添付-4

メコン流域における GCF アクセス状況

添付資料：メコン流域における GCF アクセス状況

1. 国家指定機関（NDA）/フォーカルポイント

カンボジア	環境省大臣 Mr. Say Samal
ラオス	天然資源環境省 災害管理と気候変動局管理調整部長 Mr. Syamphone Sengchandala 気候変動局総務部次長 Mr. Amphayvanh Oudomdeth
タイ	天然資源環境省 天然資源環境省常任事務官 Dr. Wijarn Simachaya 気候変動管理調整局局長 Dr. Natthanich Asvapoositkul
ベトナム	計画投資省 科学・教育・天然資源と環境局局長 Dr. Pham Hoang Mai 科学・教育・天然資源と環境局 Ms. Nguyen Thi Dieu Trinh
ミャンマー	環境保全林業省 環境保全局局長 Mr. Hla Maung Thein

2.レジネス活動状況

2.1　カントリープログラム策定

カンボジア	－
ラオス	ラオスカントリープログラム（2019 年 2 月 1 日提出)
タイ	タイカントリープログラム (2017 年 12 月提出)
ベトナム	－
ミャンマー	－

2.2　レジネス活動

	活動名称とデリバリーパートナー	**GCF 拠出予定額**
カンボジア	・NDA 強化とカントリープログラム (NCSD)	332.2 千 USD
ラオス	・枠組み強化 (FAO) ・機関支援 (GIZ) ・戦略的枠組み (Global Green Growth Institute; GGGI) ・NDA 強化とカントリープログラム(UNDP)	1.6 百万 USD
タイ	・戦略的枠組み (GGGI) ・戦略的枠組み (GIZ) ・NDA 強化 (GIZ)	1.3 百万 USD
ベトナム	・NDA 強化とカントリープログラム (Ministry of Planning and Investment)	299.6 千 USD
ミャンマー	・戦略的枠組み (Global Green Growth Institute; GGGI) ・NDA 強化とカントリープログラム(UNEP) ・戦略的枠組み(UNEP-CTCN)	1.5 百万 USD

3 提出されているコンセプトノート

国（提出数）	プロジェクト名	AE	提出日
カンボジア（3）	地方分権化による森林管理を通じたカンボジアの排出削減	CI	2018 年 11 月
	気候変動に対して脆弱なコミュニティのための保健衛生（複数国対象）	UNOPS*	2017 年 2 月
	地方政府と気候変動(LGCC)	NCDD-S*	2017 年 1 月
ラオス（4）	改善されたガバナンスと持続可能な森林ランドスケープ管理を通じたラオスの排出削減プログラム実施	GIZ	2018 年 6 月
	気候変動に対して脆弱なコミュニティのための保健衛生（複数国対象）	UNOPS*	2017 年 2 月
	ラオスにおけるレジリエンス総合食料システム	UNDP	2016 年 9 月
	ラオスにおけるエコシステムと都市適応	UNEP	2015 年 7 月
タイ（1）	タイにおける効果的な水管理と持続可能な農業による気候レジリエンス強化	UNDP	2016 年 9 月
ベトナム（3）	メコンデルタにおける気候と災害レジリエント土地利用と水管理	GIZ	2018 年 10 月
	国家 REDD+アクションプログラムゴール支援を通じたベトナム中央高原における排出削減の達成	FAO	2018 年 6 月
	ベトナム中央高原及び中南部沿岸地域における小規模農家の気候変動による水不足に対するレジリエンス強化	UNDP	2017 年 12 月
ミャンマー（1）	第三極における気候レジリエンス強化（複数国対象）	WMO	2016 年 11 月

4.採択済みプロジェクト

国（提出数）	プロジェクト名	採択日	AE	GDP 拠出額（USD）
カンボジア（1）	気候にやさしいアグリビジネスバリューチェーンセクタープロジェクト	2018 年 3 月	ADB	融資 10.0 百万 贈与 30.0 百万
ベトナム（2）	ベトナムの産業企業のためのエネルギー効率の拡大	2018 年 3 月	WB	保証 75.0 百万 贈与 11.3 百万
	ベトナムにおける気候変動に脆弱な沿岸コミュニティにおけるレジリエンス改善	2016 年 6 月	UNDP	贈与 29.5 百万

添付-5

Lancang-Mekong Cooperation LMCに関する情報収集資料

1. 瀾滄江－メコン開発協力（Lancang-Mekong Cooperation - LMC）

✓ 中国は、自国が主導できるメコン流域国家のみを対象とする協力枠組みとして、2015 年に瀾滄江－メコン開発協力（LMC）を創設した。2012 年に構想が出され、2015 年 4 月の最初の会合(高官レベル)以降、外相や国家元首クラスの会合はじめ、多くの活動が開催されている (下表)。

これまでの活動

年日	場所	活動内容	宣言その他
2012 年		タイが瀾滄江－メコン地域の持続可能な発展に関する構想を提案	
2014 年 11 月 12-14 日	ネピドー (ミャンマー)	第 17 回中国-ASEAN 首脳会議で李克強首相が LMC 創設を提案	
2015 年 4 月 6 日	北京 (中国)	第 1 回 LMC 高級官僚会議	
2015 年 7 月 23 日	バンコク (タイ)	第 1 回 LMC 外交共同作業部会	
2015 年 8 月 21 日	チェンライ (タイ)	第 2 回 LMC 高級官僚会議	
2015 年 11 月 12 日	雲南省景洪 (中国)	第 1 回外相会議	共同声明[1] LMC 枠組みに関する概念書
2016 年 1 月 29 日	雲南省昆明 (中国)	第 2 回 LMC 外交共同作業部会	
2016 年 2 月 24 日	海南省三亜 (中国)	第 3 回 LMC 高級官僚会議	
不明	海南省三亜 (中国)	第 3 回 LMC 外交共同作業部会	
2016 年 3 月 17 日	-	中国外務省が LMC に関するプレスリリース	LMC に関する 5 つの特徴について[2]
2016 年 3 月 23 日	海南省三亜 (中国)	第 1 回首脳会議「瀾滄江－メコン流域国間の平和と繁栄の共有された未来コミュニティのた	**三亜宣言**[3]

[1] Joint Press Communiqué of the First Lancang-Mekong Cooperation Foreign Ministers' Meeting, (http://www.mfa.go.th/main/contents/files/media-center-20151117-123745-981913.pdf)
[2] Five Features of Lancang-Mekong River Cooperation (https://www.fmprc.gov.cn/mfa_eng/zxxx_662805/t1349239.shtml)
[3] Sanya Declaration of the First Lancang-Mekong Cooperation (LMC) Leaders' Meeting -For a Community of Shared Future of Peace and Prosperity among Lancang-Mekong Countries - (https://www.fmprc.gov.cn/mfa_eng/topics_665678/lkqcxboaoyzlt2016nnh/t1350039.shtml)

年日	場所	活動内容	宣言その他
		めに」	
2016年3月31日		MRCが“この新たな構想の歓迎”を表明	公式Webサイトで表明[4]
2016年 11月9-11日		第4回LMC外交共同作業部会	
2016年 12月22-23日	シェムリアップ(カンボジア)	第4回LMC高級官僚会議 第5回LMC外交共同作業部会 第2回外相会議	共同声明[5] 第1回首脳会議決議内容実施に関する中間報告
2017年 2月26日	北京(中国)	第1回水資源管理に関するLMC共同ワーキンググループ会合	
2017年 3月10日	北京(中国)	LMC中国事務局の設立(北京) 瀾滄江ーメコン水資源協働センターの設立(北京)	
2017年 6月12日	雲南省(中国)	LMC中国事務局 雲南連絡事務所の設立	
2017年 9月28日	プノンペン(カンボジア)	メコン研究地球センター(GCMS)の設立	
2017年 9月29日	雲南省大理(中国)	第6回LMC外交共同作業部会	
2017年 10月28日	雲南省昆明(中国)	第5回LMC高級官僚会議	
2017年 11月15日	北京(中国)	瀾滄江ーメコン環境協力センター(LMEC)の設立(北京)	
2017年 11月16日	北京(中国)	瀾滄江ーメコン淡水管理に関する国際ワークショップの開催(LMEC主催)	
2017年 12月15日	雲南省大理(中国)	第3回外相会議	共同声明[6]
2017年		プレスリリース:世界水パートナーシップ	関連記事[7]

[4] Lancang -Mekong Cooperation: MRC welcomes the New Initiative for Regional Cooperation by six countries in the Mekong River Basin (http://www.mrcmekong.org/news-and-events/news/lancang-mekong-cooperation-mrc-welcomes-the-new-initiative-for-regional-cooperation-by-six-countries-in-the-mekong-river-basin/)

[5] Joint Press Communiqué of the First Lancang-Mekong Cooperation Foreign Ministers' Meeting, (http://www.mfa.go.th/main/contents/files/media-center-20151117-123745-981913.pdf)

[6] Joint Press Communiqué of the Third Lancang-Mekong Cooperation (LMC) Foreign Ministers' Meeting (https://www.fmprc.gov.cn/mfa_eng/zxxx_662805/t1520022.shtml)

[7]“GWP Supports Transboundary Cooperation on Lancang-Mekong” by SDG Knowledge Hub (http://sdg.iisd.org/news/gwp-supports-transboundary-cooperation-on-lancang-mekong/)

年日	場所	活動内容	宣言その他
12 月 21 日		(GWP)、GWP 中国、GWP 東南アジア及び中国水資源省とのパートナーシップを通じ LMC を支援することを示唆。	
2018 年 1 月 9 日	プノンペン (カンボジア)	第 6 回 LMC 高級官僚会議	
2018 年 1 月 10 日	プノンペン (カンボジア)	第 2 回首脳会議「平和と持続的発展の我らの川」	**プノンペン宣言**[8] LMC 5 ヵ年行動計画 (2018-2022)[9]
2018 年 2 月 9 日	ビエンチャン (ラオス)	ラオス国立水情報センターの設立	
2018 年 3 月 1 日	チェンライ (タイ)	第 2 回水資源管理に関する LMC 共同ワーキンググループ会合	
2018 年 3 月 24 日	雲南省昆明 (中国)	水環境管理に関する瀾滄江ーメコン円卓会議 LMEC 雲南事務所の設立	
2018 年 11 月 1-2 日	雲南省昆明 (中国)	第 1 回瀾滄江ーメコン水資源協力フォーラム	昆明イニシアチブ[10]
2018 年 12 月 16-17 日	ルアンパバーン (ラオス)	第 4 回外相会議「共有された繁栄に向けたパートナーシップ推進」	共同声明[11]

出典：Devlaeminck, D.J. (2019)[12] を調査団が修正

今後の活動予定

年月	場所	活動内容	宣言
2019 年 12 月	中国	第 5 回外相会議	
2020 年 1 月	ラオス	第 3 回首脳会議	

[8] PHNOM PENH DECLARATION of the Second Mekong-Lancang Cooperation (MLC) Leaders' Meeting "Our River of Peace and Sustainable Development" (http://pressocm.gov.kh/en/archives/21699)
[9] Five-Year Plan of Action on Lancang-Mekong Cooperation (2018-2022) (http://www.lmcchina.org/eng/ttxw_1/t1525364.htm)
[10] http://www.xinhuanet.com/english/2018-11/03/c_137577584.htm
[11] The 4th Lancang-Mekong Cooperation (LMC) Foreign Ministers' Meeting Held in Luang Prabang (http://brisbane.china-consulate.org/eng//zgxw/t1625067.htm)
[12] Timeline of the Lancang-Mekong Cooperation (LMC) Mechanism (2019) https://www.academia.edu/36426349/Timeline_of_the_Lancang-Mekong_Cooperation_LMC_Mechanism_Last_Updated_February_12_2019

三亜宣言 2016 年 3 月 23 日 (第 1 回首脳会議)

- メコン川流域の開発を促すため、100 億ドル（約 1 兆 1300 億円）超の融資枠を設ける意向を表明。
- 協力分野は発電、送電網、自動車、冶金、建材、交通インフラ、生産設備など。中国が直接投資、技術協力、生産設備輸出などでメコン川流域の開発を支援することを明記。

プノンペン宣言 2018 年 1 月 10 日　(第 2 回首脳会議)

- 中国はメコン川の活用に関して「効果的で持続可能なやり方で活用すべき。水資源の保護、管理、活用において、関係各国が協力を推し進める必要がある」とし、一定の規制を設けることを提案。
- LMC5 ヵ年行動計画 (2018-2022)を採択した。

出典：Office of the Council of Ministries of Cambodia Web サイト

2. LMC 5 ヵ年計画 (2018-2022) について

- ✓ 2018 年 1 月 10 日に採択。対象地域の社会経済的な発展に貢献することを目的とする。
- ✓ 他方、中国が進める「一帯一路」構想にも LMC が寄与することも明言。
- ✓ 本業務に関連する項目の方針は以下のとおり

4.2.5 水資源

- 持続可能な水資源利用における、LMC 諸国間の協力のためのトップレベルの設計を実行し、水資源に関する政策対話を強化し、そして定期的に瀾滄江－メコン水資源協力フォーラムを開催する。
- 瀾滄江－メコン水資源協力を支援するための包括的な協力プラットフォームを創設する目的で、瀾滄江－メコン水資源協力センターの建設を進める。
- 水資源管理に関する技術協力や交流を促進し、瀾滄江－メコン水資源及び気候変動への影響等に関する共同研究・分析を実施し、持続可能な開発に関するパイロットプロジェクト及び優先的な協力プロジェクトを実施する。
- 強化学術プログラム、交換プログラム、トレーニング、フィールドトリップ、スタディツアーを実施することにより、水資源管理に関する能力開発を強化し促進する。
- すべての瀾滄江－メコン諸国にアクセス可能な水質モニタリングシステム、強度データおよび情報共有を開発し改善する。
- 瀾滄江－メコン河の洪水と干ばつ災害の緊急管理を深め、メコン流域における治水と干ばつ救済の共同評価を実施し、洪水の緊急事態における情報共有のための通信回線/チャンネルの早期設定に関する共同研究を実施する。
- 水資源協力に関する 5 年間行動計画を策定する。この計画では、共通の懸念事項が取り上げられるか、または対処される可能性がある。

4.2.6 農業

- 政策協調を強化し、食料と栄養の安全保障、食の安全を確保し、投資機会を促進し、持続可能な農業開発に関する協力を強化するための協調を強化する。
- 農業科学技術における交流と協力を拡大する。 研究機関を支援し、情報の共有、コミュニケーション、訪問の交換を強化する。 共同実験室、実証基地および技術センターを建設し、LMC 農業情報ネットワークを確立する。
- 瀾滄江－メコン諸国間で村落指導者フォーラムを開催する。
- 農産物の品質と安全の協力を促進し、農産物の貿易を促進し、農産物のための総合的な瀾滄江－メコン市場を創出し、地域の農産物の競争力を高める。
- 動植物の疾病および流行状況の監視、早期警戒、共同予防および管理に協力する。 獣医の協力を強化する。 水資源保全に協力する。 瀾滄江－メコン流域の生態学的保全に関する交換および協力のメカニズムを確立し、情報共有のための野生魚の繁殖および救助センターを共同で設立する。例えば、魚の多様性、魚の豊度および魚の移動などに関する情報ならびに可能性 水産養殖開発における能力開発の強化など、漁業協力に関す

る機会。

- 農業産業協力公園を共同で建設し、公園の建設と運営に参加するように非政府部門を指導する可能性を探る。

4.2.8 森林

- 森林資源の保全と利用を強化し、瀾滄江－メコン流域の森林生態系の統合管理を促進する。
- 合法的に入手された原材料から生産される林産物の貿易量の拡大、小規模コミュニティ森林企業の発展の促進、森林法の執行と統治の強化、違法伐採および関連貿易との闘いにおける協力の促進、林業部門における科学技術協力と交流の強化 そしてメコン川流域の森林再生と植林を強化する。
- 国境地域における山火事の防止と管理における協力を強化する。
- 野生生物保護協力を強化し、合法的に違法野生生物取引に対処する。
- 林業管理及び科学研究における瀾滄江－メコン諸国の能力開発を改善し、林業関連の高等教育および人的資源の協力を促進し、テーマ別研修を実施し、奨学金制度及び研究者訪問プロジェクトを実施する。

4.2.9 環境保護

- 瀾滄江－メコン環境協力センターの設立を推進する。瀾滄江－メコン諸国の環境保護開発計画を相乗させ、瀾滄江－メコン環境協力戦略を策定する。
- 瀾滄江－メコン流域グリーン計画を策定し、実施する。これは、大気汚染および水質汚染の管理ならびに生態系管理の改善に協力することに重点を置き、他の関連する小地域メカニズムとのコミュニケーションを強化することを目的とする。
- 環境保護能力の構築、広報および教育に関する協力を強化し、公衆の環境意識を高める。

4.3.2 観光

- 瀾滄江－メコン観光都市間連携同盟の設立を模索する。
- 観光人材の育成を推進し、瀾滄江－メコン諸国が ASEAN 観光フォーラム、メコン観光フォーラム、中国国際観光マート（CITM）などの関連する観光イベントや活動に参加するよう奨励する。
- ソフトインフラとハードインフラの観光開発の強化を目指して、LMC の中長期的な観光開発のビジョンを確立する可能性を模索する。

- ASEAN 観光基準の推進に関する認識を高める。

✓ 支援体制は以下のとおり。

5.1 資金支援

中国が設立した LMC 特別基金を最大限に活用する。 優先事項として、首脳会議または外相会議で採択され、三亜宣言及び首相と外相が合意したその他の重要文書によって設定された目標に沿ったプロジェクトを支援する。加盟 6 カ国からのより多くの資金と資源の投入を奨励する。 アジアインフラ投資銀行 (AIIB)、シルクロード基金、アジア開発銀行 (ADB)などの金融機関から積極的に支援を募る。 社会的資源と市場資源を活用し、総合的な財政支援システムを確立する。

5.2 知的支援

政府、企業、学界を取り入れた協力モデルを模索するとともに、メコン河研究のためのグローバルセンターの設立に協力し、次第に瀾滄江ーメコン協力に関するトラック II チームとシンクタンクネットワークを形成する。

5.3 監督体制

加盟 6 か国の LMC 国内事務局または調整ユニットを利用する。 様々な分野での協力を強化し、相乗効果を形成するためにリソースを調整する。 自国の関連部門/機関に協力に参加し、主要な活動について定期的な評価を実施するよう監督および助言する。 第三者の監督の役割を果たすことができる NGO の専門機関のリソースを活用する。

Box

ハイドロ・ヘゲモニー

国際流域における流域国間の力関係において最優位となる流域国を「ハイドロ・ヘゲモニー」と呼ぶが、そのためには以下の 3 要素を全て備える必要がある。

1) 流域位置

流域位置とは「上流」「下流」という地理的条件を指す。この要素は明らかに水利権や水利用における「上流・下流」紛争において重要な役割を果たす。

2) パワー

ここではその具体的な指標を①経済、②軍事力、③人口、から構成されるものと定義する。

3) 開発能力

開発能力は、インフラを通して水資源を獲得する技術や能力である。1) 流域位置が流域国の水資源へのコントロールに関して意味を持つのはこの「開発能力」が加わることで成立する。流域国が水資源を思いのままに利用するためには、水資源の配分や輸送するインフラが必要であり、流域国には巨大なインフラ・プロジェクトを計画、実行、そして運営する能力を兼ね備えていなければない。それによって初めて水資源を自由に獲得し使用することができる。

これらの 3 条件に関して、中国は以下のことが言える。1) 流域位置に関しては「上流」という流域位置に加えて、包蔵水力も他国のそれに比べて圧倒的に大きいことから、その優位性は明らかである。また、メコン河流域はモンスーン地帯に位置しており、上流において中国がダムによって流量調節を恣意的に行えば、下流国は乾期において水不足に陥るなど、中国は完全に水資源コントロール権を掌握していることになる。

2) パワーに関して明らかに他の流域国より相対的に強大である。さらに、3) 開発能力は、中国はメコン河上流におけるダム開発も着手されていることなどから、巨大ダムの計画・建設・運営を行う水理能力がある。したがって、中国は上記 3 条件を全て満たしており、中国はメコン河流域における「ハイドロ・ヘゲモニー」であると定義することができる。

添付-6

セミナー等資料

添付-6-1

キックオフセミナー@ラオス　資料

Mekong River Commission (MRCS)

and

Japan International Cooperation Agency (JICA)

Tentative Agenda

The Regional Kick-off Meeting on

The Study on Data Collection Survey on the Basin Management and Environmental Conservation in Mekong River Basin

22 June 2018 at MRCS Office, Vientiane, Lao PDR

1. Background

During the 8th top-level meeting among Japan and Mekong countries on 7th September 2016, Mr. Shinzo Abe, the Japanese Prime Minister, announced the commencement of a survey for the environmental conservation program on Mekong River Watershed. The first phase of the program focuses on the data collection survey for the development of forest cover map in the basin and recommends policy for forest preservation.

Under this Japan-Mekong Cooperation, the Mekong River Commission (MRC) and Japan International Cooperation Agency (JICA) have co-implemented the new initiative on "Data Collection Survey on the Basin Management and Environmental Conservation in Mekong River Basin" Project which includes 4 Member Countries (MCs) and Myanmar. The Project will implement from December 2017 to March 2019. The objectives of this Project are to: (1) understand the existing condition of forest preservation; (2) clarify the issues on forest management and preservation; and (3) propose the effective countermeasures as policy recommendations for basin management in the Mekong River. The expected outputs are; (i) the basic information for forest management are collected and reviewed; (2) the environmental impacts by climate changes and the historical changes of forest resources are studied and (iii) the best practices for basin management in the Mekong River are recommended.

During February-March 2018, the JICA Study Team (JST) with the co-ordinations from the Mekong River Commission Secretariat (MRCS) conducted the informal meetings with the Member Countries (MCs) to present and discuss the project details and work plan with the National Mekong Committees (NMCs) and relevant line agencies. Later, the Inception Report had been developed by the JST based on feedbacks and suggestions from 4 MCs. Then, the report was submitted to MRCS for further feedbacks and suggestions. MRCS disseminated the Inception Report attached with MRCS' feedbacks and suggestions to 4 MCs for further reviewing and providing comments.

In order to implement the next step, the regional kick-off meeting is needed to present, discuss and finalize the Inception Report and present the major key findings from the informal meetings. Suggestions and feedbacks will be gathered for further improvement of the Inception Report and the implementation of the Project.

2. Objectives of the Meeting

The objectives of the regional kick-off meeting on the study on data Collection survey on the basin management and environmental conservation in Mekong River Basin are to:

- Present, discuss and finalize the Inception Report of the Project; and
- Present and discuss the major key finding from the informal meetings with NMCs and relevant national line agencies.

3. Expected Outputs

The expected outputs from this meeting are as follows:

- Inception Report of the Project will be presented, discussed and finalized. Suggestions and feedbacks will be gathered for further improvement; and
- The major key findings from the informal meetings with NMCs and relevant line agencies will be presented and discussed among 4 MCs. Feedbacks will be collected for further improvement of the implementation of the Project

4. Agenda

Time	Activities
09.00-09.30	Registration ***Facilitated by MRCS ED Staff***
09.30-09.40	Welcome Address ***By Dr. Pham Tuan Phan, Chief Executive Officer, MRC***
09.40-09.50	Opening Remarks ***By Mr. Morita Takahiro, Senior Deputy Director General, Global Environment Department, JICA***
09.50-10.00	Memorandum of Understanding (MoU) between MRC and JICA Signing
10.00-10.10	Opening Guidance: (1) Introduction and Background; (2) Objectives of the Meeting; and (3) Expected Outputs ***By Mr. Ichikawa Shumpei, Meeting Coordinator, JICA Study Team***

Time	Activities
Session I: Inception Report on the Study	
10.10-10.55	Presentation on Inception Report on the Study ***By Mr. Sasabe Keiji, Team Leader, JICA Study Team***
10.55-11.10	**Tea and coffee break**
11.10-12.00	Discussions on Inception Report on the Study ***Facilitated by Dr. So Nam, Chief Environmental Management Officer***
12.00-13.30	**Lunch break**
Session II: Major Key Findings from Informal Meetings	
13.30-14.30	Presentation on the major key findings from the informal meetings with NMCs and relevant national line agencies ***By Mr. Nakamura Kazuhiro, Sub-Team Leader, JICA Study Team*** ***Ms. Fujimura Sahori, Sustainable Forest Management Specialist, JICA Study Team***
14.30-14.45	**Tea and coffee break**
14.45-16.00	Discussions on the major key findings from the informal meetings with NMCs and relevant national line agencies ***Facilitated by Dr. So Nam, Chief Environmental Management Officer***
16.00-16.30	Wrap-up and Next Steps ***By Dr. So Nam, Chief Environmental Management Officer***
16.30-16.45	Fill-up the Questionnaire ***By Mr. Sasabe Keiji, Team Leader, JICA Study Team***
16.45-17.00	Closing Remarks ***By Dr. Truong Hong Tien, Director of MRCS ED***

Title	The Regional Kick-off Seminar on the Data Collection Survey on the Basin Management and Environmental Conservation in Mekong River Basin
Date / Time	22nd June 2018 (Fri) / 9:30 ~ 17:00
Venue	MRC Conference Room, Vientiane, Lao P.D.R
Participants	【Cambodia】4 members 【Lao PDR】5 members 【Thailand】5 members 【Viet Nam】5 members 【MRCS】14 members 【JICA】5 members 【JICA Study Team (JST)】4 members
Agenda and Topics	1. Welcome Address 2. Opening Remarks 3. Memorandum of Understanding (MoU) between MRC and JICA Signing 4. Opening Guidance 5. Discussion on the Inception Report of the Study 6. Discussion on the Major Key Findings: "Climate Change / Hydrology" 7. Discussion on the Major Key Findings: "Forest Cover Map" 8. Discussion on the Major Key Findings: "Formulation of Future Project" 9. Wrap-up and Next Steps

Main Items discussed

1. Welcome Address

Welcome Address was announced by Dr. Pham Tuan Phan, Chief Executive Officer, MRC.

