematic groups for specific project activities. The results of interviews to the staff of all member institutions of TCG show that TCG meeting is an effective tool for coordination among relevant institutions. <ul style="list-style-type: none"> <li>- The Project has been implemented in coordination/cooperation with members of TCG, including MAFWE, MOEPP, DPR, HM, and PEMF.</li> <li>- The Project has strengthen cooperation and cooperation among CMC and the relevant institutions involved in prevention of forest fire through information sharing and discussions in TCG and other meetings on the subjects related to the Project.</li> </ul>		
3-8 Methods and contents of technology/knowledge transfer from the project experts to counterparts and partner organizations.	CMC	- Technology/knowledge transfer was good. <ul style="list-style-type: none"> <li>- Japanese experts with the relevant background, appropriate experiences, and sufficient technical level have been assigned. They were hardworking and committed to their assignment.</li> <li>- Short-term experts made a significant contribution to the development of MKFFIS, started from its design, system development, testing and also its improvement.</li> </ul>		
3-9 Promoting/hindering factors to produce the outputs.		-		

NA

65

<p>4 Impact</p> <p>The impact of the project is A.</p>	<p>4-1 Prospect of achieving the Overall Goal (the occurrence of massive forest fire is reduced) in 3-5 years after the termination of the project.</p>	JET	<ul style="list-style-type: none"> <li>- Massive forest fire, which is written in the overall goal, is often attacked by helicopter. The fact that CMC disseminate the information through MKFFIS was known to helicopter administration division, Ministry of Interior. CMC provided IDs and passwords to the officers in helicopter administration division.</li> </ul>	
		RCMC	<ul style="list-style-type: none"> <li>- MKFFIS (ver.1) provides an overview of data related to vegetation dryness, vegetation species, areas susceptible to fire, infrastructure and other elements which are necessary in the forest fire risk assessment process. For that reason the system will, in future, provide for a larger development of the national system for forest fire risk assessment.</li> <li>- The implementation of the project ensured a joint approach by the staff from various institutions in assessing forest fire dangers, and it also provided for a stronger coordination mechanism among relevant institutions, which in its turn should allow for quicker actions by all competent authorities in mitigating forest fire risks.</li> </ul>	
		PEMF	<ul style="list-style-type: none"> <li>- More resources will have to be directed towards the human factor, because it has the greatest impact of causing forest fires in the field. Raising public awareness to prevent forest fire is essential.</li> </ul>	
	<p>4-2 Ongoing/possible collaborations, if any, with multi/bi-lateral development organizations (UN, NGO, civil society, and private sectors)</p>	UNDP	<ul style="list-style-type: none"> <li>- UNDP has been implementing "Disaster and Climate Risk Reduction Program" with the purpose of strengthening the CMC's capacities for multi-risk monitoring and assessment (project period: 2011-2013, project budget is USD230,000).</li> <li>- The UNDP project has been developing databases for potential hazards, exposure and vulnerability of communities, with the aim of increasing the resistance of the impacts of disasters. The Project and the UNDP project have been exchanging information as needed.</li> </ul>	
		MAFWE	<ul style="list-style-type: none"> <li>- Macedonia is a member country of the "Ministerial Conference on the Protection of Forests in Europe (Forest Europe)", and has been in the process of "Intergovernmental Negotiation Committee for a Legally Binding Agreement on Forests in Europe (INC)". INC is anticipating having an agreement on forests in Europe in near future. After the agreement, Macedonia might have assistance on forest fire management.</li> </ul>	
	<p>4-3 Any positive/negative impact brought about by the project (such as policy and research development, environmental protection etc.)</p>	CMC	<ul style="list-style-type: none"> <li>- Results achieved by the Project will enhance the legal and inter-institutional (multi-sectorial) bases of the country for effective and efficient communication, coordination and timely exchange of information related to all types of disaster in the country.</li> <li>- The Project introduces new technologies and new ways in operation; therefore there has been a certain aloofness and abhorrence among some staff, because they are afraid of changing their longstanding habits of works.</li> </ul>	
		JET, CMC	<ul style="list-style-type: none"> <li>- MKFFIS can be a platform of all kind of disaster such as flood, earthquake, landslide and so on. It enables all disaster management more promptly and more adequately.</li> </ul>	
		PEMF	<ul style="list-style-type: none"> <li>- The Project created geospatial database from forest inventory information and boundary information, and MKFFIS provides means to centrally accumulate forest related information to be continuously updated. That enabled PEMF to efficiently plan and manage forests.</li> <li>- Thematic maps and database of forest related information are useful tools for sustainable forest management by the forestry sector, as well as for the responsible institutions of the forest fire risk management.</li> </ul>	
		MOEPP	<ul style="list-style-type: none"> <li>- After integrating information on three national parks into MKFFIS (ver.2), it is expected to make PE's process of preparing annual operational plans for national parks more efficient and effective.</li> <li>- The system provides accurate information for forest fire management, so that can be shared with authorities of neighboring countries such as Albania and Bulgaria.</li> </ul>	
	<p>5 Sustainability</p> <p>The sustainability of the project is B.</p>	<p>5-1 Prospect from institutional viewpoint (legislations &amp; policies, rule &amp; regulation, organization, operational procedures, participation of stakeholders etc.)</p>	JET	<ul style="list-style-type: none"> <li>- Current legislative framework and policy/strategy for prevention and early warning of forest fires will continue after the termination of the Project.</li> <li>- Development of draft(s) for necessary modifications of the existing government procedures in collaboration with the relevant institutions envisaged under Output 2 will enhance institutional sustainability in each institute.</li> <li>- The Project activities have been implemented in collaboration with members of the Technical Coordination Group. The collaborative relationship enhanced through the Project is expected to continue as both CMC and member institutions.</li> <li>- Formalization of a periodical coordination meeting at technical level for post-project period is envisaged under Output 2.</li> </ul>
			CMC	<ul style="list-style-type: none"> <li>- The technical level inter-institutional coordination group are planned to be transformed into permanent body and forum for post project period.</li> </ul>