2. Opening Remarks

Opening Remarks was announced by Mr. Morita Takahiro, Senior Deputy Director General, Global Environment Department, JICA.

3. Memorandum of Cooperation (MoC) between MRC and JICA

Memorandum of Cooperation (MoC) of the Project was signed by MRC and JICA.

4. Opening Guidance

Opening Guidance including Introduction and Background, Objectives of the Meeting and Expected Outputs was explained by Mr. Ichikawa Shumpei, Meeting Coordinator, JICA Study Team.

Main Items discussed

5. Discussion on the Inception Report of the Study

The concept of Inception Report was presented by Mr. Sasabe Keiji, Team Leader, JICA Study Team and directions and work plans were discussed with the following key suggestions and comments.

- All modelling task will be conducted at MRC office with TD and JST.
- Copy right of MRC property shall be taken care.
- "South China Sea" should be revised to "East Sea"
- Detailed roles and responsibilities of JICA, JST, MRCS, NMCs and line agencies (particularly the forestry departments of the 4 MCs and Myanmar) should be clear in this project- e.g. involvement of MCs experts in modelling work.
- Sea level rising and salinity intrusion at the Mekong Delta are very important issue for the climate change in Viet Nam and related ministry has many information for this issue. Mekong Delta issue is focused by another JICA project and the result of this project will be referred.
- Transboundary issues and relationship between upstream and downstream stakeholders should be considered for the model and forest cover map.
- Socio-economy has a large impact to the scenario for deforestation and mangrove reduction in Viet Nam. A total of 10 % of mangrove has been lost from 2011 to 2016 in Viet Nam. Viet Nam has available data for this issue.
- Capacity building for government staff on forest management and conservation is needed.
- Consultation and discussion with the 4 MCs are needed for understanding and identifying the issue in each country.
- Data/information sharing should be JICA to/from MRCS and MRCS to/from NMCs and Line Agencies according to PDIES.
- Carbon credit referred REDD+ will be considered as the one of the optional solution of this project.
- The terms "Business policy" should be defined clearly.
- Definition of "Watershed management" and "Basin management" should be clear.

6. Discussion on the Major Key Findings: "Climate Change / Hydrology"

The Major Key Findings, "Climate Change / Hydrology" was presented by Mr. Nakamura Kazuhiro, Sub-Team Leader, JICA Study Team and operation plan was discussed with the following key suggestions and comments.

- Three MRC's CCAI climate change scenarios (RCP 2.6, 6.0/4.5 and 8.5) will be used and combined with deforestation data to evaluate the impacts on hydrology and hydraulics of the river basin
- Future deforestation/forest cover data for SWAT model will be prepared by JST to evaluate the negative/positive impacts on LMB. Comparing the before/after deforestation, vulnerable areas (hot spots) will be identified.

Main Items discussed

- In particularly vulnerable areas, detailed hydrological and hydraulic analysis including water level, flow regime, flood inundation area, etc. shall be conducted by using RRI Model which has been developed by The International Centre for Water Hazard and Risk Management (ICHARM).
- RRI model can be adapted to areas where availability of meteorological and hydrological data is poor.
- RRI model is free and user can get RRI Model for free from web site of ICHARM.
- Target year for the scenario shall be 2040.

7. Discussion on the Major Key Findings: "Forest Cover Map"

The Major Key Findings, "Forest Cover Map" was presented by Mr. Nakamura Kazuhiro, Sub-Team Leader, JICA Study Team and operation plan was discussed with following key suggestions and comments.

- MRC's land cover data and 4 MCs' forest cover data shall be collected and combined to make whole cover map, although there is concern that criteria and categories in each country may be different.
- In addition to using MRC's land cover data, using ADPC (Asia Disaster Preparedness Center) land cover data including Myanmar is considered as an option to prepare the forest cover map of the whole Mekong basin.
- To identify the hot spot, not only historical trend but also forest policy and its achievement should be considered.

8. Discussion on the Major Key Findings: "Formulation of Future Projects"

The Major Key Findings, "Formulation of Future Projects" was presented by Ms. Fujimura Sahori, Sustainable Forest Management Specialist, JICA Study Team and operation plan was discussed with following key suggestion and comments.

- Future projects related to good practices for protecting forest resources will be identified and proposed based on the results of this initial study.
- Some deforestation drivers are missing so resources to identify the driver should be checked carefully. Livelihood may be most important driver.
- Deforestation drivers should be considered by each Forest classification type and area (e.g. upstream and downstream).
- Solution of the deforestation activity should be considered for both structural and non-structural measures.
- Quantitative evaluation of forest function is necessary.
- Data source for the project suggestion should be clear whether official or not.
- A ppt presentation on National Country Forestry Report shall be prepared by MCs and submitted to JST by 31 August 2018 and will be presented at the next workshop in October 2018.

9. Wrap-up and Next Steps

Main Items discussed

Wrap-up of this seminar and following next step were shared by Dr. So Nam, Chief Environmental Management Officer, ED, MRC.

- Report of this seminar will be summarized until 6th July 2018.
- Finalization of the Inception Report will be conducted until 15th July 2018 and shared with the 4 MCs and Myanmar.
- Study tour in Japan will be conducted for 1 week on the second week of September 2018.
- Regional workshop will be held on October 2018.
- Final seminar will be held on February 2019.

Photos

Welcome Address by Dr. Pham Tuan Phan, Chief Executive Officer, MRC

Opening Remarks by Mr. Morita, Senior Deputy Director General, Global Environment Department, JICA

Memorandum of Cooperation (MoC) Signing

Memorandum of Cooperation (MoC) Signing

Presentation of Inception Report by Mr. Sasabe Keiji, JST

Presentation of Major Key Finding by Mr. Nakamura, JST

Presentation of Major Key Finding by Ms. Fujimura, JST

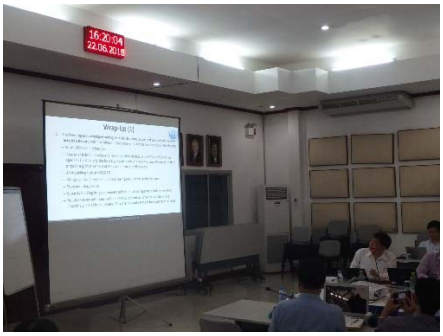
Comments from Thailand

Photos

Comments from Lao PDR

Comments from Viet Nam

Comments from Cambodia



Wrap-up from Dr. So Nam, Chief Environment Management Officer, MRC

End of Documents

Opening Guidance

Introduction and Background

Background

- ✓ At the Mekong-Japan Summit held on September 2016, Prime Minister of Japan expressed his intention to start a study to contribute to environmental conservation, and particularly protection of forest resources, in the Mekong River Basin
- ✓ Mekong River Commission (MRC) and Japan International Cooperation Agency (JICA) have co-implemented the new initiative on "Data Collection Survey on the Basin Management and Environmental Conservation in Mekong River Basin" Project.

Mekong-Japan Summit in 2016

Opening Guidance

Introduction and Background

Background

- ✓ During February-March 2018, the JICA Study Team (JST) conducted the informal meetings with the Member Countries to discuss the project details and work plan with the National Mekong Committees (NMCs) and relevant line agencies.
- ✓ In order to implement the next step, the Kick-off Seminar is needed to finalize the Inception Report and discuss the major key findings from the informal meetings.

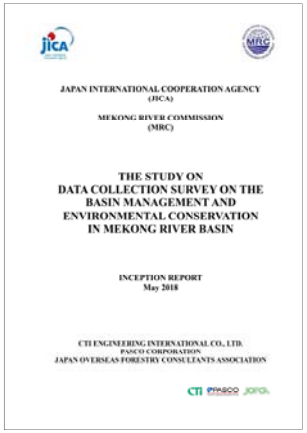

Meeting with MRC, JICA and JST on March

Opening Guidance

Objectives of the Seminar

1. Present, Discuss and Finalize the Inception Report of the Project

2. Present and Discuss the following Major Key Finding
   - Basin Environment Management Model
   - Forest Cover Map
   - Formulation of Future Project


JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

MEKONG RIVER COMMISSION (MRC)

THE STUDY ON DATA COLLECTION SURVEY ON THE BASIN MANAGEMENT AND ENVIRONMENTAL CONSERVATION IN MEKONG RIVER BASIN

INCEPTION REPORT
May 2018

CTI ENGINEERING INTERNATIONAL CO., LTD.
PASCO CORPORATION
JAPAN OVERSEAS FORESTRY CONSULTANTS ASSOCIATION

Opening Guidance

Expected Outputs

- As a result of the discussion of Inception Report
  ⇒Suggestions and feedbacks will be gathered for further improvement
- As a result of the discussion of the Major Key Findings
  ⇒Feedbacks will be collected for further improvement of the implementation of the Project
- Relationship will be built for the future cooperation

Opening Guidance

Program

Session I: Inception Report on the Study

Presentation from JICA Study team

Discussion with All

Session II: Major Key Findings from Informal Meetings

Presentation from JICA Study team

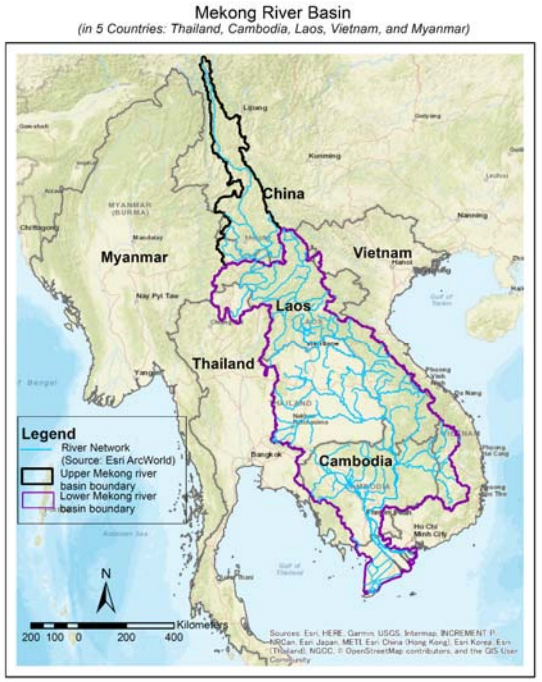
- ✓ Forest Cover Map
- ✓ River Basin Management
- ✓ Formulation of Future Project

Discussion with All

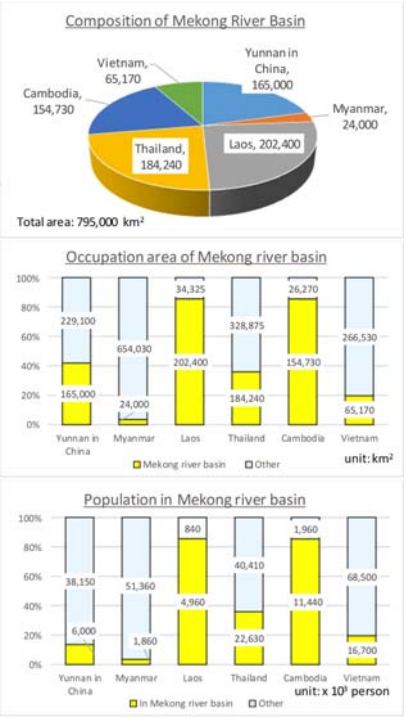
Basic Concept
for
Data Collection Survey on the Basin Management and Environmental Conservation in Mekong River Basin

22nd June 2018

JICA Study Team (JST)



Location Map



Data source: JICA

About Mekong River Basin

- Catchment area: 795,000 km^2
- River length: 4,800 km
- Countries in river basin: Cambodia, Lao PDR, Thailand, Viet Nam, Myanmar and China
- River head: Tibetan Plateau
- River mouth: State of Ben Tre in Viet Nam
- Flow regime: 16,000 m^3/s
- Forest area: 140,000 km^2 (1973) to 100,000km^2 (2009)
- Estimated population in the basin: 60 million
- General issues due to deforestation:
  Increase of natural disasters such as flooding and drought, collapse of ecosystems and acceleration of global warming, etc.

Data source: JICA, FAO

Cultivations on slope areas causing soil losses

Regenerating forests by the Government Programme

Discussion of private business promotion on cocoa beans (contribution to prevention of deforestation)

Contents

1. Outline of the Survey

Outline

Target country:

Cambodia, Lao PDR, Thailand, Viet Nam and Myanmar

Relevant parties:

Main counterpart: Mekong River Commission (MRC), National Mekong Committees (NMC)

Relevant Agencies: organizations relevant to water resources management and forest resources management

International donors: ADB, UNDP, United States of America, etc.
Interaction partner countries: China and Myanmar

Others:. private company, NGO, etc.

1. Outline of the Survey

Outline

Objectives:

The project objectives are to
1) understand the existing condition of forest preservation
2) clarify the issues
3) propose effective countermeasures as best practices/recommendations for basin management in the Mekong River.

The project shall be carried out in considerations with as below.
- collection of basic information of forest management
- environmental impacts by climate changes
- historical changes of forest resources

1. Outline of the Survey

Outline

Work Procedure:

Step 1 : Preparation
- Prediction of changes of forest areas by creation of forest cover maps (from 1990's to 2010's) ⇒ To identify the deforestation area by maps (hot spot 1)
- Development of basin model for evaluation of impact by deforestation and climate changes quantitatively ⇒ *MRC Tool box will be utilized*
- Decisions of future scenarios based on the prediction of forest areas and latest study results of climate changes.

Step 2 : Evaluation
- Execution of simulations under future scenarios and analysis on their results ⇒ To identify potential vulnerable areas (flooding, drought and saline intrusion) by deforestation and climate change (hot spot 2)
- Clarification of issues in future caused by deforestation and climate changes

Step 3 : Recommendation
- Examinations of practical countermeasures for forest management by both hardware and software methods based on the evaluation results
- Proposal for business policies for improvement of the river basin management

1. Outline of the Survey

About Hot spot

Hot spot is defined as potential vulnerable areas by deforestation and/or climate change.

Hot spot 1:

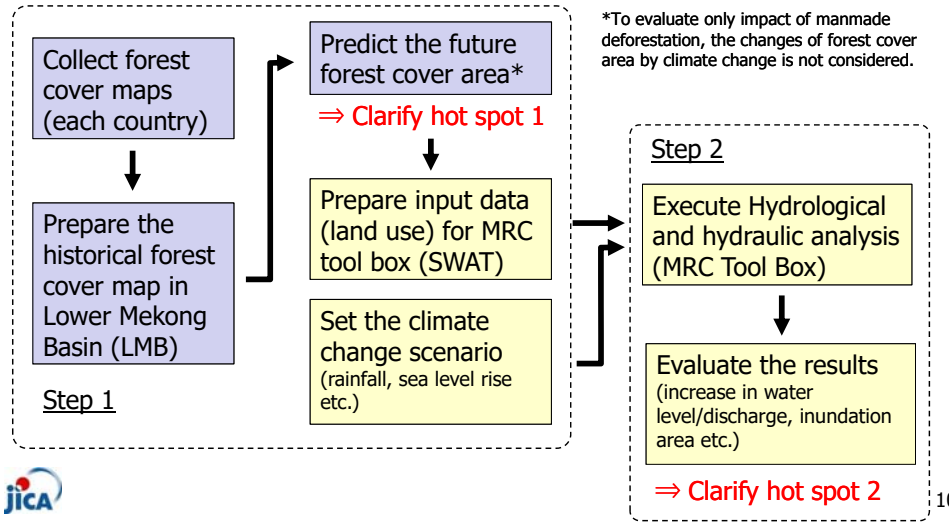
Deforestation area is identified from historical land cover maps, and a certain area which can be affected environmentally and socio-economically by deforestation will be clarified as hot spot 1.

Hot spot 2:

The flow regime of Mekong River can be changed by deforestation and climate changes, which might cause increases in vulnerable areas against flooding, drought and salt injury. Those areas are defined as Hot spot 2, and will be estimated by basin management model.

1. Outline of the Survey

How to clarify the Hot spot ?



1. Outline of the Survey

Expected outcome/products

- Basin models (equal to hydrological analysis model)
  *all data sets
- Historical forest cover maps
  (3~4 maps, from 1990's to 2010's)
  *GIS format
- Study reports, including best practices/recommendations for improvement of forest management in Mekong River Basins

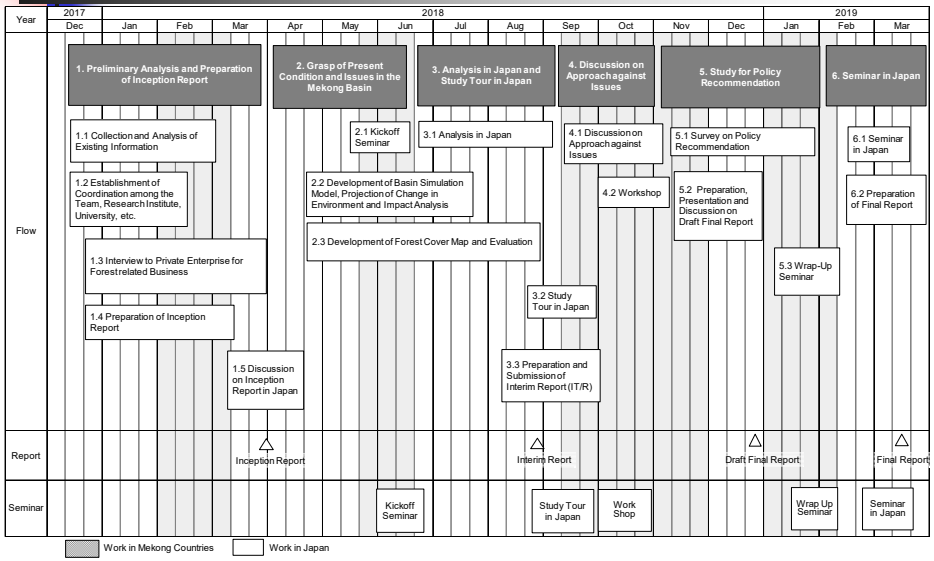
1. Outline of the Survey

JICA Study Team (JST)

Position	Name
Team Leader / Basin Management 1	SASABE Keiji
Sub-Team Leader / Basin Management 2 / Climate Change / Hydrology	NAKAMURA Kazuhiro
Forest Cover Map	SATO Kei
Private Promotion and Business Partnership	KIYOTA Daisaku
Sustainable Forest Management (Mitigation and REDD+)	FUJIMURA Sahori
Support for Seminar	ICHIKAWA Shumpei

1. Outline of the Survey

Project Flow and Schedule



2. Implementation Policy

(1) Basic Understanding

I. Expanding of disaster by climate change and deforestation
- Disaster such as flooding, drought and sediment discharge causes economic damage while economic development contributes to climate change in Mekong countries

II. Challenges for practical basin management in LMB
- Management in Mekong basin is implemented based on the Integrated Water Resources Management (IWRM)
- MRC conducted the Council Study and predicted future conditions in Mekong River Basin, which can contribute to JICA study.
- From now, concrete policies and proposals for practical basin management is required.

III. Necessary for strengthening of relationship between Japan and Mekong Basin countries, Cambodia, Lao PDR, Thailand, Viet Nam and Myanmar.

2. Implementation Policy

(2) Technical Policy

■Basin Environment Management Model

- MRC Tool Box is employed for this project.

■Projection of Change in Basin Environment by Climate Change

- JST will utilize the results from CCAI (Climate Change Adaptation Initiative) and Council Study by MRC.
- Study results of MRC considered the knowledges from AR5 (IPCC Fifth Assessment Report).
- JST will provide Japanese study cases on climate change for reference of future study of MRC.

2. Implementation Policy

(2) Technical Policy

■Forest Cover Map of the Lower Mekong Basin

I. Utilization of existing the Forest Cover Maps
- Compatibility, Continuity, Publicness, Trustability, Detailed analysis possibility
- Polygon based map, Satellite image year possibility

II. Target class type and reference years
- Evenly period for extraction of change volume in class
- Utilization of recent Forest Cover Map

2. Implementation Policy

(2) Technical Policy

■Forest Cover Map of the Lower Mekong Basin

- ➢ Consideration of existing class type and IPCC standard
- ➢ Consideration of factor for deforestation and forest degradation

III. Utilization of integrated Forest Cover Map and Cover Change Map

- ➢ Extraction of change volume of common class type in Mekong river basin
- ➢ Integration of change volume of purpose based class from each country's map

2. Implementation Policy

(2) Technical Policy

■Formulation of Countermeasures

Development of Forest Cover Map of the Lower Mekong Basin → Projection of change in environment by Basin Environment Management Model

↓

Identification of the deforestation hotspot and vulnerable areas

↓

Formulation of Counter measures
- ➢ Best Practices/recommendation formulation
  e.g. Land use planning, Payment for Ecosystem Services (PES)
- ➢ Promotion of private investment
  e.g. Forest Products trading, Carbon trading
- ➢ Improvement of technology
  e.g. Disaster control, Seedling production

2. Implementation Policy

(2) Technical Policy

■Formulation of Countermeasures

Approach ideas for formulation of Countermeasures

	Forest Products trading	Disaster control technology	Carbon trading
Target	Livelihood improvement with Sustainable Forest Management	Eco-DRR	REDD+
Data collection (Japan)	Demand investigation for forest products	Estimation of deforestation hot spots/fragile areas by watershed environmental management model and forest cover map	Study on the interest level and the inhibitory factors for carbo business by questionnaire and interview
Data collection (Mekong basin)	Gathering information on good practice (literature, interview, field visit) Consideration of possibility on expansion of good practice	Existing forest policies related with disaster Field survey of estimated hot spots and/or fragile areas Inspection of existing mountain disaster control technology	Responses to climate change (e.g. NDC), Acceptance system of foreign private sector Investigation of precedent activity and consideration to a expansion of similar activity
Point	**Social business** through sustainable forest management and business of Forest products	Forest conservation and **disaster risk reduction by ecosystem** in areas with high vulnerability	**Mobilization of private-sector resources** to deal with climate change
Assumed Project type	Formation on Business by Forest Products	Formation of Master Plan Technology transfer from Private sector to Private Sector	Establishment of REDD+ to participate in National program, JCM, CSR, Voluntary Carbon Market
Assumed funding source	Company that benefit from forest product business, JICA SME support, international/domestic NGO	JICA Project, Country budget, Private sector(e.g. Dam company, Mining company)	GCF, JICA Project, Private sector, Country budget, international/domestic NGO

2. Implementation Policy

(2) Technical Policy

■Policy Recommendation

Approach ideas for formulation of Countermeasures

Prioritized Counter measures
- ➢ **Policy formulation**
- ➢ **Promotion of private investment**
- ➢ **Improvement of technology**

Urgency

Seriousness

Implementation Challenges for Each Country

↓

Policies contribute to Sustainable Forest Management

↓

Vulnerable Areas in the Mekong River Basin for Climate Change
Based on the results from
1) Basin Environmental Management Model,
2) Forest Cover Map and Forest Cover Change Map

2. Implementation Policy

(3) Operational Policy

I. Relationship with each stakeholder

- It is important to cooperate with JICA, Mekong five countries and other stakeholders

II. Practical Use of Seminar and workshop

- Spreading information, exchanging opinions and building consensus are to be progressed by practical use of seminar and workshop.

Kickoff Seminar	June, 2018	Confirmation of Activities and Position of this Survey and MRC
Study Tour in Japan	September, 2018	Studying and strengthening of relationship for basin conservation and management
Workshop	October, 2018	Sharing information and challenges of prediction and evaluation of basin environment change and forest cover
Wrap Up Seminar	February, 2019	Meeting and agreement for Policy Recommendation
Seminar in Japan	March, 2019	Promotion of participating private sector and partnership in Japan

Note: Above proposed schedule might be changed depending on the progress of the study.

3. Operation Plan

(1) Grasp of Present Condition and Issue in the Mekong Basin

■Kickoff Seminar

Date	22nd June 2018
Place	Vientiane, Lao PDR
Participants	Participants from MRC office, NMC and other stakeholders
Contents	• Explain of implementation plan on this Survey • Presentation of policy, challenges and approach on basin management and forest conservation • Share of policy and output on the Survey • Major key findings from the informal meetings with NMCs and relevant line agencies (as of May 2018)

3. Operation Plan

(1) Grasp of Present Condition and Issue in the Mekong Basin

■Development of Basin Simulation Model, Projection of Change in Environment and Impact Analysis

- Through the discussions with MRC members, JST understood that MRC Tool Box has been developed for years as decision support framework (DSF). In addition, for keeping consensus of MRC member countries, update of the MRC Tool Box needs much processes and approvals.
- MRC has prepared the model with MRC Tool Box for any different purpose, for instance, evaluation of climate change (CCAI).
- JST will utilize the existing tool and results of MRC at most.

3. Operation Plan

Utilization of MRC Output

Under developed scenarios, MRC has conducted hydrological and hydraulic simulation in LMB, which will contribute to JICA study.

	Scenario	Level of Development for water-related sectors						Climate
		ALU	DIW	FPF	HPP	IRR	NAV	
M1	Early Development Scenario 2007 (Base Sc.)	2007	2007	2007	2007	2007	2007	1985-2008
M2	Definite Future Scenario 2020	2020	2020	2020	2020	2020	2020	1985-2008
M3	Planned Development Scenario 2040	2040	2040	2040	2040	2040	2040	1985-2008
M3 CC	Planned Development Scenario 2040	2040	2040	2040	2040	2040	2040	More seasonal

※ALU : Agriculture & Lan Use, DIW: Drinking & Industrial Water use, FPF: Flood Protection, HPP: Hydro Power Plants, IRR: Irrigation, NAV: Navigation. CC: Climate Change, Source: MRC

3. Operation Plan

(1) Grasp of Present Condition and Issue in the Mekong Basin

■Development of Forest Cover Map and Evaluation

I. Collecting of necessary information and data

II. Creation of Forest Cover Map in lower Mekong river basin

- Extraction of classification items and indicators and examination of integration of items
- Item integration at each country based on the result of above examination
- Geography coordination system at each country is unified to UTM (WGS84)

3. Operation Plan

(1) Grasp of Present Condition and Issue in the Mekong Basin

■Development of Forest Cover Map and Evaluation

- Forest cover maps is integrated and vectorized by head up digitizing
- Forest cover map of each country after vectorization is integrated as a shapefile by year

III. Analysis of deforestation and forest degradation

- Confirmation of effect of direct and indirect factor
- Extraction of relation between factor and forest cover change area
- Hotspot estimation by GIS analysis based on Geospatial data and extracted relation result

3. Operation Plan

(2) Analysis in Japan and Study Tour in Japan

■Study Tour to Japan (Tentative)

Date	One week at middle of September 2018
Place	Relevant authorities such as ministry, research institute and local government in Japan
Participants	Some persons from MRC office, NMC, relevant authorities and other stakeholders including Director position (total: 7)
Contents	Lecture and Site Visit on Skill, Knowledge and Experience in Japan for Basin management/Conservation and Forest conservation
Schedule example	Day1: Arrival Day2~4: Kickoff and Study for water resource management, basin management and water catchment system at the eastern Japan Day5~6: Study for forest conservation at the western Japan Day7: Departure

3. Operation Plan

(3) Discussion on Approach against Issues

■Discussion on Approach against Issues

I. Conversion of Forest Cover Map for basin simulation

II. Feature prediction analysis based on the historical land cover maps and study results of climate change (scenarios)

III. Implementation of basin simulation under some future predictions

IV. Reconfirmation of issues caused by deforestation and forest degradation

V. Discussion for countermeasures with C/P and stakeholders

3. Operation Plan

(3) Discussion on Approach against Issues

■Workshop (Tentative)

Date	October 2018
Place	Vientiane, Lao PDR
Participants	Participants from MRC office, relevant authorities in Japan and other stakeholders
Purpose	To share information and challenges on prediction and evaluation of basin environment change and forest cover
Contents	• Discussion on the result of simulation and analyzing of forest cover map • Exchanging opinions related to the best practices recommendation

3. Operation Plan

(4) Study for Policy Recommendation

■Survey on Best practices/Recommendation

- Verification of Business Potential and Preparation of draft business scheme
- Verification of feasibility and validity on the business scheme

■For preparation of inputs to 10th Mekong-Japan Summit (Nov. 2018)

- Policy recommendations prepared by this project will be dealt with references of 10th Mekong Japan Summit.
- Through the seminars/workshops, what is to be shared for LMB at the prime summit should be discussed.

3. Operation Plan

(4) Study for Policy Recommendation

■Wrap-Up Seminar（Tentative)

Date	End of January or Beginning of February 2019 (to be scheduled)
Place	Vientiane, Lao PDR
Participants	Participants from MRC office, NMC and other stakeholders
Purpose	To agree the Best practices/Recommendation
Contents	• Share of analyzing result on the basin management model simulation and forest cover map • Discussion on the feasibility and follow up method of the suggested project

3. Operation Plan

(5) Seminar in Japan

■Seminar in Japan (Tentative)

Date	End of February or Beginning of March 2019 (to be scheduled)
Place	Japan
Participants	100 people from relevant Industry, Government, Academia and Embassies.
Purpose	• To disseminate the result of the Survey to the Japanese relevant organizations • To exchange opinions on the business development
Contents	• Presentation on the result of the Survey • Exchanging opinions on the business development in Mekong Basin

3. Operation Plan

(6) Technical support

■Formulation of support commission

JICA established the technical support commission in Japan for smooth implementation of the project.

No.	Member	Organization	Description
1	Toshio KOIKE	Director of ICHARM (International Centre for Water Hazard and Risk Management)	Supports of establishment of climate change scenarios and evaluations of impacts of climate changes, etc.
2	Taikan OKI	Professor of the University of Tokyo Univ.	Supports for development of basin models and evaluations of impacts of climate changes, etc.

Thank you for your attention and your kind cooperation.

Contact: mekong@ctii.co.jp

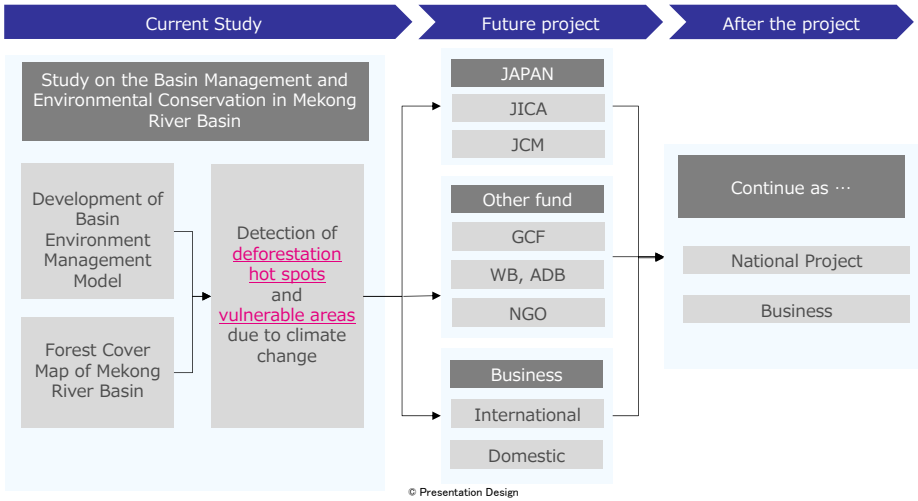
Major Key Findings from Informal Meetings

Formulation of future project

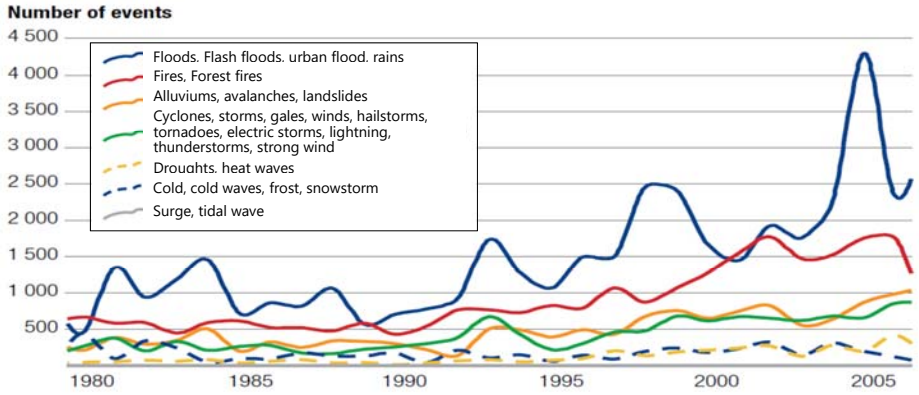
22 June 2018
JICA Study Team (JST)

Contents

1. Aim for formulation of future project



2. Basin management including forest management



Number of flood and rain extensive risk loss reports (1980–2006)

Source : Global assessment report on disaster risk reduction (2009), United Nations International Strategy for Disaster Reduction Secretariat (UNISDR)

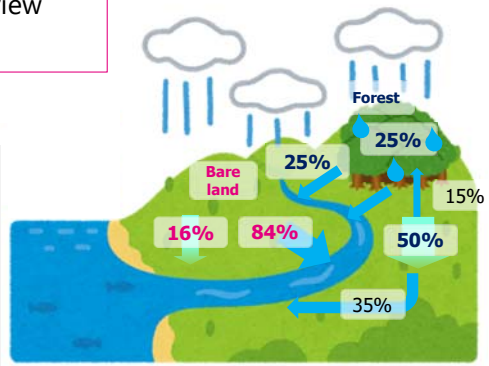
2. Basin management including forest management

Approach of this study

Consider basin management including view point of watershed forest management

Destination of rain falling in the forest

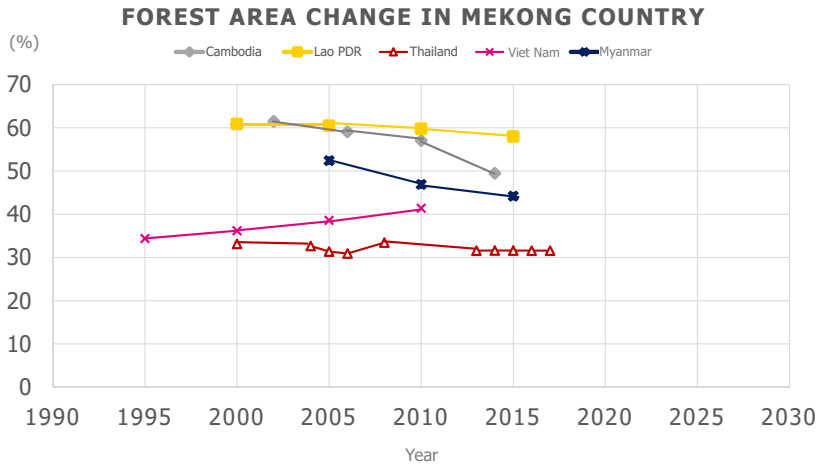
- Stop at trunks, branches and leaves
- Flowing on the ground into the river
- To be stored in the ground
- Become groundwater and slowly flow into the river
- Sucked up from the roots and evaporated from the leaves



2. Basin management including forest management

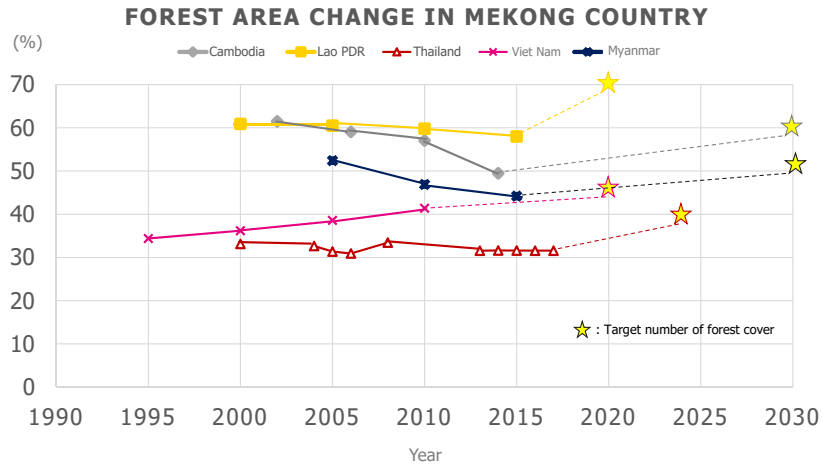
Country	Forest Definition	Current forest cover	Policy target	Deforestation forest degradation deriver
Cambodia	Minimum area 0.5ha Minimum height 5m Minimum canopy cover <10% Rubber as National policy→ F Rubber as REDD+→NF	49.48%(2014) Cambodia Forest cover 2014	60% by 2030 National Forest Program 2009-2029	Deforestation : Conversion to the Agricultural land, Infrastructure and Mining, Forest Encroachment and Forest grabbing Forest degradation : Illegal logging, unsustainable use of NTFPs
Lao PDR	Minimum area 0.5ha Minimum DBH 10cm Minimum canopy cover <20% Rubber → F	58.0%(2015) National REDD+ Strategy	70% by 2020 Forestry Strategy to the Year 2020 of the Lao PDR	Deforestation : Conversion to the Agricultural land and Industry planation, Development of hydropower dam, Forest fire, Mining, Development of Infrastructure Forest degradation : Unsustainable forest exportation, slash and burn and Illegal logging
Thailand	Minimum area 0.5ha Minimum height 10m Minimum canopy cover <20% Rubber → NF	31.58%(2016) Result of Interview	40% by 2024 Forestry Master Plan	Deforestation : Forest encroachment, Slash and burn, Conversion to the agricultural land, development of resort and infrastructure and Mining Forest degradation : Illegal logging, Forest fire
Viet Nam	Minimum area 0.5ha Minimum height 10m Minimum canopy cover <10% Rubber → F	41.4%(2010) Viet Nam's Submission on Reference levels for REDD+ Result Based Payments under the UNFCCC	45% by 2020 Forestry Development Strategy 2006-2020	Forest cover is increasing by establishment of new plantations and re-designation of limestone forests but natural forests continues to be more fragmented and degraded by conversion, infrastructure development, illegal logging and forest fire .
Myanmar	Minimum area 0.5ha Minimum height 5m Minimum canopy cover <10%(10-40 Open forest) (>40 Closed forest) Rubber in PFE→F Rubber out of PFE→NF	44.2%(2015) FRA 2015	51% by 2031 Forest Master Plan 2001-2031	Deforestation drivers are Forest Conversion to the agricultural land, slash and burn and charcoal wood collection etc. . From 2006, conversion of forests to agricultural lands (sugar cane, tapioca, castor oil and rubber) located in the northern outlying boundary of Myanmar is the biggest driver of deforestation.

2. Basin management including forest management



Source : Cambodia , Lao PDR, Thailand and Viet Nam : Result of interview, Myanmar; FRA2015

2. Basin management including forest management

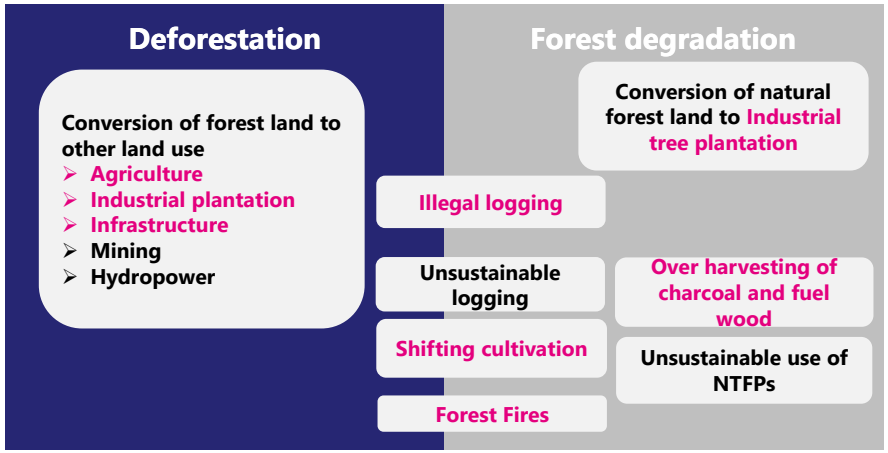


Source : Cambodia , Lao PDR, Thailand and Viet Nam : Result of interview, Myanmar; FRA2015

3. Driver of Deforestation and Forest degradation

	Drivers	Cambodia	Lao . PDR	Thailand	Viet Nam	Myanmar
Conversion	Agricultural land	**X**	**X**	**X**	**X**	**X**
	Industrial Plantation	**X**	**X**	**X**	**X**	**X**
	Infrastructure	**X**	X	**X**	**X**	**X**
	Mining	**X**	X	**X**		X
	Hydropower		X		**X**	**X**
logging	Illegal logging	**X**	**X**	**X**		X
	Unsustainable logging		X		**X**	X
Shifting cultivation		X	X	X	X	X
Overharvesting of fuel wood		X	X	X		**X**
Unsustainable use of NTFPs		**X**			**X**	
Forest Fires			X	**X**	**X**	X

3. Driver of Deforestation and Forest degradation

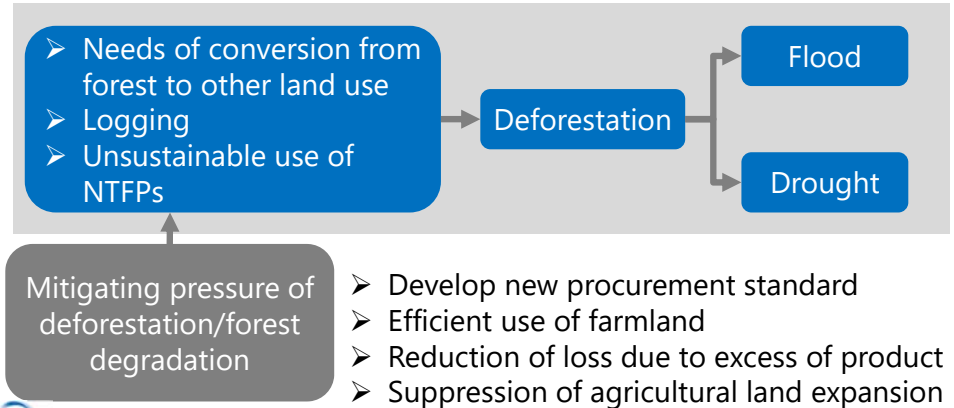


3. Driver of Deforestation and Forest degradation

- ✓ **Population increases**
- ✓ **Poverty**
- ✓ **Increasing demand for industrial agriculture products**
- ✓ **Demand for wood energy for domestic and industrial use**
- ✓ **Weak forest sector governance**
- ✓ **Lack of demarcation of forest areas**
- ✓ **Increasing accessibility of forest areas …**

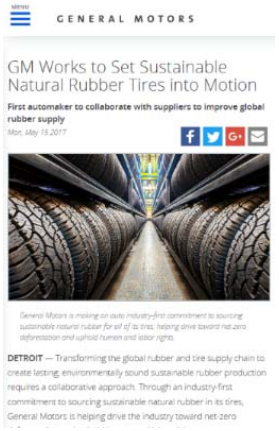
4. Ideas of good practices for future project

4-1. Approach to the Deforestation/forest degradation drivers



- Develop new procurement standard
- Efficient use of farmland
- Reduction of loss due to excess of product
- Suppression of agricultural land expansion

Approach to the Deforestation/ forest degradation drivers


GENERAL MOTORS

GM Works to Set Sustainable Natural Rubber Tires into Motion

First automaker to collaborate with suppliers to improve global rubber supply

Mon, May 15 2017

DETROIT — Transforming the global rubber and tire supply chain to create lasting, environmentally sound sustainable rubber production requires a collaborative approach. Through an industry-first commitment to sourcing sustainable natural rubber in its tires, General Motors is helping drive the industry toward net-zero

1. Sustainable production and procurement of natural rubber

Conversion of the forest to rubber plantation is one of the biggest deforestation/forest degradation drivers in the Mekong basin. In whole supply chain, it is required to implement sustainable production and procurement with transparency by own policy to be developed.

To stop deforestation by the expansion of rubber plantation...

- ◆ Develop own procurement policy
- ◆ Ensure traceability
- ◆ Work together with stakeholders

Source: https://www.detroitnews.com/story/business/autos/general-motors/2017/05/15/sustainable-natural-rubber-tires/101713952/

Approach to the Deforestation/ forest degradation drivers

2. Sustainable production and procurement of charcoal

Over harvesting of firewood and charcoal is one big driver of deforestation and forest degradation. To use firewood and charcoal sustainably, realize not only harvesting and utilization, but also planting, so that it is made possible to use charcoal cyclically and sustainably.








Source of photos: http://eisei.asia/

Approach to the Deforestation/ forest degradation drivers

3. Efficient energy use

Introduction of cooking stoves with high combustion efficiency and utilization of agriculture and forestry residue to biofuel to reduce pressure of deforestation and forest degradation due to collection of firewood charcoal

Structure of cooking stove


Existing cooking stove


High combustion cooking stove

Production of bio fuel with agriculture waste

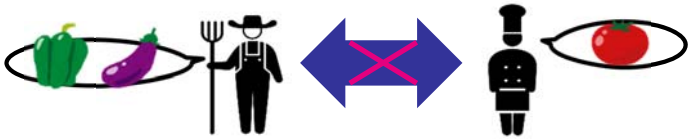
Source of photos: https://www.nanopowers.net/

Approach to the Deforestation/ forest degradation drivers

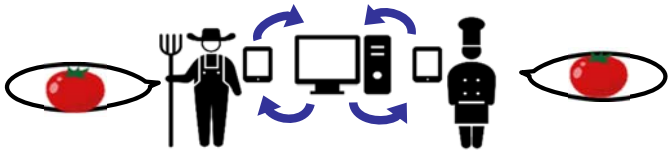
4. Production management visualizing supply-demand balance

Introduce production management system to reduce the production loss caused by the difference in demand-supply balance between producers and consumers, realize efficient agricultural production by small farmers, and contribute to control agricultural land expansion.

Current situation



Introduction of production management system



4. Ideas of good practices for future project

4-2. Improvement of Reforestation

Decline of watershed conservation function by Deforestation → Implementation of Reforestation → Lack of appropriate silviculture operation and forest product value chain

Improvement of forestation technique

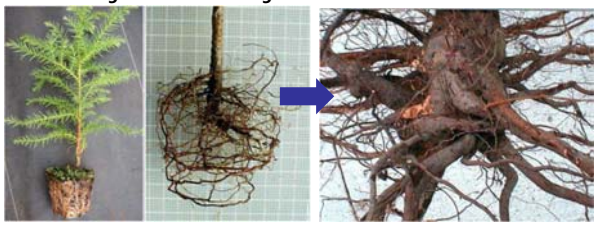
- Implement efficient and effective reforestation
- Recovery of watershed conservation function
- Mitigation of flood damage

Improvement of Reforestation

Growing Container seedlings

5. Introduction of container seedlings

The container seedlings are cultivated in a special container. The roots are protected within a peat and therefore less susceptible to damage and environmental stresses. The container seedling results in high survival rate and growth rates.



Looping root of the seedling which grow in the pot

After planting, root is still looping

Root of container seedling is not looping because of air pruning

Source: http://www.pref.hokkaido.lg.jp/sr/srs/contena/konntenanaesono1.pdf

4. Ideas of good practices for future project

4-3. Prevention technology of Slopes disasters

Increase of Slopes disasters → The earth and sand from the landslides are accumulated in the river → The sediment will be the cause of Flood

Introduction of technology for Slopes disasters control

- Prevention of sediment disaster
- Suppressing the deposition of sediment in a river
- Mitigation of flood damage

Prevention technology of Slopes disasters

Structure of Ground anchor

6. Ground anchor construction method

It is a method of tying the stable underground rock and the surface with a cable to create tension, thereby stabilizing slopes and structures. It is effective to prevent landslides and estabilize road slopes.

Construction to slopes close to the railroad

Construction to highway slopes

Reinforcement of sabo dam

Figure and pictures are courtesy of SE Corporation : http://www.se-corp.com/en/Top.html

Prevention technology of Slopes disasters

Slope greening sheet with straw

Structure of the sheet

7. Slope greening sheet

The greening sheet attaching seeds and fertilizer is installed to bare land to promote recovery of vegetation. After installing them, grasses and shrubs which are attached to the sheet as seed will cover the slope and these root preserve soils from erosion.

Before Work

After Work

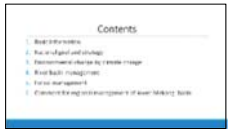
After 10 month

Pictures are courtesy of Rontai Corporation : http://www.rontai.co.jp/

5. Requests for Mekong Countries

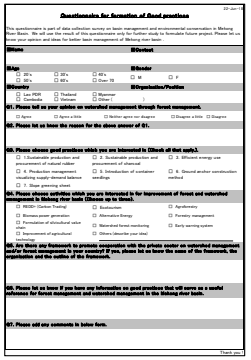
5.1. Country Report

Please complete the country report according to the format prepared by JST by 31th August.