NA

5-2 Prospect from technical viewpoint (technology/knowledge and its update, deliverables and its maintenance etc.)	RCMC, RPEMF	<ul style="list-style-type: none"> <li>- Selected RCMCs are all competent to having the technical capacity for maintaining the existing components of MKFFIS. The need for periodical update of technical skill from their side is low.</li> <li>- Selected RPEMF is confident to be technically sustainable to use MKFFIS for their daily operation.</li> </ul>
	CMC	<ul style="list-style-type: none"> <li>- CMC believes that CMC staff members are already equipped with high-level technical capacity. It is expected that they would be able to continue the relevant activities by them after the project end.</li> <li>- However, for long-term and stable system utilization, it is necessary to refresh the knowledge. It will attempt to provide within the regular budgets of CMC although all faced with unstable funding.</li> <li>- The techniques and methods transferred through the Project as well as the deliverables are relevant with the technical levels. The transferred techniques/methods and/or the project deliverables are expected to be continuously utilized after the project end.</li> <li>- Operation and maintenance manuals for AWS in Macedonian have been provided by the makers, so that HM can technically maintain.</li> <li>- Although most of the equipment has been imported from outside of Macedonia, spare parts and consumables would be procured by domestic suppliers.</li> </ul>
5-3 Prospect from human resource viewpoint (number of staff, assignment of responsible personnel, his/her qualification and motivation, new recruitment and volunteer etc.)	JET	<ul style="list-style-type: none"> <li>- All the project personnel of CMC and RCMCs are permanent staff whose employment will be ensured. They are expected to be continuously assigned to the relevant posts so that they would be able to utilize their knowledge and skills to continue their task and sustain the project effect in future.</li> </ul>
	RCMC, RPEMF	<ul style="list-style-type: none"> <li>- Selected RCMCs and RPEMFs believe that human resources involved in the project will continue to be the major drivers enabling sustainability of the system.</li> </ul>
	PEMF	<ul style="list-style-type: none"> <li>- To ensure sustainability in human resource it is necessary to appoint staff who will care for the functioning of the system of technical and administrative aspects. For this it is necessary to modify the internal job systematization.</li> </ul>
5-4 Prospect from financing viewpoint (budget allocation within institutions, external financing etc.)	RPEMF	<ul style="list-style-type: none"> <li>- In terms of human resources, the greatest challenge is to ensure proper administration of the system.</li> </ul>
	CMC	<ul style="list-style-type: none"> <li>- Data maintenance within key service providers (HM and PEMF) gives influence on the quality and regularity of data in MKFFIS. Also, maintenance of equipment is important for MKFFIS's stability.</li> <li>- CMC, so far, has allocated necessary budget, including cost for data transmission (internet access). According to CMC, it is also ready to provide necessary budget for maintenance of MKFFIS even their warranty period will be expired.</li> <li>- According to the Memorandum of Understandings (MOU) for ownership transfer signed by CMC and relevant institutions (PEMF, HM, DPR, MAFWE) in May 2012 and in May 2013, the respective institution is obliged to maintain the equipment in accordance with the technical instructions and standards prescribed by the manufacturer. It is expected that each institution will secure necessary budget for maintenance after the warranty period is expired.</li> </ul>
	HM	<ul style="list-style-type: none"> <li>- Fifteen (15) AWSs were donated to HM for the purpose of collecting meteorological information. HM proposed annual budget of 2014 with the cost of AWS maintenance, however, the maintenance cost might become a burden for HM in future.</li> </ul>
	RCMC, RPEMF	<ul style="list-style-type: none"> <li>- PCs are in the maintenance inventory list of institutions (RCMC, RPEMF), so that maintenance of PCs is not a problem.</li> </ul>
	JET	<ul style="list-style-type: none"> <li>- Three institutions (CMC, PEMF, and HM) maintain data servers each of which has different function to be a part of MKFFIS system. Three institutions have limited financial resource to renew necessary software licenses, replace broken parts and corrective maintenance of unexpected system failure.</li> </ul>
PEMF	<ul style="list-style-type: none"> <li>- To have financial sustainability, PEMF plans to incorporate MKFFIS operation and its maintenance with upcoming PEMF IT strategy paper.</li> </ul>	