5.2. Questionnaire

Please describe the answer on the questionnaire distributed.



6. Way Forward

5	6	7	8	9	10	11	12	1	2	3
	Kick off seminar				Interim seminar				Final work shop	
Cambodia	Lao PDR	Thailand		Vietnam	Myanmar					

Information gathering of Forest condition and Good practices → Analysis of issues → Formulation of good practices

Development of Mekong Basin model

Development of Forest Cover map

Thank you for your attention and your kind cooperation.

Contact: mekong@ctii.co.jp

s.matsumoto@jofca.or.jp

Major Key Findings from Informal Meetings

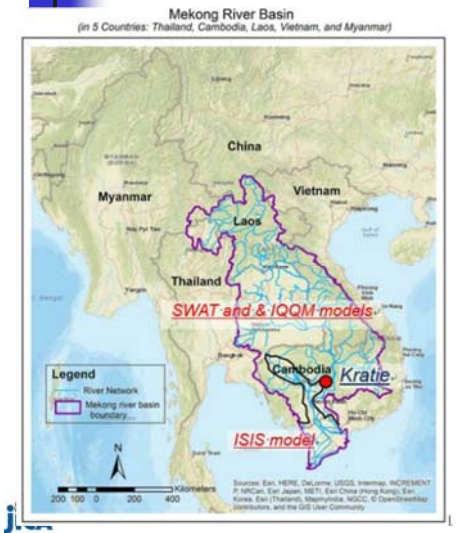
Climate Change / Hydrology

22nd June 2018

JICA Study Team (JST)

1. MRC Tool Box

Outline



MRC Tool Box:

- Developed as Decision Support Framework (DSF) for Lower Mekong Basin (LMB)
- DSF consists several hydrological/hydraulic analysis models, etc.
- For estimation of flow regime in LMB, three models (SWAT, IQQM and ISIS) are used.
- Data set is prepared and approved by all MRC members (NMC).

1. MRC Tool Box

Summary of each model

No.	Model	Description
1	SWAT	The SWAT developed by the United States Department of Agriculture has been set-up to generate sub-basin runoff from rainfall and climate data then provide inputs to a series of basin simulation models. The scenarios of land use change and climate change can be applied with this model.
2	IQQM	The Integrated Quantity and Quality Model (IQQM) is a basin simulation model, originally developed for the Murray-Darling Basin in Australia. IQQM used output from SWAT sub-basins to route through the river system, making allowance for control structures such as dams and irrigation abstractions.
3	ISIS	The ISIS is a hydrodynamic model, developed by HR Wallingford and Halcrow, is used to simulate the river system downstream part of the basin including Great Lake and Delta. The hydrodynamic model represents the complex interactions caused by tidal influences, flow reversal in the Tonle Sap River and over-bank flow in the flood season with the varying inflows from upstream.

1. MRC Tool Box

Past Developed DSF

For different purpose, DSF was developed

1) For evaluation of climate change
According to the Climate Change Adaptation Initiative (CCAI), DSF model (baseline: 2007) was developed.

2) For Council Study
In "The Study on Sustainable Management and Development of the Mekong River, including Impacts by Mainstream Hydropower Projects" , new DSF was developed.

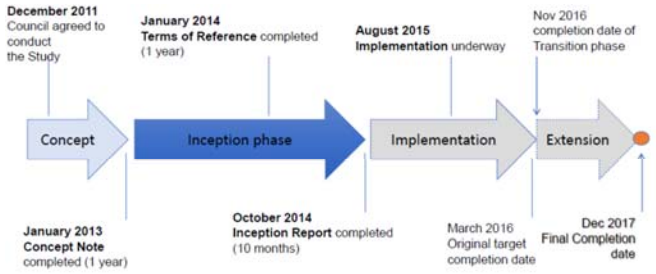
,etc.

1. MRC Tool Box

Council Study

Key Objectives:

- Study **positive and negative environmental, social, and economic impacts of water resources development**
- Integrate results into the MRC knowledge base to enhance the Basin Development Planning process
- Promote capacity and ensure technology transfer to Member Countries



1. MRC Tool Box

Simulations in Council Study

Scenarios conducted in Council Study, which contribute to JICA Study

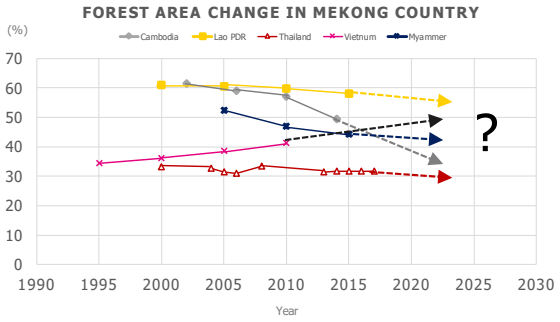
	Scenario	Level of Development for water-related sectors						Climate
		ALU	DIW	FPF	HPP	IRR	NAV	
M1	Early Development Scenario 2007 (Base Sc.)	2007	2007	2007	2007	2007	2007	1985-2008
M2	Definite Future Scenario 2020	2020	2020	2020	2020	2020	2020	1985-2008
M3	Planned Development Scenario 2040	2040	2040	2040	2040	2040	2040	1985-2008
M3 CC	Planned Development Scenario 2040	2040	2040	2040	2040	2040	2040	More seasonal

※ALU : Agriculture & Lan Use, DIW: Drinking & Industrial Water use, FPF: Flood Protection, HPP: Hydro Power Plants, IRR: Irrigation, NAV: Navigation. CC: Climate Change, Source: MRC

2. Evaluation of Deforestation

Prediction of forest cover area

- Forest has an important roles for water resources management including countermeasures against natural disaster such as flood and drought, etc. in LMB and the proper forest conservation is indispensable.
- Therefore, simulations in case of serious deforestation shall be done.

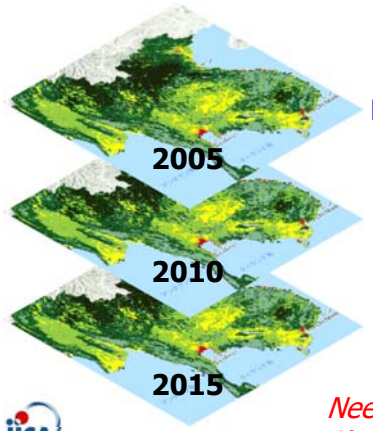


Source: Cambodia , Lao PDR, Thailand and Viet Nam ; Result of interview, Myanmar; FRA2015

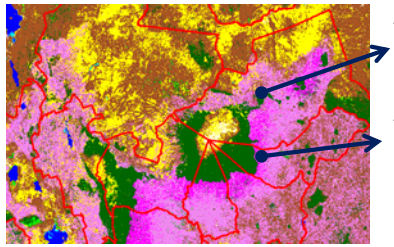
2. Evaluation of Deforestation

Prediction of forest cover area

- Prepare historical forest cover map



- Occupancy of forest area in each sub-basin (SWAT Model) shall be calculated.

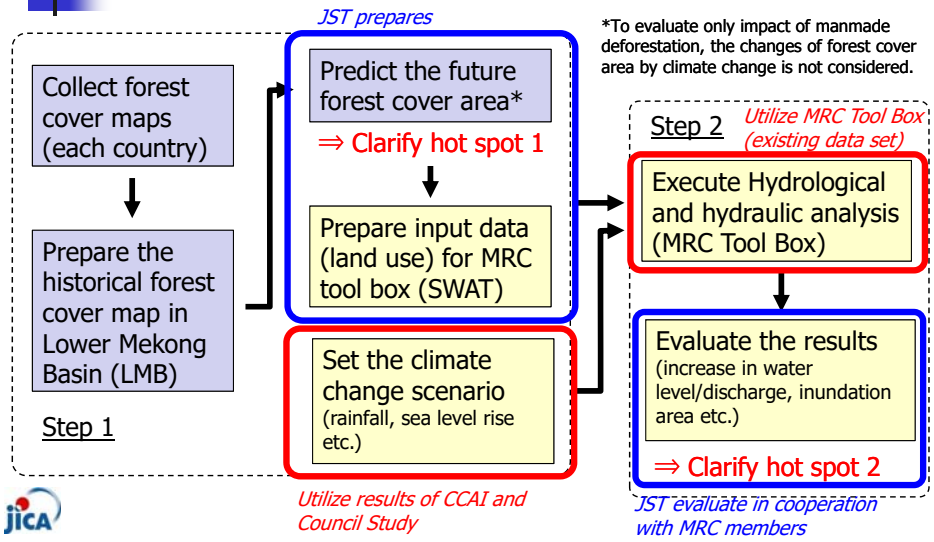


- Future occupancy of forest area shall be set up based on the past changes of forest area, etc. in cooperation with MRC.

Need to prepare 1) optimum, 2) medium and 3) worst scenarios.

3. Impact Assessment

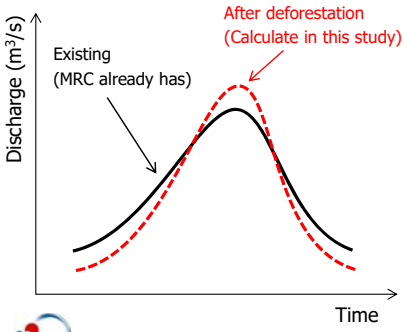
How to evaluate the impacts

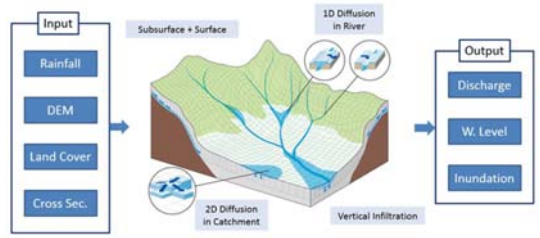


3. Impact Assessment

Examination of hydrological outputs

- Compare hydrographs and extract remarkable points. (at calculation points of SWAT)
- In areas which can become vulnerable due to deforestation will be examined with RRI Model developed by ICHARM, Japan.





Schematic Diagram of RRI Model

http://www.icharm.pwri.go.jp/research/rri/rri_top.html

3. Impact Assessment

RRI Model

- Developed by ICHARM (http://www.icharm.pwri.go.jp/)
- Distributed hydrologic model and unsteady flow model
- River flow and inundation area can be calculated considering sea tide.
- Free distribution

http://www.icharm.pwri.go.jp/research/rri/rri_top.html

4. Climate Change

Climate Change

MRC has already evaluated impacts of climate change in Climate Change Adaptation Initiative (CCAI).

Model: Data set approved by MRC and all NMC
Base line: 2007
Climate change scenario:
Low (RCP 2.6), Medium (RCP 6.0/4.5) and High (RCP 8.5)
Evaluation term:
2030 (2021 - 2040), 2060 (2031 - 2070) and 2090 (2081 - 2100)

MRC's output will be utilized maximally.

5. Points to be considered

- Target year 2030 ? 2040 ?
- Simulation scenario (combination of climate changes and deforestation)
- Which DSF model should be employed.

,etc.

JST would like to discuss with MRC members continuously.

Thank you for your attention and your kind cooperation.

Contact (open 24 hours):
mekong@ctii.co.jp

Major Key Findings from Informal Meetings

Forest Cover Map

22nd June 2018

JICA Study Team (JST)

Forest Cover Map – Initial Plan

I. Collecting of existing the Forest Cover Maps from each countries
   - Compatibility
   - Continuity
   - Publicness
   - Trustability
   - Detailed analysis possibility

II. Combining of existing the Forest Cover Map
   - Merging of cover type → Forest, Urban area, Other

III. Extraction of cover change (Ex. 2000 to 2005)

Forest Cover Map – Colleting

Country	Organization Name
	Mekong River Commission (MRC)
Cambodia	General Directorate of Administration for Nature Conservation and Protection (GDANCP), Ministry of Environment
	Forestry Administration, Ministry of Agriculture, Forestry and Fisheries
Lao PDR	Department of Forest, Ministry of Agriculture and Forestry
Viet Nam	Viet Nam Administration of Forestry, Ministry of Agriculture and Rural Development
	Forest Inspection and Planning Institute, Ministry of Agriculture and Rural Development
Thailand	Royal Forest Department, Ministry of Natural Resource and Environment
	Department of National Parks, Wildlife and Plant Conservation, Ministry of Natural Resource and Environment
	Faculty of Forestry, Kasetsart University
Myanmar	Forestry Department, Ministry of Environmental Conservation and Forestry

Forest Cover Map – Colleting

I. Available year of existing the Forest Cover Maps
   - 2000 – 2015 *Greatest common factor

II. Utilized satellite imagery
   - LANDSAT satellite imagery were mostly utilized
   - SPOT satellite imagery or other satellite imagery were utilized some year and some country

III. Classification method: Segmentation based classification

IV. Number of land cover type
   - 6 to 22 classis (included forest type)
   - For forest: 3 to 12 classis
   - Thailand: Forest or Non-forest only

Thank you for your attention and your kind cooperation.

Contact: mekong@ctii.co.jp

Forest Cover Map – Option

I. Utilization of Land Cover Map which was developed by ADPC (Asia Disaster Preparedness Center)

- Available year: 2000 – 2016 (each year)
- Cover area: Whole Mekong River Basin
- Utilized Satellite Imagery: LANDSAT Satellite Imagery
- Classification Type: Pixel based classification
  * Supervised classification with deep learning
- Utilized software: Google Earth Engine
- Number of land cover type: 22 classes
  * Forest: 9 classes, Non-forest: 11 classes
- Cooperation: USAID, NASA, Spatial Informatics Group, USDA Forest Service, Google, MRC, etc.

Forest Cover Map – Option

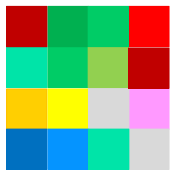
II. How to use the ADPC's Land Cover Map

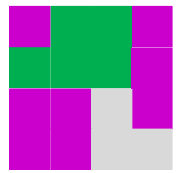
- To merge land cover type
  * 20 classes to 3 classes
- To compare forest area between reference years
  * Ex) 2000 – 2005, 2005 – 2010, 2010 – 2015
  * To understand trend of forest cover area
- To use for model simulation
  * Preparation: calculation for percentage of land cover type on each sub or sub-sub basin

Forest Cover Map – Option

Merging of land cover type → 20 to 3

Forest A
Forest B
Forest C
Bushland
Grassland
Cropland
Bare land
Urban Area
Waterbody

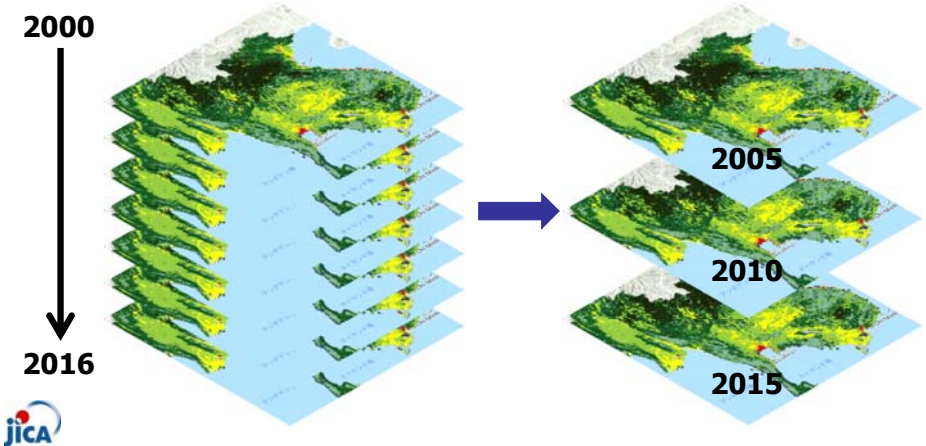




Forest
Urban Area
Other

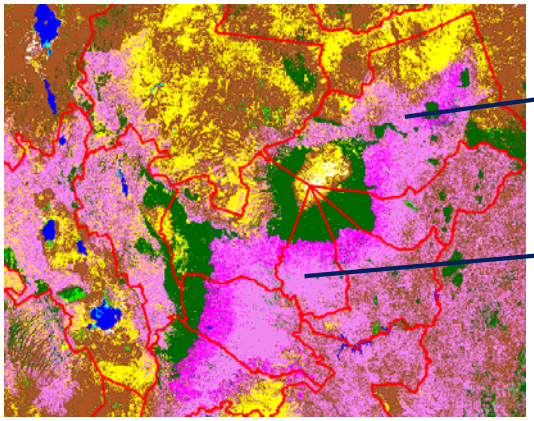
Forest Cover Map – Option

Reference Interval Year: 4years or 5 years



Forest Cover Map – Option

Calculation for percentage of land cover type



Area 1

Forest: 20%
Urban: 5%
Other: 75%

Area 2

Forest: 60%
Urban: 2%
Other: 38%

Cambodia • Lao PDR • Thailand • Viet Nam
For sustainable development

Wrap-Up and Next Steps

MRC-JICA **Regional Kick-off Meeting on**
The Study on Data Collection Survey on the Basin Management and Environmental Conservation in Mekong River Basin
22 June 2018 at MRCS Office, Vientiane, Lao PDR

Wrap-Up (1)

1. The Meeting acknowledged and agreed the structure, scope and contents of the **Draft Inception Report**, with the following key comments for the final version of the Report:
   - South China Sea to East Sea
   - Clearer and detailed roles and responsibilities of JICA, JST, MRCS, NMCs and line agencies (particularly the forestry departments of the 4 MCs and Myanmar) in this project- e.g. involvement of MCs experts in modelling work
   - All modelling task at MRCS TD
   - Mangrove forest reduction- check the figures (VN has available data)
   - Transboundary issues
   - Capacity building for government staff on forest management and conservation
   - Need more consultations, with the 4 MCs, but not national consultations: e.g. choosing years of forest covers, CC scenarios, and payment for ecosystem services

Wrap-Up (2)

- Data sharing ref. to PDIES: JICA to/from MRCS to/from NMCs and to/from LAs for needed data
- Carbon credit, with ref REDD+ and Links of this project with REDD+
- Make clarification of the terms “business policy”

Wrap-Up (3)

2. Key findings from informal meeting with Mekong MCs- **CC & hydrology**

- 13 Sub scenarios of the MRC Council Study;
- Choose 2040
- JST will prepare **deforestation/forest cover data** for MRCS TD to run MRC SWAT Model and then hot spots will be identified and selected for running RRI model for impact assessment in regard to water level, discharge and inundation.
- Use the 3 MRC CCAI climate change scenarios (RCP 2.6, 6.0/4.5 and 8.5)combined with deforestation data to assess the impacts on hydrology and hydraulics of the River

Wrap – UP (4)

2.2 Forest cover maps

In addition to MRC land cover data and 4 MCs forest cover data using **ADPC land cover data** to include Myanmar to prepare forest cover maps of the Mekong basin.

Wrap – UP (5)

2.3 Formulation of future projects

- Identify **future projects** related to good practices for protecting forest resources, based on the results of this initial study.
- Each MC should prepare a ppt presentation on National Country Forestry Report submitted to JST by 31 August 2018 presented at the next workshop in October 2018.

Next steps

No.	Item	Deadline
1.	Summary report of the meeting	6 July 2018
2.	Finalization of the Inception Report and share with the 4 MCs and Myanmar	15 July 2018
3.	Study tour in Japan for 1 week	Second week of September 2018
4.	Regional workshop on Sharing information and challenges of prediction and evaluation of basin environmental changes and forest cover maps at MRCS	October 2018
5.	Final workshop at MRCS on Sharing of possible projects and programmes for promoting forest conservation and management to be included in the proposed best practices/ policy recommendations	Early Feb 2019
6.	Prepare the final project report	End of March 2019

Thank you for your attention!

添付-6-2

中間ワークショップ@ラオス　資料

Mekong River Commission (MRCS)

and

Japan International Cooperation Agency (JICA)

Tentative Agenda

The Regional Interim Workshop on

the Study on Data Collection Survey on the Basin Management and Environmental Conservation in Mekong River Basin

24th January 2019 at MRCS Office, Vientiane, Lao PDR

1. Background

During the 8th top-level meeting among Japan and Mekong countries on 7th September 2016, Mr. Shinso Abe, the Japanese Prime Minister, announced the commencement of a survey for the environmental conservation program on Mekong River Watershed. The first phase of the program focuses on the data collection survey for the development of forest cover map in the basin and recommends policy for forest preservation.

Under this Japan-Mekong Cooperation, the Mekong River Commission (MRC) and Japan International Cooperation Agency (JICA) have co-implemented the new initiative on "Data Collection Survey on the Basin Management and Environmental Conservation in Mekong River Basin" Project which includes 4 Member Countries (MCs) and Myanmar. The Project will implement from December 2017 to JulyMarch 2019. The objectives of this Project are to: (1) understand the existing condition of forest preservation; (2) clarify the issues on forest management and preservation; and (3) propose the effective countermeasures as policy recommendations for basin management in the Mekong River. The expected outputs are; (i) the basic information for forest management are collected and reviewed; (2) the environmental impacts by climate changes and the historical changes of forest resources are studied and (iii) the best practices for basin management in the Mekong River are recommended.

On 22nd June 2016, the regional kick-off seminar was held in cooperation with the Mekong River Commission Secretariat (MRCS) and the Member Countries (MCs), in order to present and discuss the project details and work plan with the National Mekong Committees (NMCs) and relevant line agencies. After the seminar, the inception report was finalized and JST commenced practical activities. To prepare the study report, the JST, with the coordination of MRCS and the respective NMCs, had conducted the interview sessions with relevant line agencies of the MCs during August to November 2018. Results from these interview sessions were used for further improvement of information gaps and development of the study report.

The Regional Interim Workshop aims to present the progress of project activities and outputs by the JST and discuss about the further activities for forest management in Lower Mekong Basin (LMB) region.

2. Objectives of the Workshop

The objectives of this Regional Interim Workshop on the Study on Data Collection Survey on the Basin Management and Environmental Conservation in Mekong River Basin are to:

- Report the progress of project activities especially the results from interview sessions with relevant line agencies during August to November 2018;
- Discuss the preparation of forest cover maps and hot spot (deforestation areas) and drivers for deforestation; and
- Discuss further study on hydrological/hydraulic analysis and policy recommendations with MRCs, NMCs and relevant national line agencies.

3. Expected Outputs

The expected outputs from the Workshop are as follows:

- The employment of historical forest cover maps generated by ADPC's satellite imagery (Landsat) for the Project was finalized and agreed;
- Common perceptions on deforestation drivers in each country were shared and discussed;
- Future land cover scenarios for evaluation of deforestation in LMB was discussed and agreed; and
- Methodology of estimation of vulnerable areas by future land cover areas was discussed and agreed.

4. Agenda

Time	Activities
09.00-09.30	Registration ***Facilitated by MRCS ED Staff***
09.30-09.40	Opening Remarks ***By Mr. Tran Minh Khoi, Director of MRCS ED and*** ***Mr. Yoshiharu YONEYAMA, Director of JICA Laos Office***
09.40-09.50	Opening Guidance: (1) Introduction and Background; (2) Objectives of the Workshop; and

Time	Activities
	(3) Expected Outputs ***By the JICA Study Team***
Session I: Interim Report on the Study	
09:50-10:45	Presentation on Interim Report on the Study 1) Outline of the Survey; 2) Preparation of Land cover maps and hotspot 1; 3) Data request; and 4) Deforestation drivers, etc. ***By the JICA Study Team***
10:45-11:00	Tea and coffee break
11:00-12.00	Discussions on Interim Report on the Study ***Facilitated by Dr. So Nam, Chief Environmental Management Officers, MRCS ED***
12.00-13.30	Lunch break
Session II: Discussion for Further Studies	
13.30-14.30	Presentation on the major key findings and discussions 1) Relation of deforestation drivers and actual land cover changes; 2) Deforestation scenarios; 3) Methodology of estimation of hotspot 2; and 4) Next steps ***By the JICA Study Team***
14.30-14.45	Tea and coffee break
14.45-16.00	Discussions on the major key findings and proposal by JST ***Facilitated by Dr. So Nam, Chief Environmental Management Officers, MRCS ED***
16.00-16.30	Wrap-up and Next Steps ***By MRCS ED and the JICA Study Team***
16.30-16.45	Fill-up the Questionnaire ***By the JICA Study Team***
16.45-17.00	Closing Remarks ***By MRCs or JICA Laos office***

Title	The Regional Interim Workshop on the Data Collection Survey on the Basin Management and Environmental Conservation in Mekong River Basin
Date / Time	24th January 2019 (Thu) / 9:30 ~ 17:00
Venue	MRC Conference Room, Vientiane, Lao P.D.R
Participants	46 participants from Cambodia, Lao PDR, Thailand, Viet Nam, Myanmar, Stakeholder, MRCS, JICA, JICA Study Team (JST)
Agenda and Topics	1. Opening Remarks 2. Session 1: Interim Report on the Study 3. Session 2: Discussion for Further Studies 4. Wrap-up and Next Steps & Closing Remarks

Main Items discussed

1. Opening Remarks

Opening Remarks was announced by Dr. An Pich Hatda, CEO, MRCS ED and Mr. Yoshiharu YONEYAMA,, Director of JICA Laos Office.

2. Interim Report on the Study

The summary of the Interim Report was presented by JST and contents were discussed with the following key suggestions and comments.

- Evidences of criteria to classify the hot spot 1 come from past experiences, reduction ratio of forest transition and correlation between forest area and farm area.
- Category of land cover map is changed from 21 to 4 in order to catch the trend of forest reduction. Amount of forest area wasn't analyzed in this study.
- MRC also has the own maps so differences between MRC's map and maps of project output should be clear.
- Project output should be checked consistency with MRC's data.
- Classifying natural forest and plantation is difficult because of using land cover map to compare with forest area and farm area in this project.
- Area of forest reduction is used only in case it is described in the official documents such as REDD+ report.

3. Discussion for Further Studies

The Further Studies regarding to hydrological analysis, forest reduction and private cooperation were presented by JST and opportunity for future activities was discussed with the following key suggestions and comments.

- Hot spot 1 shows actual area of forest reduction to grasp the trend of forest reduction and hot spot 2 shows area received impact of forest reduction and climate change indirectly.

Main Items discussed

- Deforestation scenario should be shown by JST for the future discussion.
- Amount of hydrological flow receives impact of dam ischarge.
- Precipitation data after 2008 is needed for the study.
- Hydraulic analysis by MRC needs more than 2 months.

4. Wrap-up and Next Steps & Closing Remarks

Wrap-up of this workshop was shared by Dr. So Nam, Chief Environmental Management Officer, ED, MRC.

Photos

Open Remarks

Open Remarks

Presentation by JST

Presentation by JST

End of Documents

Session I: Interim Report on the Study

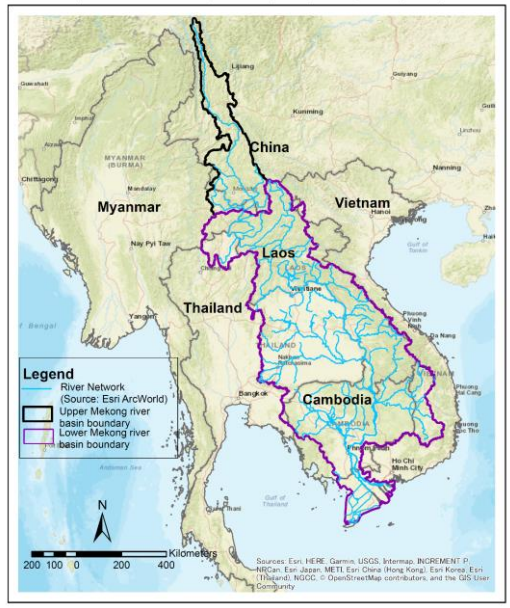
"Data Collection Survey on the Basin Management and Environmental Conservation in Mekong River Basin"

24th January 2019

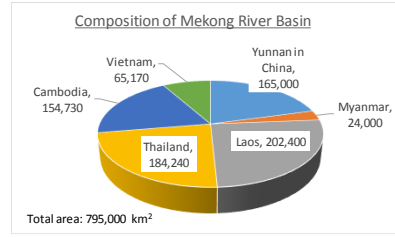
JICA Study Team (JST)

0

Mekong River Basin
(in 5 Countries: Thailand, Cambodia, Laos, Vietnam, and Myanmar)



Location Map



- Catchment area: 795,000 km²
- River length: 4,800 km
- Headwater: Tibetan Plateau
- River mouth: State of Ben Tre in Viet Nam
- General issues due to deforestation:
  Increase of natural disasters such as flooding, drought, collapse of ecosystems, acceleration of global warming and etc.

Data source: JICA

1

1

Agenda

Today's Presentation

1. Outline of the Survey

Provide basic information, work procedure and the JST of the study

2. Progress of each Step

Report the progress of

Step 1: 1) Utilization of Satellite Images, and 2) Statistical Approach

Step 2: 1) Data request, 2) Method for finding Hot Spot 2 and 3)Future deforestation scenarios

Step 3-1: 1) Deforestation Drivers, and 2) Private Promotion and Business Partnership

1. Outline of the Survey

Basic Information

Project Name:

Data Collection Survey on the Basin Management and Environmental Conservation in Mekong River Basin

Target country: Cambodia, Lao PDR, Thailand, Viet Nam and Myanmar

Main counterpart:

Mekong **R**iver **C**ommission (MRC) and 4 **N**ational **M**ekong **C**ommittees (NMC)

Objectives:

1) To understand forest cover areas in **L**ower **M**ekong **B**asin (except for China)
2) To clarify triggers of deforestations and issues of forest management
3) To propose effective countermeasures and to recommend effective basin management policy focusing on forestry sector in LMB

Project period: Dec 2017 to July 2019

1. Outline of the Survey

Work Procedure

Step 1

Collect satellite images

Prepare historical forest cover maps in Lower Mekong Basin (LMB)

⇒ Identify deforestation areas as *hot spot 1*

Predict the future forest cover area*

Prepare input data (land use data considering future deforestation)

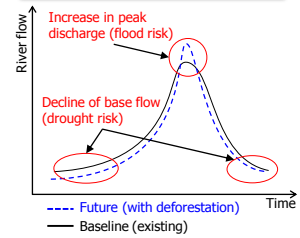
Set the climate change scenario (sea level rise etc.)

*Where man-made deforestation is mainly evaluated while the effects of climate change inducted deforestation is not considered.

Step 2 *Next activity*

Execute hydrological simulations

Evaluate the results



⇒ Identify potential vulnerable areas as *hot spot 2*

4

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1. Outline of the Survey

Work Procedure

Step 3-1 *On-going*

Clarify deforestation areas and its drivers (by field/interview surveys and literature search, etc.)

Find activities for against deforestation (by interview survey, literature search, etc.)

Verify relations between drivers and "*hot spot 1*"

Evaluate actual or potential effectiveness of the activities

Focus on private promotion and business partnership

List up effective countermeasures against deforestation

5

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1. Outline of the Survey

Work Procedure

Step 3-2 *Next activity*

Analyze potentially vulnerable areas ("*hot spot 2*") from viewpoint of water resources management

Analyze detail negative impacts by deforestation (by RRI Model), if needed

List up effective countermeasures

Step 4 *Next activity*

Propose effective countermeasures and to recommend effective basin management policy focusing on forestry sector in LMB based on the output from Step 3

1. Outline of the Survey

JICA Study Team (JST)

Position	Name
Team Leader / Basin Management 1	SASABE Keiji
From Jan 2019 through certain circumstances… Team Leader Basin Management 1	HATANO Takayuki GOTO Toshihiro
Sub-Team Leader / Basin Management 2 / Climate Change / Hydrology	NAKAMURA Kazuhiro
Forest Cover Map	SATO Kei
Private Promotion and Business Partnership	KIYOTA Daisaku
Sustainable Forest Management (Mitigation and REDD+)	FUJIMURA Sahori
Support for Seminar	ICHIKAWA Shumpei

2. Interim Report

Progress of Step-1

(1) Utilization of Satellite Images for Land Cover Maps (LCM)

(2) Statistical Approach for understanding historical forest cover area

Progress of Step 1

(1) Utilization of Satellite Images

Situation of Forest Cover Maps

- Ideally, Preparing forest cover maps by compiling maps supplied by member countries is the best methods for the project purpose. However, there are certain difficulties for this such as lack of maps in some areas, inconsistencies in image resolutions covering the target areas and limited time for processing.
- Therefore, it is practical as well as optimum to utilize global observation data.
- ADPC (**A**sian **D**isaster **P**reparedness **C**enter in Bangkok)* can provide time series Land Cover Map (based on Landsat imagery) for free.
- JICA, MRC and NMC agreed on the utilization of satellite images prepared by ADPC to analyze the historical changes of forest cover areas in LMB at Joint Seminar on June 2018.

*ADPC website: https://www.adpc.net/igo/?

Progress of Step 1

(1) Utilization of Satellite Images

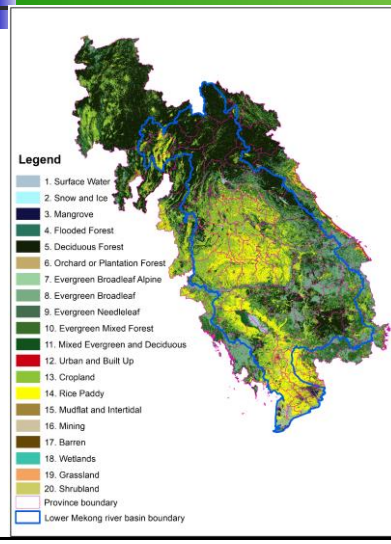
Basic Condition for Preparation of Maps

- Duration: 16 years, from 2000 to 2015
- Images resource: LANDSAT 4 to 8
- Utilization bands:
  RGB (Blue, Green, Red) ,near infrared and middle infrared band
- Land Cover Classification:
  (1) forest (9 class types), (2) urban area, (3) cropland, (4) rice paddy, (5) others (8 class types), (6) unknown e.g. obstacle by clouds
- Method:
  Utilization of indices such as NDVI (Normalized Difference Vegetation Index), NDWI (Normalized Difference Water Index), etc. with machine learning (random forest algorithm) as supervised classification. It is pixel based automatic classification
- Reliability: Over 70% even without field surveys.

Progress of Step 1

(1) Utilization of Satellite Images

Land Cover Maps



- Land Cover Classification: Total 21-class
  (1) forest (9 class types)
  (2) urban area
  (3) cropland
  (4) rice paddy
  (5) others (8 class types)
  (6) unknown

Fig- Land Cover Map by ADPC

Progress of Step 1

(2) Statistical Approach

Preparation of analytic data and analysis

- Integration of class type on Land Cover Map:
  21 Classes → 4 Classes
  (1) Forest, (2) Agricultural Area, (3) Urban Area and (4) Other
- Provincial level approach:
  Counting the area size for 4 class types at province
  3 years average window function for smoothing
- Analysis:
  Correlation between (1) Forest and (2) Agricultural Area for 2001 to 2014
  Calculation for:
    Forest change ratio between 2001 and 2014
    Deforestation percentage
  Extraction of hotspot province:
    Forest cover ratio at province >= 50%, Deforestation >= 0.22% / Year, Correlation <= -0.7

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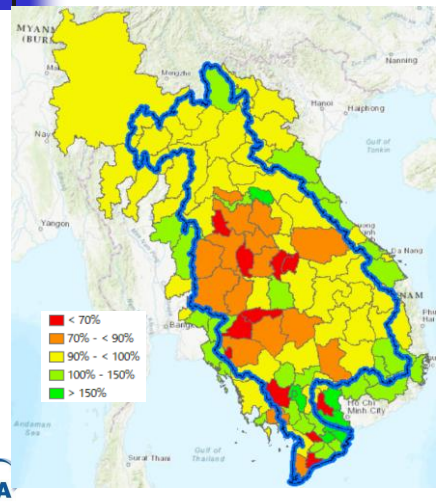
Progress of Step 1

(2) Statistical Approach

Result on Image Analysis (1)



- The map indicates decrease/increase of provincial forest area.
- By using global observation data such as satellite images, change of forest cover area can be examined even for broad study area.
- Deforestation rates and areas can be calculated.

Fig- Forest Change Ratio in LMB (from 2001 to 2014)

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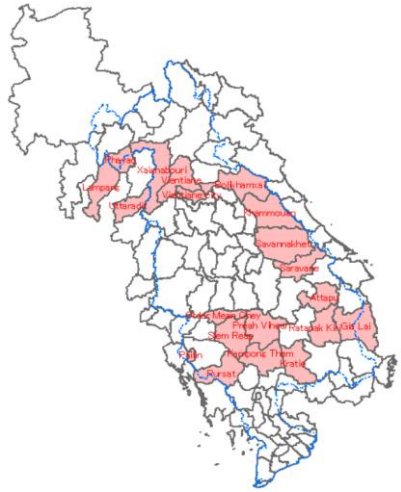
Progress of Step 1

(2) Statistical Approach

Result on Image Analysis (2)



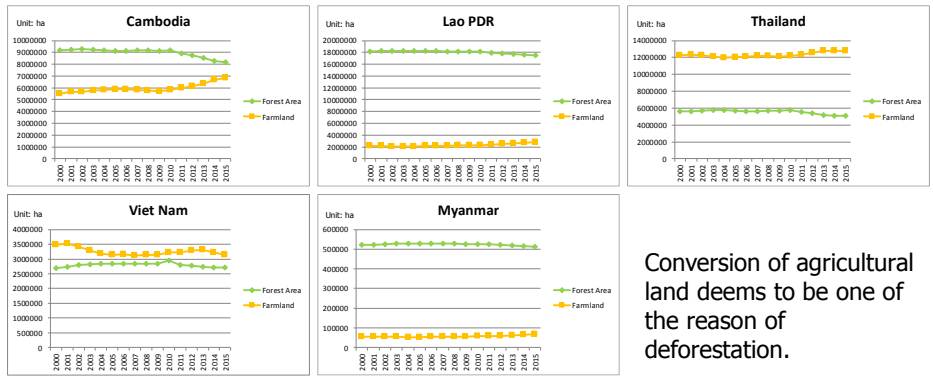
- Hotspot criteria
  - ✓ Forest cover ratio at province >= 50% in 2001
  - ✓ Deforestation >= 0.22% / Year
  - ✓ Correlation <= -0.7
  - * Forest area and Agricultural Area

Fig- Hotspot Provinces in LMB (from 2001 to 2014)

Progress of Step 1

(2) Statistical Approach

Result on Image Analysis (3) – Country Level



Conversion of agricultural land deems to be one of the reason of deforestation.

Fig- Historical Changes of Forest and Agricultural Area (Farm Land and Paddy field)
Note: Province area was not counted if out of Lower Mekong Basin

Progress of Step 1

(2) Statistical Approach

Result on Image Analysis (3) – Province Level

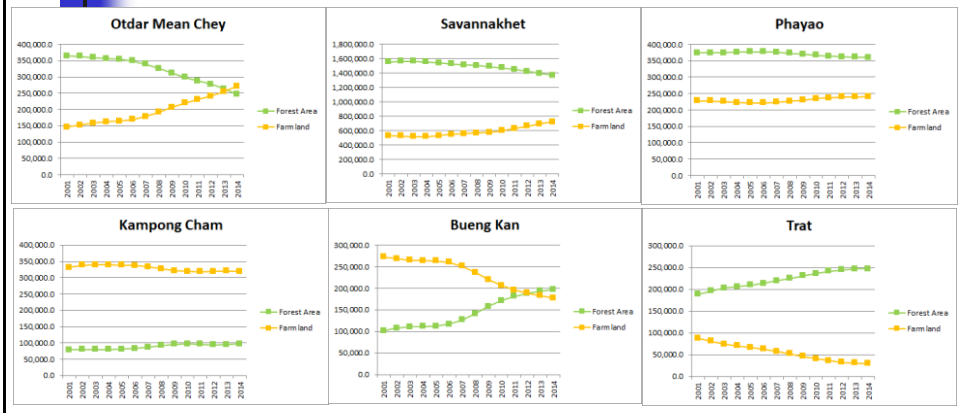


Fig- Historical Changes of Forest and Agricultural Area (Farm Land and Paddy field)

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Progress of Step 2

2. Interim Report

Progress of Step-2

(1) Data Request

(2) Method for finding Hot Spot 2

(3) Future deforestation scenarios

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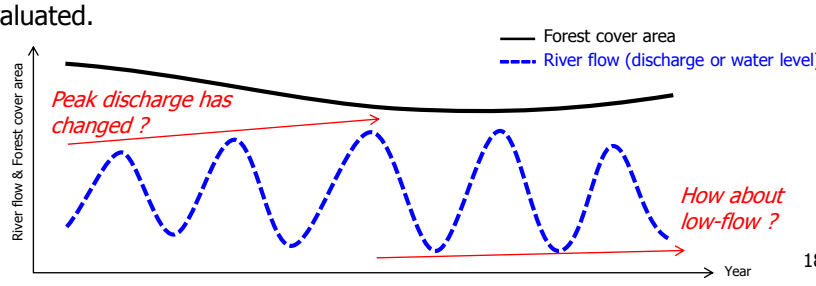
Progress of Step 2

(1) Data Request

Collection of observed data

- One of purpose this project is "to clarify triggers of deforestations and issues of forest management".
- JST believes that land use conditions including forest cover area in LMB affects on flow regime of Mekong River to some extent.
- By comparing historical changes of forest cover areas and flow regime at major observation station, the impact of deforestation can be evaluated.



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Progress of Step 2

(1) Data Request

Collection of observed data

- JST understands the influences of river structures such as hydropower dam, weirs, etc. which can change flow regime of mainstream and tributaries of LMB. So, the relation between forest cover areas and flow regime may not appear.
- However, JST believes that it is necessary to certify the no influences of forest area changes (or not) by science-basis in an objective manner.

Request Data (at least)

1. Water level or discharge data at Major hydrological stations
2. Rainfall and evaporation data at Major hydrological stations
3. Term: 1986 to present (to fit land cover maps)
4. Information about facilities incl. dams weirs [location(coordinates), established year, storage capacity]

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Progress of Step 2

(2) Method for finding Hot Spot 2

JST would like to discuss about how to identify Hot Spot 2 with MRC and line agencies at this afternoon.

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Progress of Step 2

(3) Future Deforestation Scenarios

Set future (2040) forest cover areas

JST would like to discuss about the future deforestation scenarios with MRC and line agencies at this afternoon.

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Progress of Step 3

2. Interim Report

Progress of Step-3

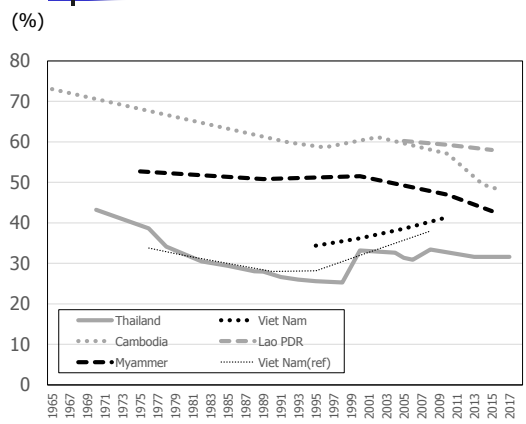
(1) Deforestation Drivers

(2) Method for finding Hot Spot 2

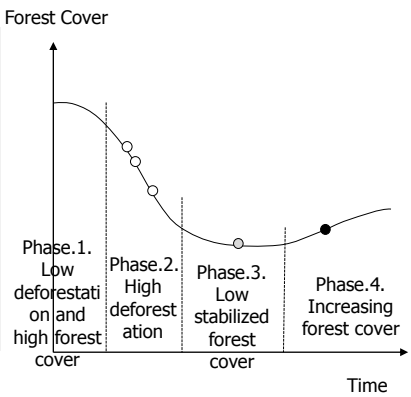
Progress of Step 3-1

(1) Deforestation Drivers

Current condition of forest in Mekong river basin



Forest area change in five countries

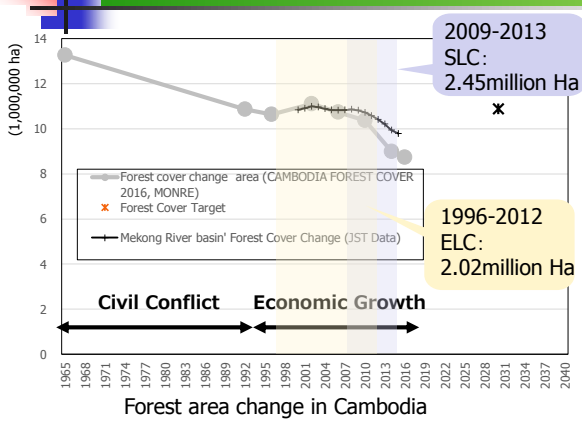


Phase of Forest transition

Progress of Step 3-1

(1) Deforestation Drivers

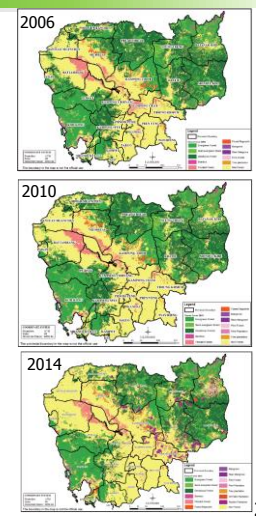
Forest area change in Cambodia



Forest area change in Cambodia

2012：Order on the Measures to Strengthen and Increase the Effectiveness of the Management of Economic Land Concessions(ELC)

2014：Inter-Ministerial Proclamation on the Strengthening of Economic Land Concessions Management



Cambodia Forest Cover 2014

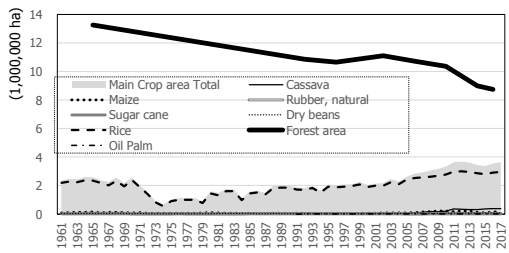
24

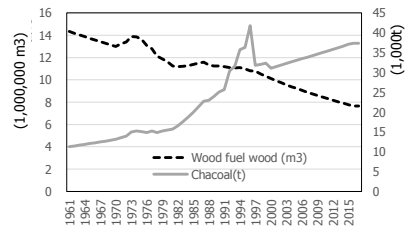
24

Progress of Step 3-1

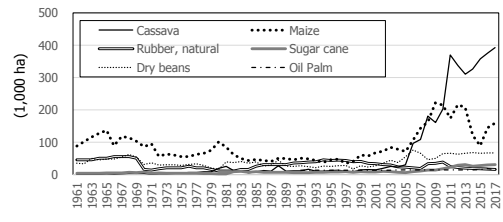
(1) Deforestation Drivers

Deforestation drivers and challenges in Cambodia

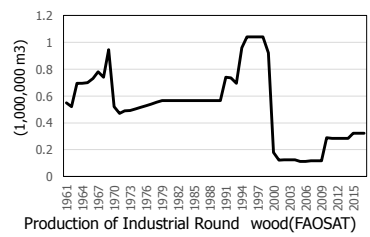




Production of biomass energy(FAOSAT)



Relation between forest land and agricultural land(FAOSAT)



Production of Industrial Round wood(FAOSAT)

25

25

Progress of Step 3-1

(1) Deforestation Drivers

Forest area change in Cambodia

Direct drivers of deforestation

- ✓ Logging activities (commercial logging, unauthorized logging, unsustainable harvesting)
- ✓ Unsustainable harvesting of non-timber products
- ✓ Infrastructure development
- ✓ Encroachment of forest land
- ✓ Rapid expansion of agriculture into forestlands
- ✓ Gas and Mining exploration
- ✓ Land grabbing

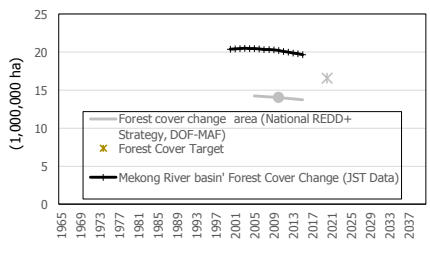
Plan and Action

- ➢ National Forest Programme 2010-2029
- ➢ National REDD+ Strategy 2017-2026

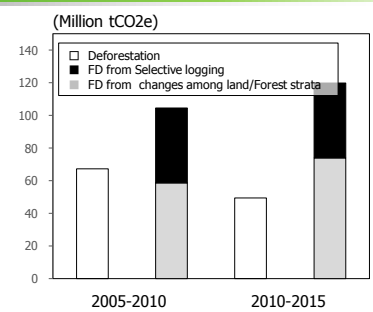
Progress of Step 3-1

(1) Deforestation Drivers

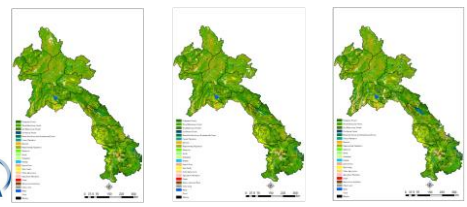
Forest area change in Lao PDR



Forest area change in Lao PDR



Carbon Emission from Deforestation and forest degradation activity (FRL Report 2018 January)

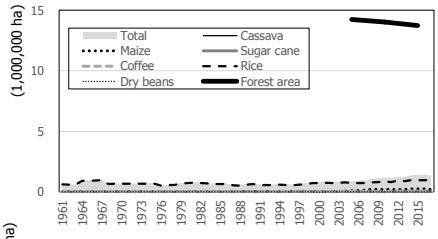


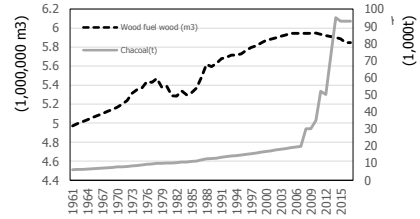
Forest area of Lao PDR (FRL Report 2018 January)