**Minutes of Meeting**

Of the Steering Committee (TCG) of the project

“Technical Assistance for Development of Integrated System for Prevention and Early Warning of Forest Fires”

Дел. Бр. 15-2776/1  
2013 год.  
11.12.2013  
Центар за управување со кризи

Date: 11.12.2013

Venue: Crisis Management Centre, Dimce Mircev st. 9, Skopje

Димче Мирчев бр.9,  
П.ФАХ 372 1000 Скопје,  
Република Македонија  
Тел. (02) 3249 101  
Факс. (02) 3249 213  
Сајт: www.cuk.gov.mk

The Minutes of this meeting serves to confirm that the SC members discussed and adopted:

1. The proposed Project Design Matrix (PDM) version 3, and
2. The Terminal Evaluation Report.

**Present SC members confirm the adoption of the above conclusions, as follows:**

**Ministry of Agriculture, Forestry and Water Management**

Authorised Representative, Mr. Vojo Gogovski [Signature]

**Secretariat for European Affairs**

Authorized Representative, Mr Xheladin Llokmani [Signature]

**PE Macedonian Forests**

Authorised Representative, Mr. Blaze Gjorgjievski [Signature]

**National Hydro Meteorological Service**

Authorised Representative, Mr. Kosta Lazarovski [Signature]

**Directorate for Protection and Rescue, as Observer**

Mr. Alexander Radosavljevic \_\_\_\_\_

**Ministry of Environment and Physical Planning, as Observer**

Ms. Smiljka Teneva [Signature]

**JICA, Final Evaluation team leader from Japanese side**

Executive Technical Advisor to the Director General, Global Environment Department

Mr. Kazuhiro Goseki [Signature]

**JICA, Project Chief Advisor**

Mr. Eisho Sato [Signature]

**Crisis Management Center**

Project Manager, Mr. Stevko Stefanoski [Signature]

Project Director, Mr. Zulfi Adili [Signature]

JICA Balkan Office  
Assistant Resident Representative Mr. Ryuichi Ito

[Signature]  
伊藤隆一



**ЗАПИСНИК**

од состанок на Управниот одбор на проектот за  
“Техничка поддршка за развој на интегриран систем за превенција и рано  
предупредување од шумски пожари”

Дел. Бр. 15-2776/1  
11.12.2013. 2013 год.

Центар за управување со кризи

Димче Мирчев бр. 9,  
П.ФАХ 372 1000 Скопје,  
Република Македонија  
Тел. (02) 3249 101  
Факс. (02) 3249 213  
Сајт: www.cuk.gov.mk

Датум: 11.12.2013 година

Место: Центар за управување со кризи, Скопје

Со овој записник се потврдува дека членовите на Управниот одбор на проектот дискутираа за и ги усвоија следните точки на дневен ред:

1. Предложена матрица на проектен дизајн (PDM) верзија 3, и
2. Извештај за завршно оценување.

Присутните членови на Управниот одбор на проектот го потврдуваат усвојувањето на горенаведените точки, како што следи:

**Министерство за земјоделство, шумарство и водостопанство:**

Овластен претставник, г-дин Војо Гоговски \_\_\_\_\_

**Секретаријат за Европски прашања:**

Овластен претставник, г-дин Целадин Локмани \_\_\_\_\_

**Јавно претпријатие “Македонски шуми”:**

Овластен претставник, г-дин Блаже Ѓорѓиевски \_\_\_\_\_

**Управа за хидрометеоролошки работи:**

Овластен претставник, г-дин Коста Лазаровски \_\_\_\_\_

**Дирекција за заштита и спасување во својство на набљудувач:**

Овластен претставник, г-дин Александар Радосављевиќ \_\_\_\_\_

**Министерство за животна средина и просторно планирање, во својство набљудувач:**

Овластен претставник, г-ѓа Смиљка Тенева \_\_\_\_\_

**JICA, Тим лидер на јапонскиот оценски тим**

Извршен технички советник на Генералниот директор, Одделение за глобална животна средина

г-дин Казухиро Госеки \_\_\_\_\_

**JICA - Главен советник на проектот:**

г-дин Еишо Сато \_\_\_\_\_

**Центар за управување со кризи:**

Раководител на проект, г-дин Стевко Стефаноски \_\_\_\_\_

Директор на проектот, г-дин Зулфи Адили \_\_\_\_\_

Банканска канцеларија на JICA  
Асистент на постојаниот претставник г. Рунчи Ито

伊藤隆 \_\_\_\_\_