Progress of Step 3-1

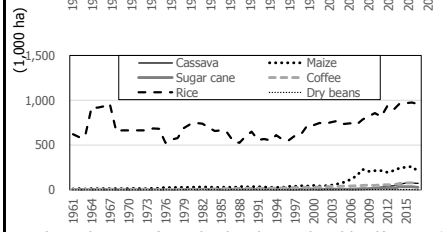
(1) Deforestation Drivers

Deforestation drivers and challenges in Lao PDR



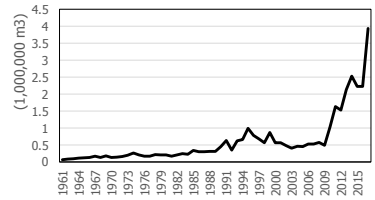


Production of biomass energy(FAOSAT)



Relation between forest land and agricultural land(FAOSAT)

No Rubber data



Production of Industrial Round wood(FAOSAT)

28

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Progress of Step 3-1

(1) Deforestation Drivers

Forest area change in Lao PDR

Direct drivers of deforestation

- ✓ Conversion to commercial tree plantation (6,000ha/year)
- ✓ Conversion to cash crop production (48,900ha/year)
- ✓ Pioneering shifting cultivation (57,300ha/year)
- ✓ Development activity (Infrastructure(1000-2000ha/year), mining(5,100-14,100ha/year), hydropower(13,100ha/year), etc.)
- ✓ Degradation of forest due to illegal logging (0.97 to 1.57 million m3 /year, 2002 to 2009)
- ✓ Degradation of forest from fire (pioneering shifting cultivation, and hunting)

Primary drivers	N	C	S
Agriculture expansion (pioneering, shifting, cultivation, and cash crop production)	✔	✔	
Infrastructure development (road construction, hydro-power development)		✔	
Conversion of natural forest to industrial tree plantation			✔
Illegal logging	✔	✔	✔

Draft of National REDD+ Strategy" (DOF, Feb. 2018), REDD_RPP(2010)

Plan and action

- ➢ Forestry Strategy to the year 2020 of the Lao PDR (Jul.2005)
- ➢ Revised Draft NATIONAL REDD+ STRATEGY (Feb.2018)

29

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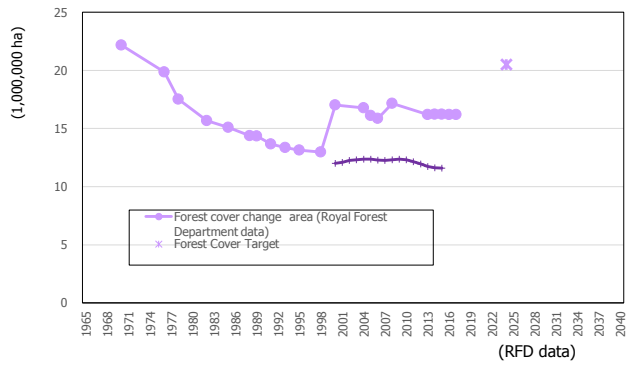
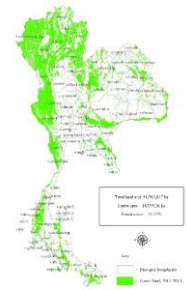
Progress of Step 3-1

(1) Deforestation Drivers

Deforestation drivers in Thailand





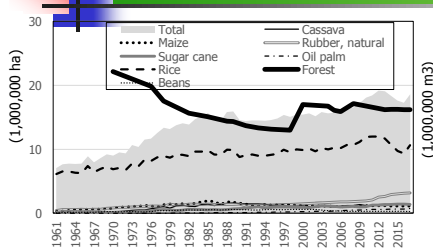
Forest area of Thailand 2013 (RFD; Forest Land Management office)

30

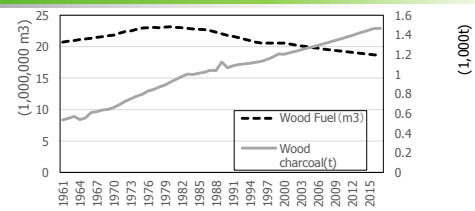
Progress of Step 3-1

(1) Deforestation Drivers

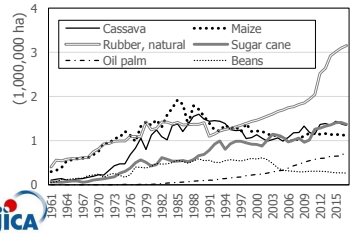
Deforestation drivers and challenges in Thailand

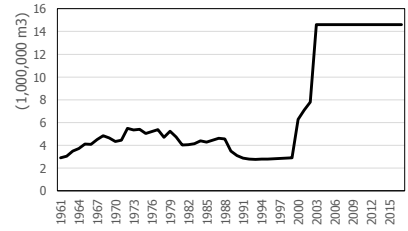


Relation between forest land and agricultural land(FAOSAT)



Production of biomass energy(FAOSAT)





Production of Industrial Round wood(FAOSAT)

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Progress of Step 3-1

(1) Deforestation Drivers

Deforestation drivers in Thailand

Direct drivers of deforestation

- ✓ Encroachment (conversions of natural forest area to commercial monoculture agriculture and other investments concerning, food and energy crops, forest plantations and tourism resorts)
- ✓ Infrastructure development
- ✓ Mining
- ✓ Forest Fire

Plan and action

- ➢ National forest policy(1985)
- ➢ Master Plan for Forest Resources Protection and Sustainable Management(2014-2024)

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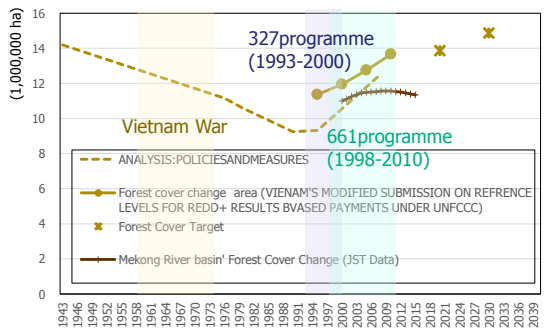
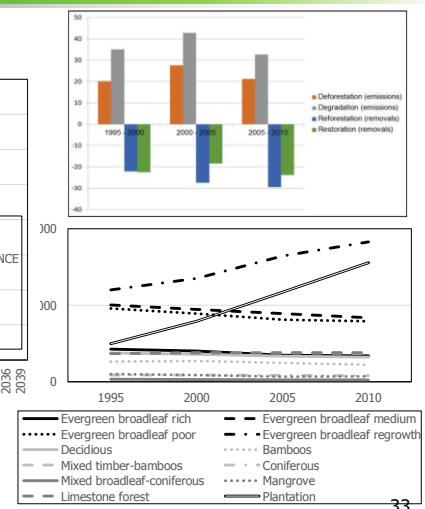
Progress of Step 3-1

(1) Deforestation Drivers

Deforestation drivers in Viet Nam



Forest area change in Viet Nam



Forest area of Viet Nam (FRL Report 2016)

33

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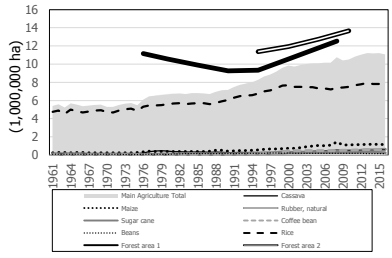
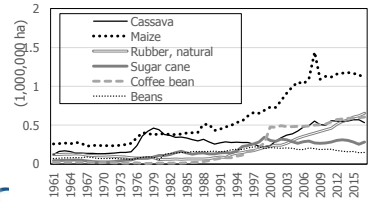
Progress of Step 3-1

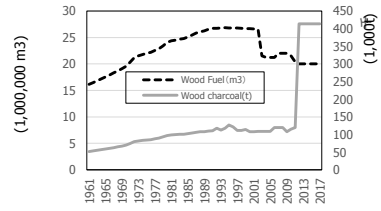
(1) Deforestation Drivers

Deforestation drivers and challenges in Viet Nam

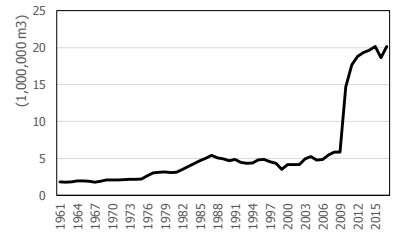




Relation between forest land and agricultural land(FAOSAT)



Production of biomass energy(FAOSAT)



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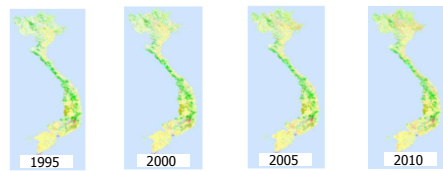
Progress of Step 3-1

(1) Deforestation Drivers

Deforestation drivers in Viet Nam



Direct drivers of deforestation

- ✓ Expansion of agricultural land due to a demand of domestic and international market
- ✓ Unsustainable wood extraction, including illegal logging; and,
- ✓ Forest fires (incidence is decreasing).
- ✓ Costal Erosion(Mangrove)

Plan and action

- ➢ Forestry Development Strategy 2006-2020
- ➢ National Action programme on the REDD+ by 2030 (Apr.2017)

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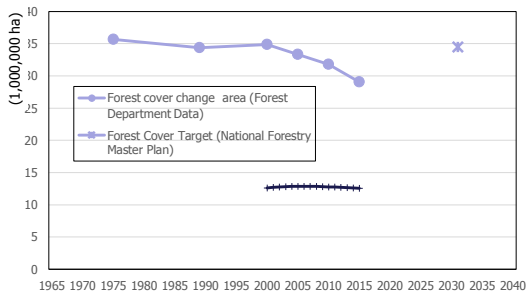
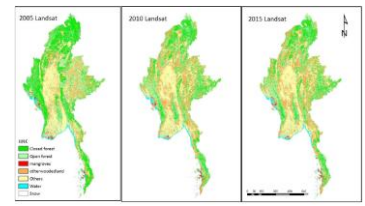
Progress of Step 3-1

(1) Deforestation Drivers

Deforestation drivers in Myanmar



Forest area change in Myanmar



Forest area change of Myanmar
(FRL Report 2018)

36

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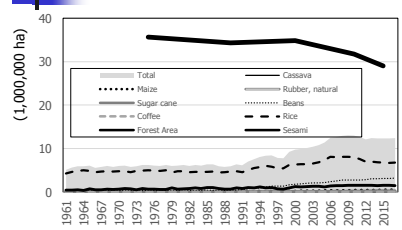
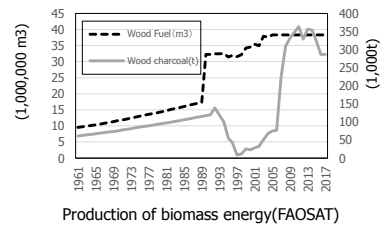
Progress of Step 3-1

(1) Deforestation Drivers

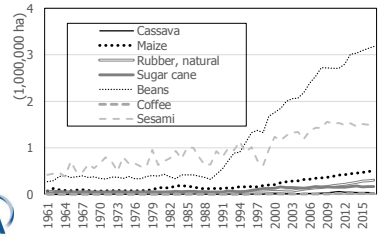
Deforestation drivers and challenges in Myanmar

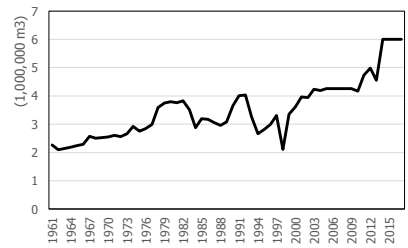


Relation between forest land and agricultural land(FAOSAT)



Production of biomass energy(FAOSAT)





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Progress of Step 3-1

(1) Deforestation Drivers

Deforestation drivers in Myanmar

Direct drivers of deforestation

Sector	Direct Drivers
Forestry sector	Over exportation of forest timber (legal-illegal)
	Over harvesting of wood biomass as a source of energy
	Unstable of pioneering, shifting, cultivation
	Forest fires
	Over-grazing
	Storms
	Pests
Outside of forestry sector	Expansion of agriculture (subsistence and commercial)
	Mining
	Hydro-power development
	Infrastructure
	Urbanization and resettlement
	Development of aquaculture

Plan and action

- Forestry Master Plan (2001-2030)
- Draft NATIONAL REDD+ STRATEGY(Mar.2018)
- Myanmar Reforestation and Rehabilitation Program MRFP (2017－2026)

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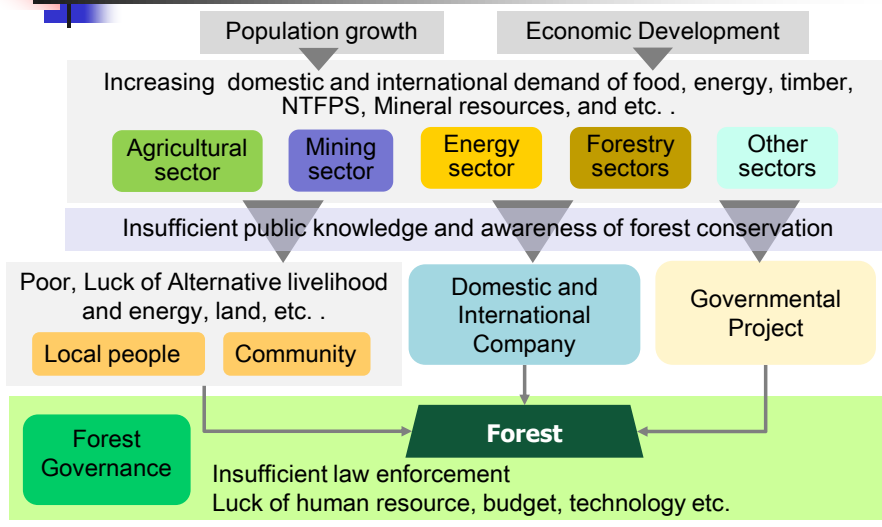
Progress of Step 3-1

(1) Deforestation Drivers

Structure of Deforestation and forest degradation



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Progress of Step 3-1

(2) Private Promotion and Business Partnership

Surrounding Environment of Deforestation and forest degradation

Agricultural sector remains major part of the population while GDP of the sector remain relatively small.

Population growth | Economic Development

Unstable Livelihood | Budget for the Forest Sector is small

Strong incentives for cultivation | Insufficient law enforcement

It is quite difficult to control the voraciousness of private sectors

Increasing domestic and international demand of food, energy, timber, NTFPS, Mineral resources, and etc. .

Progress of Step 3-1

(2) Private Promotion and Business Partnership

Strategy shall [illegible] t)

Insufficient law enforcemen[illegible]

1. Increase budget for for[illegible]
   PES, REDD, Revitalizing Forest Sector like in Vietnam

2. Improve the efficiency of the forest management
   ICT technologies: GIS DB, Drones, Satellite Imagery
   sign up local rangers, Community Forestry

3. Focusing on remaining Natural Forests and Protect them
   * Using IWRM for introducing PES as well as remained natural resources as conflict management in each basin.

Progress of Step 3-1

(2) Private Promotion and Business Partnership

Strategy shall be taken (Draft)

Unstable Livelihood

Local residents are vulnerable to external economy, especially to economic fluctuations of it.

1. Improve the livelihood of local residents considering sustainability as well as tolerance against external economy.
   Promote NTFP, stimulate NGO activities especially in local market establishment and strengthen NGOs network

2. Adding the value to their commodities
   Organic farming, quality control,

Progress of Step 3-1

(2) Private Promotion and Business Partnership

Strategy shall be taken (Draft)

Increase the incentives for preserving forest

1. Increase the value of the forest
   PES, Basic Research on Ecosystem and Biodiversity, Eco-tourism
2. Stimulate the incentives for preserving forest
   Environmental Educations

Economic Schema

1. Induce the economic activities toward more favorable to the forest preservation.
   ESG investment with certification scheme to guarantee them, Environmental Education, Ecotourism

3. Points to be considered

- Land Cover Maps (LCM) based on ADPC is acceptable ?
- Data request is acceptable ?
- Current condition of forest area in LMB is agreeable ?
- Direction of countermeasures against deforestation is reasonable ?

JST would like to discuss with MRC members continuously.

Thank you for your attention and your kind cooperation.

Contact every time !
mekong@ctii.co.jp

Session II: Discussion for Further Studies

"Data Collection Survey on the Basin Management and Environmental Conservation in Mekong River Basin"

24th January 2019

JICA Study Team (JST)

Agenda

Today's Presentation

1) Relation of deforestation drivers and actual land cover changes;

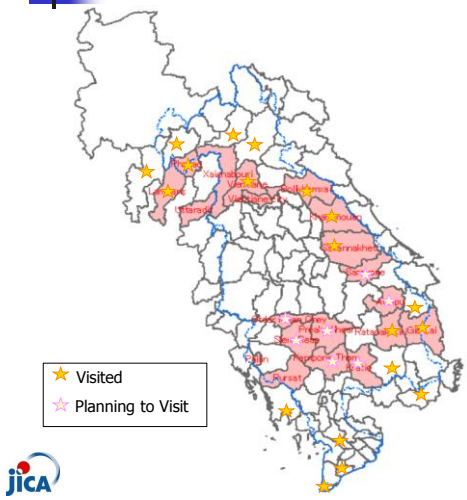
2) Deforestation scenarios;

3) Methodology of estimation of hotspot 2; and

4) Next Steps.

(1) Relation of deforestation drivers and actual land cover changes

Field study points



Country	No.	Province	Date
Lao PDR	1	Savannakhet	05 Nov. 2018
	2	Khammuane	06 Nov. 2018
	3	Bolikhamxay	07 Nov. 2018
	4	Vientiane(Province)	08 Nov. 2018
	5	Luangprabang	21 Jan. 2019
	6	Oudomxay	22 Jan. 2019
Cambodia	7	Koh Kong	30 Nov. 2018
	8	Ratanakiri, Mondulkiri	9-11 Dec. 2018
Thailand	9	Lampang	30 Oct. 2018
	10	Chiang Rai	31 Oct. 2018
	11	Phayao	11 Nov. 2018
Viet Nam	12	Ca Mau	10 Sep. 2018
	13	Can Tho	11 Sep. 2018
	14	Bac Lieu	06 Dec. 2018
	15	Lam Dong	12 Nov. 2018
	16	Gia Lai	14 Nov. 2018
	17	Kon Tum	15 Nov. 2018

Fig- Hotspot Provinces in LMB (from 2001 to 2014)

(1) Relation of deforestation drivers and actual land cover changes

Deforestation due to Conversion of Forest to agricultural land

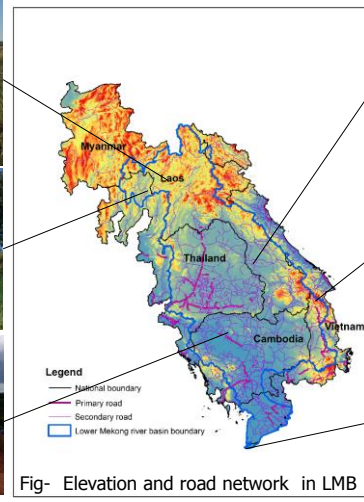
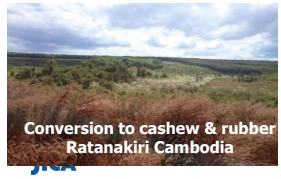


Fig- Elevation and road network in LMB

(1) Relation of deforestation drivers and actual land cover changes

Forest degradation due to Conversion of Natural Forest to industrial tree plantation



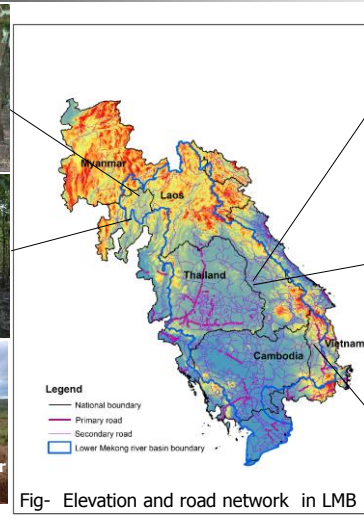


Fig- Elevation and road network in LMB

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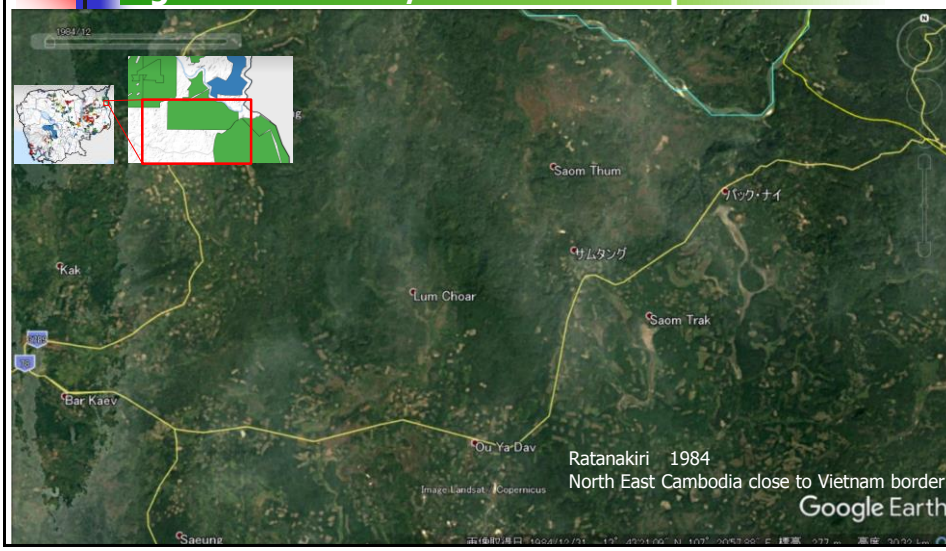
(1) Relation of deforestation drivers and actual land cover changes

Deforestation due to Conversion of Forest to agricultural land / industrial tree plantation



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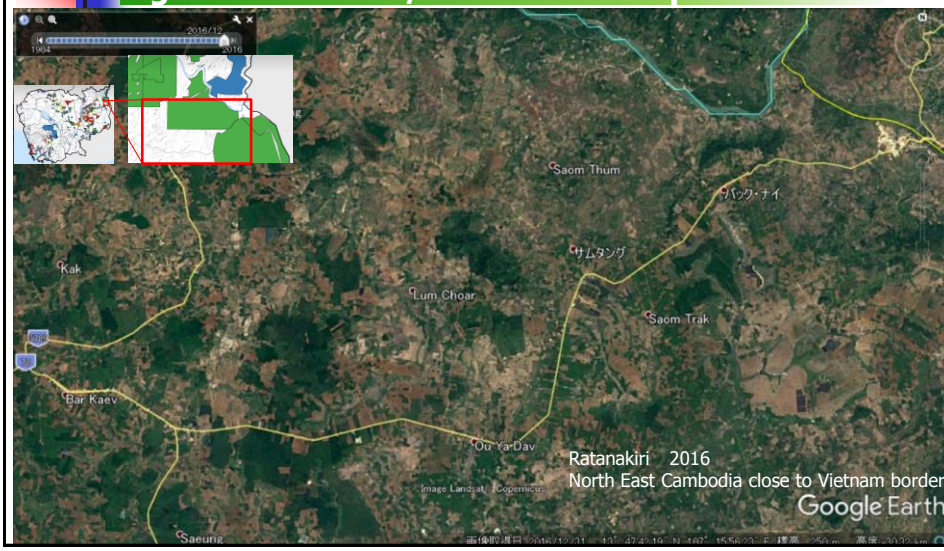
(1) Relation of deforestation drivers and actual land cover changes

Deforestation due to Conversion of Forest to agricultural land / industrial tree plantation



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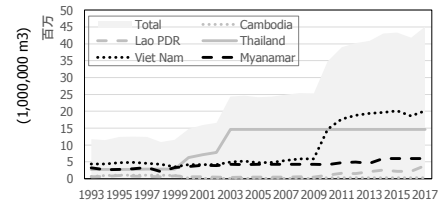
(1) Relation of deforestation drivers and actual land cover changes

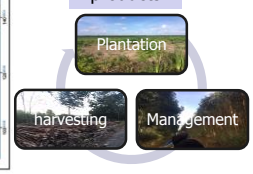
Wood extraction



Production of Industrial Round wood in Mekong river basin (FAOSAT)

From...

Forestry products



Planned harvesting

Illegal logging

Fig- Land Cover Map 2010(Mekong River Commission)

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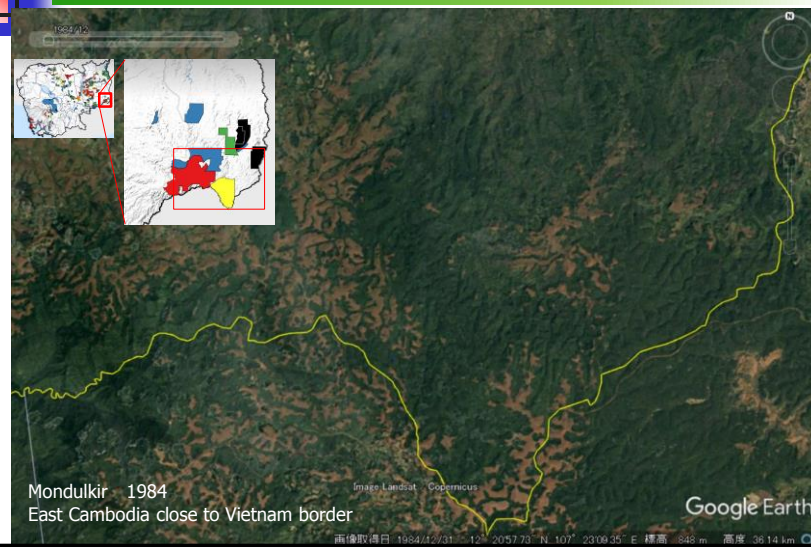
(1) Relation of deforestation drivers and actual land cover changes

Wood extraction



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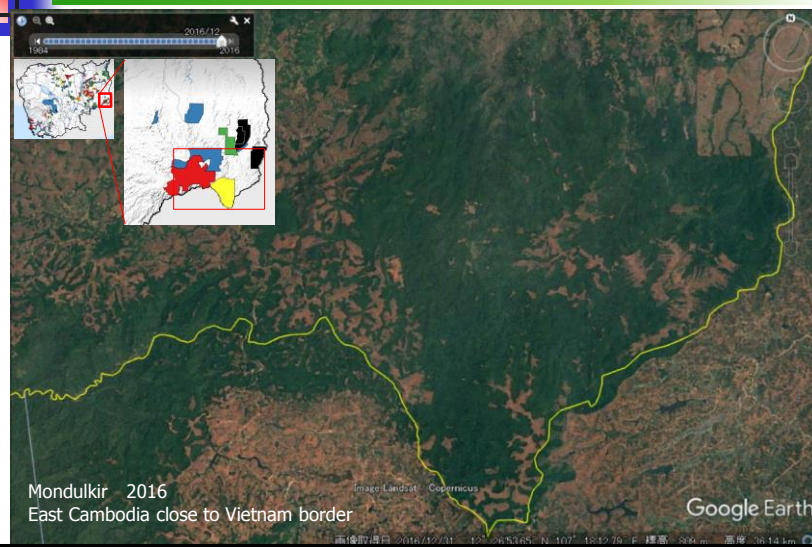
(1) Relation of deforestation drivers and actual land cover changes

Wood extraction



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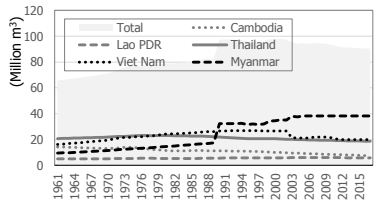
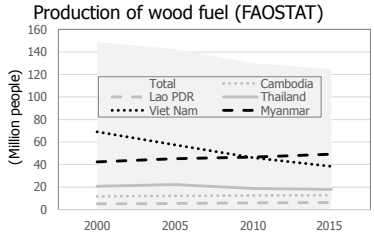
(1) Relation of deforestation drivers and actual land cover changes

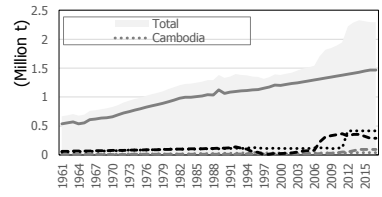
Wood fuel and charcoal



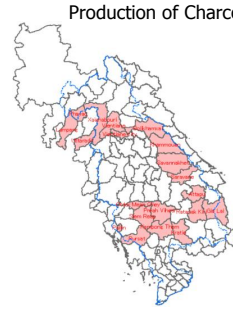
Production of wood fuel (FAOSTAT)



Population without access to clean cooking (International Energy agency Energy Access Outlook 2017, UNdata)



Production of Charcoal (FAOSTAT)



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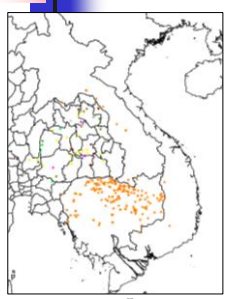
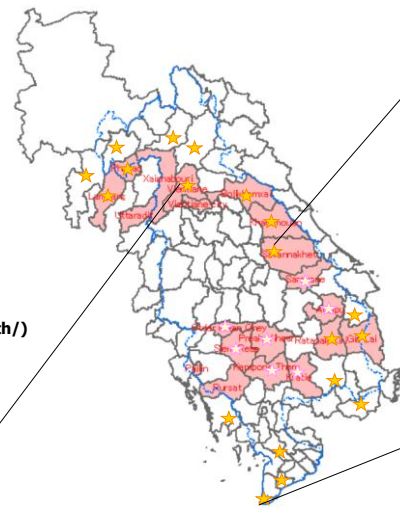
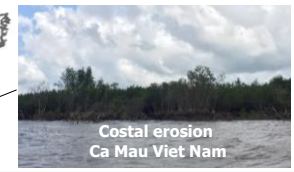
(1) Relation of deforestation drivers and actual land cover changes

Development activities and others



Forest fire spot
(GISTDA http://fire.gistda.or.th/)





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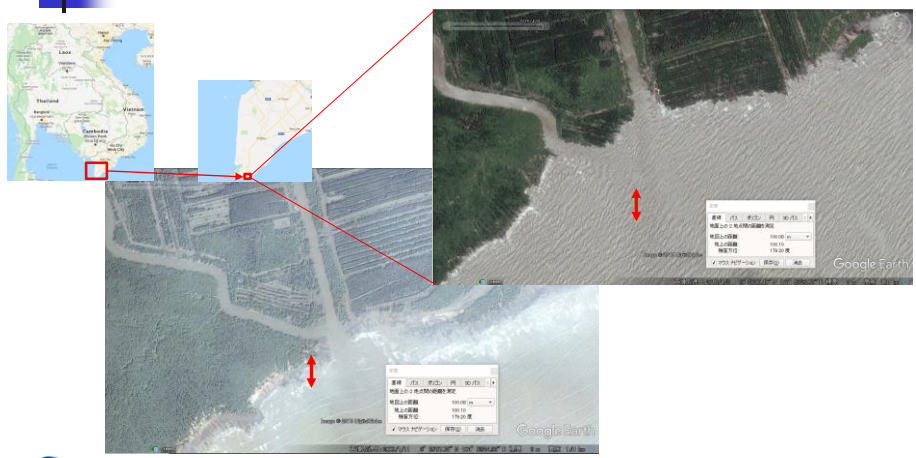
(1) Relation of deforestation drivers and actual land cover changes

Development activities and others



(2) Deforestation Scenarios

Discussion on Scenarios

1) Optimum Scenario

Ex. increase in forest areas up to planned goal of 2040 in all countries

2) Worst Scenario

Ex. decrease in forest areas up to record-low in all countries

(2) Deforestation Scenarios

Discussion on Scenarios

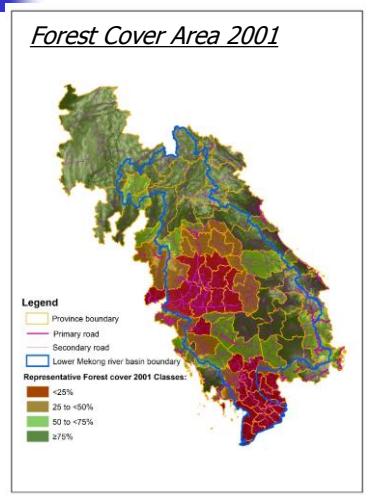
3) Particular rate Scenario

Ex. decrease in forest areas at upper areas of LMB

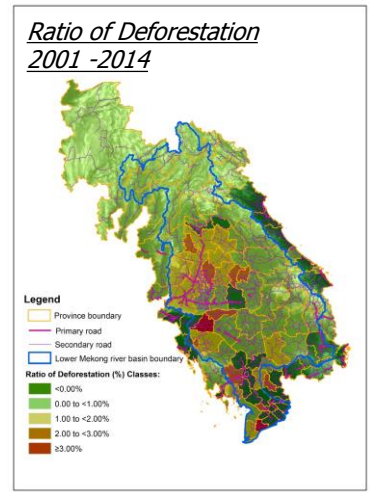
(2) Deforestation Scenarios

Reference 1

Forest Cover Area 2001



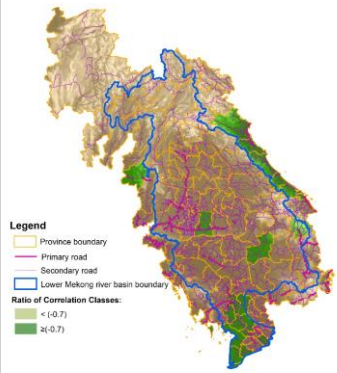
Ratio of Deforestation 2001 -2014



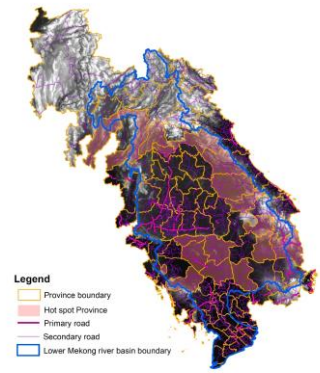
(2) Deforestation Scenarios

Reference 2

Correlation Ratio



Hot Spot 1



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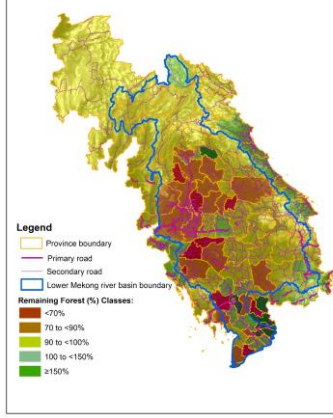
(2) Deforestation Scenarios

Reference 3

Remaining Forest



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(3) Methodology of estimation of hotspot 2

Utilization of MRC's assets

- Since MRC has already evaluated the influences on the flow regime of Mekong River by climate changes and future land use/development, etc. in the Council Study (CS) by MRC , JST will fully utilize the outputs from CS for the project.
- However, this project focuses on forest management and JST would like to conduct sensibility analysis of deforestation by using MRC Tool Box.
- Concretely speaking, JST would like to estimate flow regimes of Mekong River under some several conditions (deforestation). JST will prepare the input data (HRU file) for SWAT model. JST would like to ask MRC to execute the calculation by using existing data set which have already used in CS.

(3) Methodology of estimation of hotspot 2

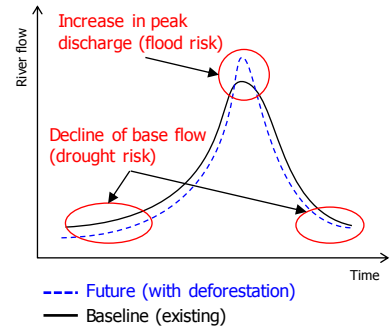
Expected simulation cases

Scenario		Level of Development for Water-related Sectors						Climate
		ALU	DIW	FPF	HPP	IRR	NAV	
M1	Early Development Scenario 2007(base line)	2007	2007	2007	2007	2007	2007	1985-2008
M3	Planed Devlopment Scenario 2040	2040	2040	2040	2040	2040	2040	1985-2008
1	Case 1-0	Deforestation (ideal)	2040	2040	2040	2040	2040	1985-2008
2	Case 1-1							Low: RCP 2.6
3	Case 1-2							Medium: RCP 6.0/4.5
4	Case 1-3							High: RCP 8.5
5	Case 2-0	Deforestation (particular)						1985-2008
6	Case 2-1							Low: RCP 2.6
7	Case 2-2							Medium: RCP 6.0/4.5
8	Case 2-3							High: RCP 8.5
9	Case 3-0	Deforestation (worst)						1985-2008
10	Case 3-1							Low: RCP 2.6
11	Case 3-1							Medium: RCP 6.0/4.5
12	Case 3-3							High: RCP 8.5

(3) Methodology of estimation of hotspot 2

Identification of Hot Spot 2

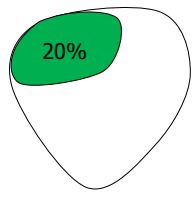
- JST defines Hotspot2 as areas can be influenced indirectly by deforestation at viewpoints of water resources management.
- JST propose to identify "Hot Spot 2" by comparing the hydrographs of baseline and that of future forest conditions.
- The number of calculation points of SWAT model is approximately 800, which covers most areas of LMB.
- Analysis shall be conducted by JST.



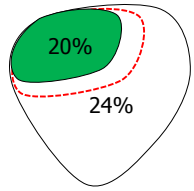
(3) Methodology of estimation of hotspot 2

How to reflect scenarios to SWAT

Sub Basin of SWAT Model



2003 land use data



2040

For instance, occupancy rete of forest cover area is 20% in SWAT model (baseline 2003).

JST set future forest cover rate considering historical forest cover maps and development plans in each member country.

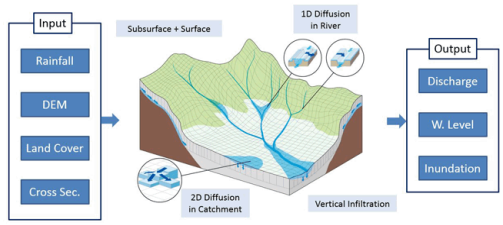
If JST sets the increase rate of forest cover area as 20% in 2040, it will be reflected to existing values of forest cover areas in SWAT model.

Future forest cover rate:
20 × 1.2(+20%) = 24 %
*increased by 20%

(3) Methodology of estimation of hotspot 2

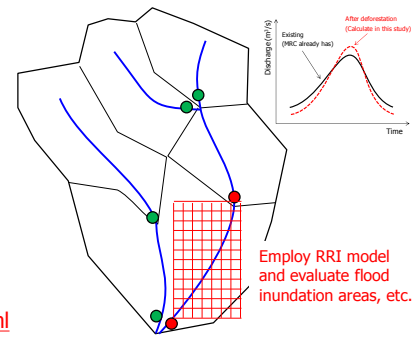
Additional Analysis

- From Hot Spot 2, areas which seems to be vulnerable particularly shall be selected and JST will analyze the detail impact by deforestation using RRI Model, if needed.



Schematic Diagram of RRI Model

http://www.icharm.pwri.go.jp/research/rri/rri_top.html



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3. Points to be considered

- Trigger of deforestation (=drivers) is agreeable ?
- Deforestation scenario in 2040 is OK ?
- Methodology of finding "Hot Spot 2" is feasible for MRC ?
- Direction of countermeasures against deforestation is reasonable ?

JST would like to discuss with MRC members continuously.

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Thank you for your attention and your kind cooperation.

Contact every time !
mekong@ctii.co.jp

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For sustainable development

Regional Interim Workshop

Wrap-up and Next Steps

Presentation by Environmental Management Division (ED)

Vientiane, Lao PDR

Date: 24 January 2019

Drafter and Presenter: Dr. So Nam, Chief Environmental Management Officer

Outline

1. Wrap-up
2. Next Steps

Wrap-up

- **Interim Study Report** and **the major key findings** from the individual interview sessions with NMCs and relevant line agencies were presented, discussed and acknowledged in the Workshop.

Wrap-up (Cont'd)

Next Steps

No.	Activities	Deadline
1	MRCS ED prepare and submit MoM of the regional interim workshop to MCs, Myanmar and JICA/JST.	8 Feb 2019
2	JST finalize the **interim study report**.	15 Feb 2019
3	JICA/JST prepare and MRC facilitate for the study tour in Japan.	April 2019
4	JICA/ JST organize the **study tour in Japan.**	May 2019
5	JICA/JST and MRC organize the **regional workshop** at MRC, Vientiane, Lao PDR.	April 2019

Next Steps (cont'd)

No.	Activities	Deadline
6	JST prepare the **draft final report** based on feedbacks and suggestions from the first regional workshop.	March 2019
7	JICA/JST and MRC organize the **wrap-up seminar** in Japan.	May 2019

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Thank you!

添付-6-3

ラップアップセミナー@ラオス　資料

Mekong River Commission (MRCS)

and

Japan International Cooperation Agency (JICA)

Agenda

The Regional Wrap-up Seminar on Reviewing the Draft Final Study Report on

Data Collection Survey on the Basin Management and Environmental Conservation in Mekong River Basin

26th July 2019 at MRCS Office, Vientiane, Lao PDR

1. Background

During the 8th top-level meeting among Japan and Mekong countries on 7th September 2016, Mr. Shinzo Abe, the Japanese Prime Minister, announced the commencement of a survey for the environmental conservation program on Mekong River Watershed. The first phase of the program focuses on the data collection survey for the development of forest cover map in the basin and recommends policy for forest preservation.

Under this Japan-Mekong Cooperation, the Mekong River Commission (MRC) and Japan International Cooperation Agency (JICA) have co-implemented the new initiative on "Data Collection Survey on the Basin Management and Environmental Conservation in Mekong River Basin" Project which includes 4 Member Countries (MCs) and Myanmar. The Project implements from December 2017 to September 2019. The objectives of this Project are to: (1) understand the existing condition of forest preservation; (2) clarify the issues on forest management and preservation; and (3) propose the effective countermeasures as policy recommendations for basin management in the Mekong River. The expected outputs are; (i) the basic information for forest management are collected and reviewed; (2) the environmental impacts by climate changes and the historical changes of forest resources are studied and (iii) the best practices for basin management in the Mekong River are recommended.

On 22nd June 2016, the regional kick-off seminar was held in cooperation with the Mekong River Commission Secretariat (MRCS) and the Member Countries (MCs), in order to present and discuss the project details and work plan with the National Mekong Committees (NMCs) and relevant line agencies. After the seminar, the inception report was finalized and JST commenced practical activities. To prepare the study report, the JST, with the coordination of MRCS and the respective NMCs, had conducted the interview sessions with relevant line agencies of the MCs during August to November 2018. Results from these interview sessions were used for further improvement of information gaps and development of the study report.

Later, on 24th January 2019, MRCS ED conducted the Regional Interim Workshop to present the progress of project activities and outputs by the JST and discuss about the further activities for forest management in Lower Mekong Basin (LMB) region. Results from the discussions and feedbacks and suggestions from the Workshop were collected for further preparation of the Draft Final Study Report of the Project.

This Regional Wrap-up Seminar aims to present and discuss the Draft Final Study Report which was prepared by the JST. Results of the discussion will be gathered for further improvement and finalization of the Study Report.

2. Objectives of the Workshop

The objectives of the Regional Wrap-up Seminar on Reviewing the Draft Final Study Report on Data Collection Survey on the Basin Management and Environmental Conservation in Mekong River Basin are to:

- Report the draft output of project activities;
- Present and discuss the Draft Final Study Report; and
- Discuss possible projects and programs promoting forest conservation and management in Lower Mekong Basin (LMB) region with MRCs, NMCs and relevant national line agencies.

3. Expected Outputs

The expected outputs from the Seminar are as follows:

- The Draft Final Study Report was presented and discussed. Suggestions and feedbacks were made for further improvement and finalization of the Report;
- The Project outputs were presented and discussed for better understanding; and
- Possible projects and programs promoting forest conservation and management in Lower Mekong Basin (LMB) region were discussed and lessons learnt were shared among the MRCS, NMCs and relevant line agencies.

4. Agenda

Time	Activities
09.00-09.30	Registration ***Facilitated by MRCS ED Staff***
09.30-09.40	Opening Remarks ***By Dr. So Nam, Officer-in-Charge and Chief Environmental Management Officer, MRCS ED and*** ***Mr. Kazunobu Suzuki, Director of Global Environmental Department, JICA Head Office***
Session I: Report on the Whole Study	
09:40-10:45	Presentation on Draft Final Study Report 1) Outline of the study; 2) Preliminary Analysis; 3) Grasp of Present Condition and Issues in Mekong Basin 4) Approach against Issues ***By the JICA Study Team***
10:45-11:00	Tea and coffee break
11:00-12.00	Discussions on the Draft Final Study Report ***Facilitated by Dr. So Nam, Chief Environmental Management Officers, MRCS ED***
12.00-13.30	Lunch break
Session II: Discussion for Further Activities	
13.30-14.30	Presentation on further activities for watershed and forest management in the LMB region 1) Recommendations for watershed management; 2) Recommendation for forest preservations; ***By the JICA Study Team***
14.30-14.45	Tea and coffee break
14.45-16.00	Discussions on further study and activities for watershed and forest management in the LMB region ***Facilitated by Dr. So Nam, Chief Environmental Management Officers, MRCS ED***
16.00-16.30	Wrap-up and Next Steps ***By MRCS ED and the JICA Study Team***

Title	The Regional Wrap-up Seminar on the Data Collection Survey on the Basin Management and Environmental Conservation in Mekong River Basin
Date / Time	26th July 2019 (Fri) / 9:30 ~ 17:00
Venue	MRC Conference Room, Vientiane, Lao P.D.R
Participants	【Cambodia】3 members 【Lao PDR】4 members 【Thailand】3 members 【Viet Nam】3 members 【Myanmar】1 member 【Stakeholder】1 member 【MRCS】7 members 【JICA】3 members 【JICA Study Team (JST)】6 members
Agenda and Topics	1. Opening Remarks 2. Session 1: Report on the Whole Study 3. Session 2: Discussion for Further Activities 4. Closing Remarks

Main Items discussed

1. Opening Remarks

Opening Remarks was announced by Dr. So Nam, Chief Environmental Management Officer, MRCS ED and Mr. Kazunobu Suzuki, Director, Forestry and Nature Conservation Group, Global Environment Department, JICA.

2. Session I: Report on the Whole Study

The summary of the Draft Final Report was presented by JST and contents were discussed with the following key suggestions and comments.

- The word of "Tree cover" is used for forest cover because plantation and agroforestry are counted as forest.
- Impact and relation between deforestation and rainfall should be analyzed.
- Agroforestry may have opportunity for mitigation of deforestation according to Thai experience.
- Sediment data couldn't be collected so that impact of sediment couldn't be input to the river basin model. Analysis of relation between forest cover and sediment flow is important so that sediment data should be collected in the future.
- Classifying of natural forest and plantation is not be conducted because of difference of forest definition each country. However, that classifying is needed for deep analysis in the future.
- Existing data collected by JST should be given to MRC and MRC should continue to collect data.

Main Items discussed

- There are some areas that have few runoff volume. This data is belonged in MRC so JST will ask it to MRC.

3. Discussion for Further Activities

The Further Activities regarding to hydrological analysis, forest reduction and private cooperation were presented by JST and opportunity for future activities was discussed with the following key suggestions and comments.

- Water quality in Mekong river is getting worse by chemical fertilizer and industry waste water from city. Monitoring and identifying of source should be implemented. Establishment of monitoring points shall be requested.
- Study for sediment flow should be implemented.
- Capacity building for the river basin management will be requested.
- Relation between deforestation and hydropower installation should be payed more attention.
- Feasibility analysis for forest cover and hydrological mapping should be continued.

4. Closing Remarks

Wrap-up of this seminar was shared by Dr. So Nam, Chief Environmental Management Officer, ED, MRC.

Photos

Open Remarks by Dr. So Nam, MRC

Opening Remarks by Dr. Suzuki Kazunobu, JICA

Presentation of Whole Study by JST

Presentation of Whole Study by JST

Presentation of Whole Study by JST

Presentation of Whole Study by JST

Presentation of Further Activities by JST

Presentation of Further Activities by JST

End of Documents

Session I: Report on the Whole Study

"Data Collection Survey on the Basin Management and Environmental Conservation in Mekong River Basin"

Final Workshop

26th July 2019

JICA Study Team (JST)

Mekong River Basin
(in 5 Countries: Thailand, Cambodia, Laos, Vietnam, and Myanmar)

Location Map

- Catchment area: 795,000 km²
- River length: 4,800 km
- Headwater: Tibetan Plateau
- River mouth: State of Ben Tre in Viet Nam
- General issues due to deforestation:
  Increase of natural disasters such as flooding, drought, collapse of ecosystems, acceleration of global warming and etc.

Data source: JICA

Agenda

Today's Presentation

1. Outline of the Survey
   Introduction of project information

2. Draft Final Report of each Step
   - Step 1: 1) Historical Land Cover Maps and 2) Future Deforestation Scenarios
   - Step 2: 1) Impact by deforestation on flow regime of Mekong River, 2) extraction of "Hot spot 2"
   - Step 3-1: Mitigations of deforestation
   - Step 3-2: 1) Inundation analysis at Hot spot 2, 2) recommendation of flood countermeasures, 3) Review of Council Study
   - Step 4: 1) Review of council study and recommendations for future watershed management and 2) propose of effective forest management

3. Points to be considered

1. Outline of the Survey

Project Information

Project Name:
Data Collection Survey on the Basin Management and Environmental Conservation in Mekong River Basin

Target country: Cambodia, Lao PDR, Thailand, Viet Nam and Myanmar

Main counterpart:
Mekong **R**iver **C**ommission (MRC) and 4 **N**ational **M**ekong **C**ommittees (NMC)

Objectives:
1) To understand forest cover areas in **L**ower **M**ekong **B**asin (except for China)
2) To clarify triggers of deforestations and issues of forest management
3) To propose effective countermeasures and to recommend effective basin management policy focusing on forestry sector in LMB

Project period: Dec 2017 to July 2019

1. Outline of the Survey

Work Procedure

Step 1

Collect satellite images

Prepare historical forest cover maps in Lower Mekong Basin (LMB)

⇒ Identify deforestation areas as *hot spot 1*

Predict the future forest cover area*

Prepare input data (land use data considering future deforestation)

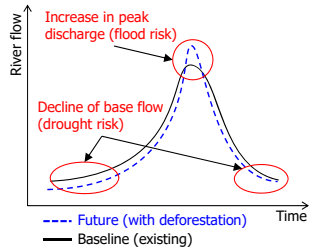
Set the climate change scenario (sea level rise etc.)

*Where man-made deforestation is mainly evaluated while the effects of climate change inducted deforestation is not considered.

Step 2

Execute hydrological simulations

Evaluate the results



⇒ Identify potential vulnerable areas as *hot spot 2*

1. Outline of the Survey

Work Procedure

Step 3-1

Clarify deforestation areas and its drivers (by field/interview surveys and literature search, etc.)

Find activities for against deforestation (by interview survey, literature search, etc.)

Verify relations between drivers and "*hot spot 1*"

Evaluate actual or potential effectiveness of the activities

Focus on private promotion and business partnership

List up effective countermeasures against deforestation

1. Outline of the Survey

Work Procedure

Step 3-2

Analyze potentially vulnerable areas ("*hot spot 2*") from viewpoint of water resources management

Analyze detail negative impacts by deforestation (by RRI Model), if needed

List up effective countermeasures

Evaluate impacts of deforestation on flow regime

Step 4

Propose effective countermeasures and to recommend effective basin management policy focusing on forestry sector in LMB based on the output from Step 3

2. Draft Final Report

Draft Final Report on Step-1

(1) Historical Land Cover Map

(2) Future Deforestation Scenarios

Step 1

(1) Historical Land Cover Maps

Situation of Forest Cover Maps

- Ideally, Preparing forest cover maps by compiling maps supplied by member countries is the best methods for the project purpose. However, there are certain difficulties for this such as lack of collected maps and limited time for processing.
- Therefore, it is practical as well as optimum to utilize global observation data.
- ADPC (**A**sian **D**isaster **P**reparedness **C**enter in Bangkok)* can provide time series Land Cover Map (based on Landsat imagery) for free.
- JICA, MRC and NMC agreed on the utilization of satellite images prepared by ADPC to analyze the historical changes of forest cover areas in LMB at Joint Seminar on June 2018.

*ADPC website: https://rlcms-servir.adpc.net/en/landcover/

Step 1

(1) Historical Land Cover Maps

Basic Condition for Preparation of Maps

- Duration: 32 years, from 1987 to 2018
- Images resource: LANDSAT 4 to 8
- Utilization bands:
  RGB (Blue, Green, Red) ,near infrared and middle infrared band
- Land Cover Classification:
  (1) forest (6 class types), (2) urban area, (3) cropland, (4) rice paddy, (5) others (8 class types), (6) unknown e.g. obstacle by clouds
- Method:
  Utilization of indices such as NDVI (Normalized Difference Vegetation Index), NDWI (Normalized Difference Water Index), etc. with machine learning (random forest algorithm) as supervised classification. It is pixel based automatic classification
- Reliability: Over 70% even without field surveys.

Step 1

(1) Historical Land Cover Maps

Land Cover Maps

Land Cover Classification: Total 18-class
(1) forest (6 class types)
(2) urban area
(3) cropland
(4) rice paddy
(5) others (8 class types)
(6) unknown

Fig- Land Cover Map by ADPC

Step 1

(1) Historical Land Cover Maps

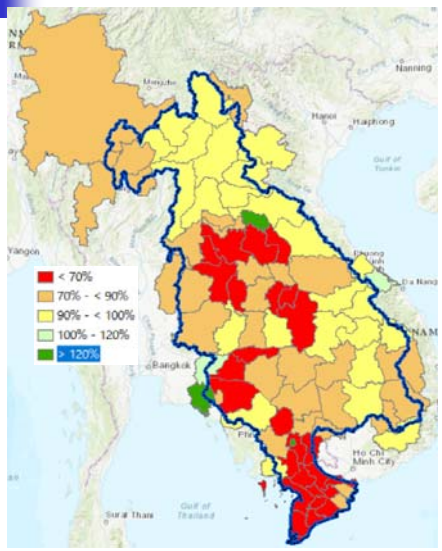
Preparation of analytic data and analysis

- Integration of class type on Land Cover Map:
  21 Classes → 2 Classes
  (1) Forest and (2) Agricultural Area
- Provincial level approach:
  Counting the area size for 4 class types at province
  3 years average window function for smoothing
- Analysis:
  Correlation between (1) Forest and (2) Agricultural Area for 1988 to 2017
  Calculation for:
  Tree cover residual rate between 1988 and 2017
  Tree cover decreasing rate (Deforestation rate)
  Extraction of hotspot province:
  Forest cover ratio at province >= 50%, Deforestation >= 0.22% / Year, Correlation <= -0.7

Step 1

(1) Historical Land Cover Maps

Result on Image Analysis (1)



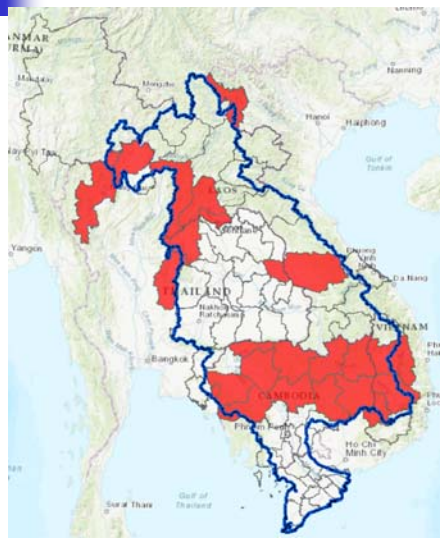
- The map indicates decrease/increase of provincial tree cover area.
- By using global observation data such as satellite images, change of forest cover area can be examined even for broad study area.
- Deforestation rates and areas can be calculated.

Fig- Tree Cover Residual Rate in LMB (from 1988 to 2017)

Step 1

(1) Historical Land Cover Maps

Result on Image Analysis (2)



- Hotspot criteria
- ✓ Forest cover ratio at province >= 50% in 1988
- ✓ Deforestation >= 0.22% / Year
- ✓ Correlation <= -0.7

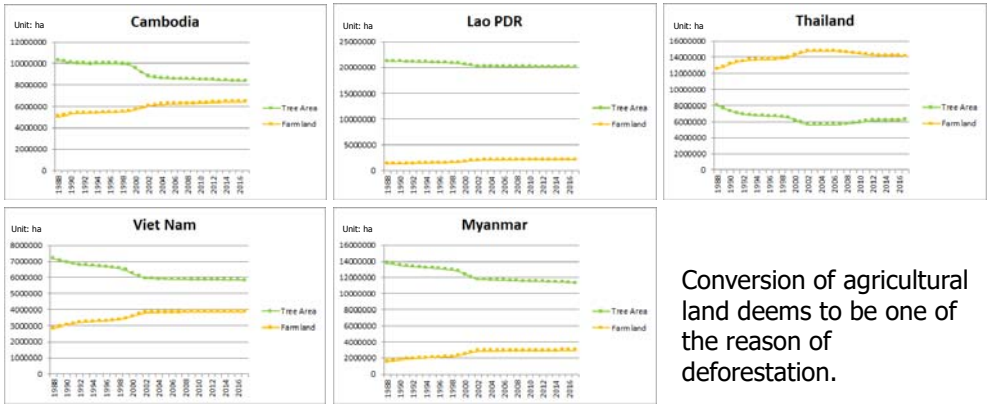
* Forest area and Agricultural Area

Fig- Hotspot Provinces in LMB (from 1988 to 2017)

Step 1

(1) Historical Land Cover Maps

Result on Image Analysis (3) – Country Level



Conversion of agricultural land deems to be one of the reason of deforestation.

Fig- Historical Changes of Forest and Agricultural Area (Farm Land and Paddy field)
Note: Province area was not counted if out of Lower Mekong Basin

Step 1

(1) Historical Land Cover Maps

Result on Image Analysis (3) – Province Level

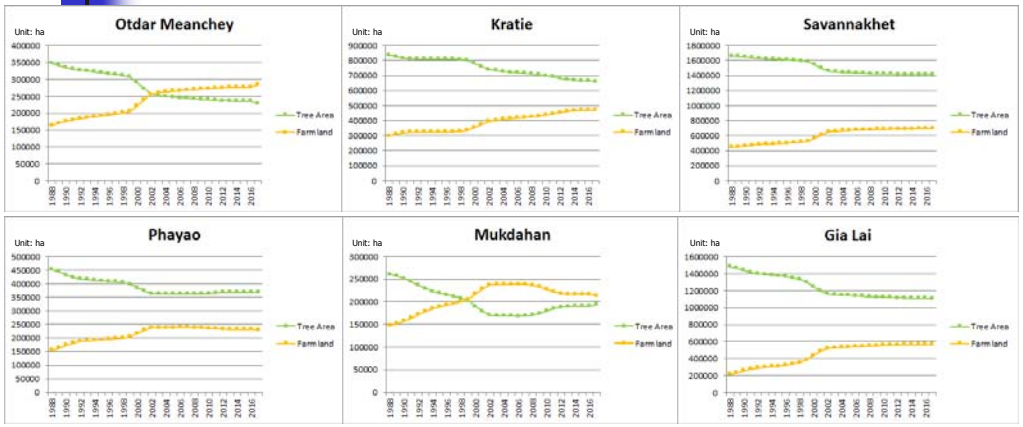
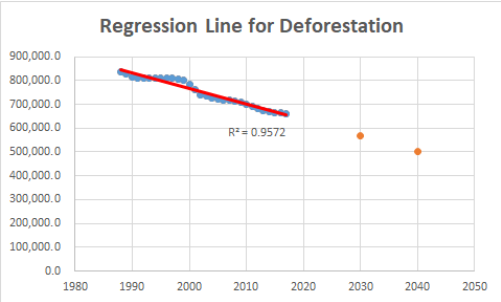


Fig- Historical Changes of Forest and Agricultural Area (Farm Land and Paddy field)

Step 1

(2) Future Deforestation Scenarios



- Deforestation criteria
  - ✓ Regression Line
  - ✓ Coefficient of Determination >= 0.7
  - ✓ Tree Cover Rate >= 10%
    - * Tree Cover Area in Province

Step 2

2. Draft Final Report

Draft Final Report on Step-2

(1) Impact by deforestation on flow regime of Mekong River

(2) Extraction of "Hot spot 2"

Step 2

(1) Impact by Deforestation on Flow Regime

Scenarios

[Scenario 1]

Based on the historical forest cover maps, future deforestation in 2040 is predicted at Step-1. Most of forest areas are expected to decrease.

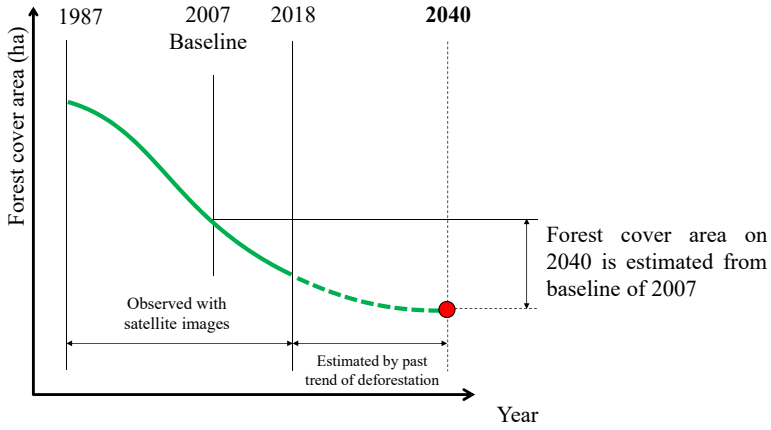
[Scenario 2]

Forest cover area which will recover up to past maximum forest areas from 1987 to 2018 was prepared as ideal case (scenario 2).

Step 2

(1) Impact by Deforestation on Flow Regime

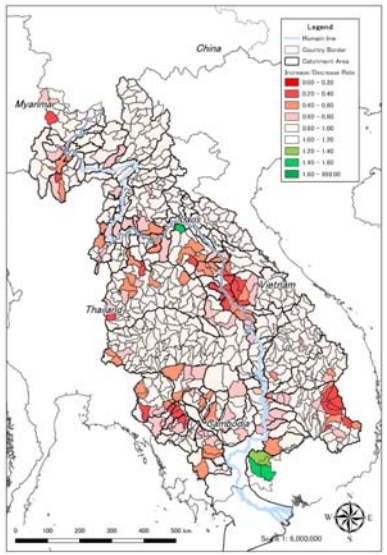
Changes of Forest Cover Area



Step 2

(1) Impact by Deforestation on Flow Regime

Changes of Forest Cover Area



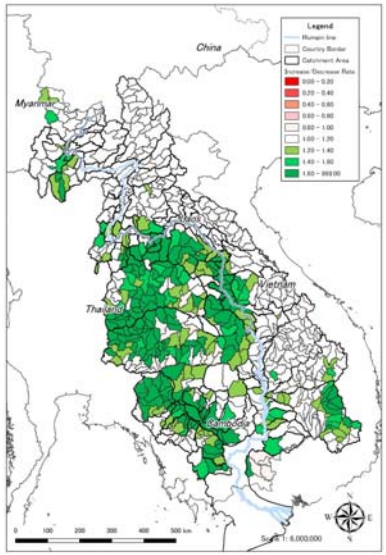
- At Scenario 1 set by historical forest cover areas, forest cover area decreases in whole LMB, especially, middle of Mekong River in Lao PDR

Fig- Increase/Decrease rate of forest cover area from baseline (scenario 1).

Step 2

(1) Impact by Deforestation on Flow Regime

Changes of Forest Cover Area



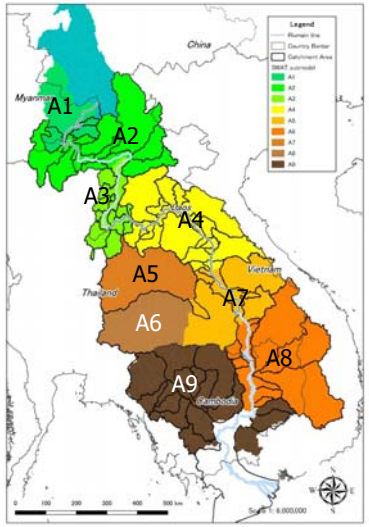
- At Scenario 2, forest cover area could be recovered up to past maximum forest cover area
- Forest cover areas in Thailand increases dramatically, which suggests that deforestation of Thailand in 1980's was serious.

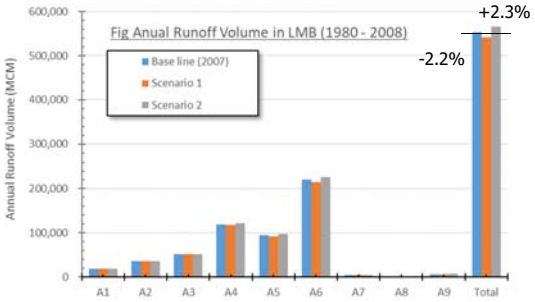
Fig- Increase/Decrease rate of forest cover area from baseline (scenario 2).

Step 2

(1) Impact by Deforestation on Flow Regime

Hydrological Analysis (SWAT model)



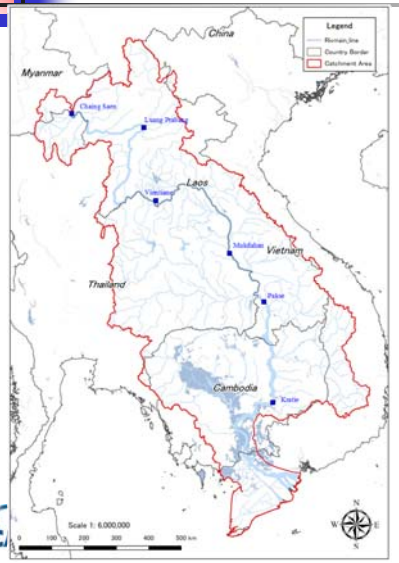


Runoff volume of Scenario 1 is different from that of Scenario 2 by approximately 4.5%.

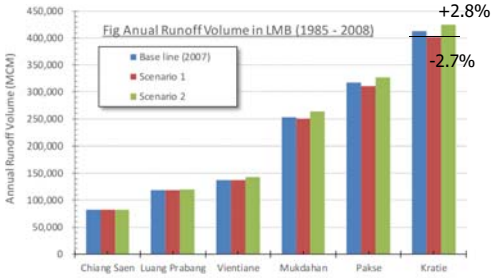
Step 2

(1) Impact by Deforestation on Flow Regime

Hydrological Analysis (IQQM Model)



- Figure shows the annual average runoff volume at key stations at Mainstream of Mekong.



- Runoff volume of Scenario 1 is different from that of Scenario 2 by 5.5%

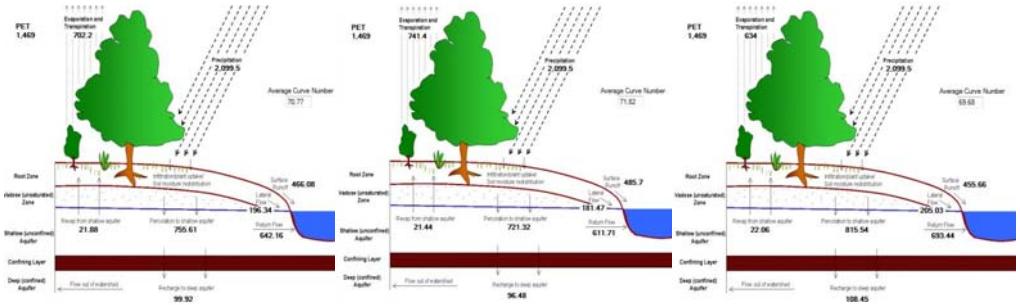
Step 2

(1) Impact by Deforestation on Flow Regime

Findings & Considerations (1/3)

- The following figures show the runoff volume of A4, for example.

[Baseline] [Scenario-1 (deforestation)] [Scenario-2 (recovery)]



Note: the values in figures is annual average from 1980 to 2007

Figure- Distributions of Runoff Volume of A4

Step 2

(1) Impact by Deforestation on Flow Regime

Findings & Considerations (2/3)

Table- Distributions of Water Resources in A4

Scenario	Hydrological Distribution of Water Resources (mm) *Annual from 1980 to 2007						
	1.Precipitation	2. Evaporation & Evapotranspiration	3. Surface Runoff	4. Lateral Flow	5. Percolation to shallow aquifer	6. Return Flow	7. Total Runoff (sum of item 3 to 6)
Base line	2,099.5	702.2	466.08	196.34	755.61	642.16	1,304.58
1 deforestation		↑741.4	↑485.70	↓181.47	↓721.32	↓611.71	**↓1,278.88**
2 recovery		↓634.0	↓455.66	↑205.03	↑815.54	↑693.44	**↑1,354.13**

- Evaporation & Evapotranspiration of Scenario-1 increases. JST assumed that deforestation areas are converted to agricultural lands (cropland and paddy land) in Scenario
- Evaporation from agricultural lands (especially paddy field and double cropping paddy field) might be larger than that of forest cover area in Area-4.
- By the recovery from deforestation, surface runoff of Scenario-2 decreases, which could contribute to reduce flooding.

Step 2

(1) Impact by Deforestation on Flow Regime

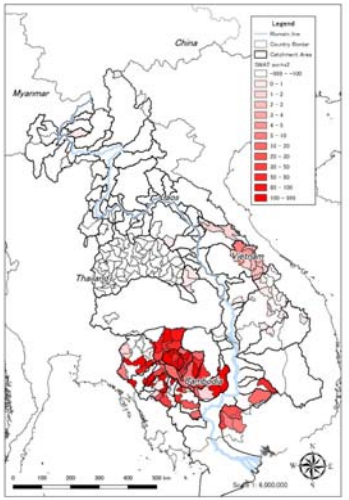
Findings & Considerations (3/3)

- Items from 4 to 6 (behavior of groundwater) of Scenario-2 increases. It could be said that the increase of forest cover areas contributes to recharge of ground water and result in the increase of return flow. This suggests that forest cover areas can improve the flow regime of Mekong River in dry season.
- A fluctuation of river water volume (water resources) can give both positive and negative impacts on watershed management in LMB. So, the monitoring of land cover and hydrological simulation is required periodically.

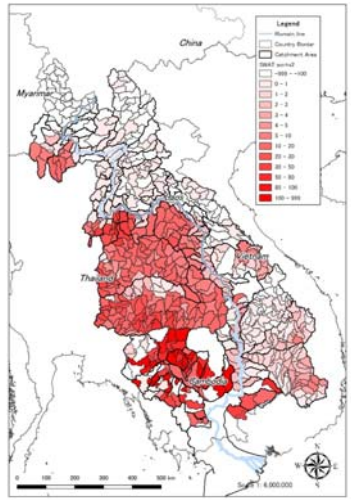
Step 2

(2) Extraction of "Hot spot 2"

Increase in Runoff volume (+% vs Baseline)



[Scenario-1 (deforestation)]

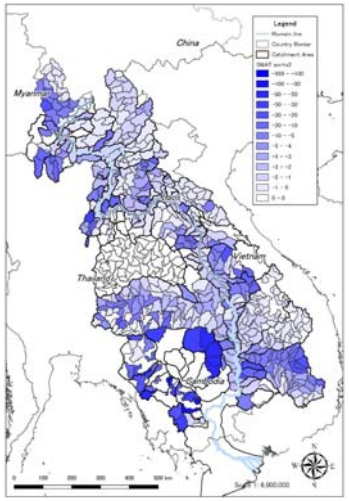


[Scenario-2 (recovery)]

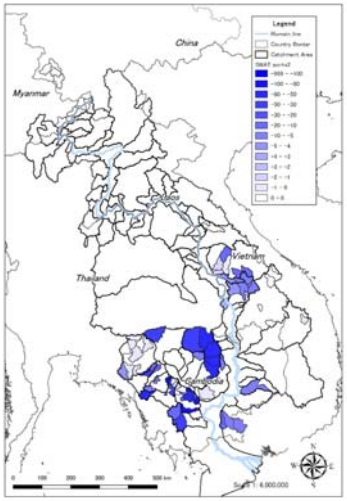
Step 2

(2) Extraction of "Hot spot 2"

Decrease in Runoff volume (- % vs Baseline)



[Scenario-1 (deforestation)]

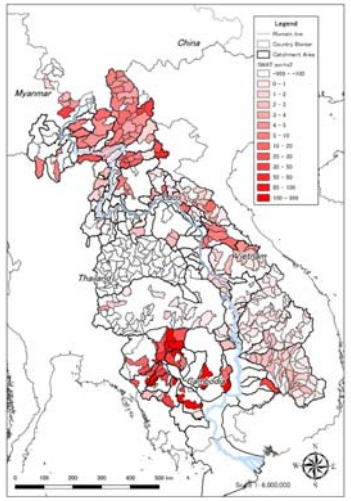


[Scenario-2 (recovery)]

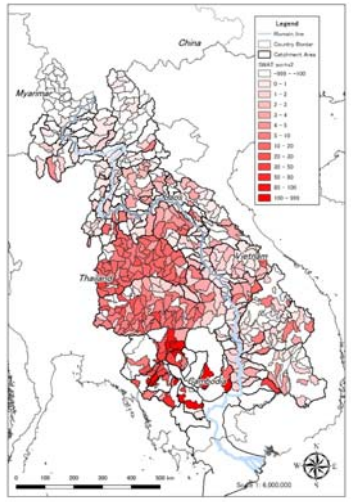
Step 2

(2) Extraction of "Hot spot 2"

Increase in Peak Discharge (+% vs Baseline)



[Scenario-1 (deforestation)]

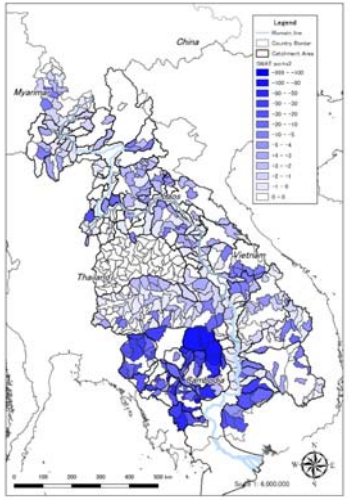


[Scenario-2 (recovery)]

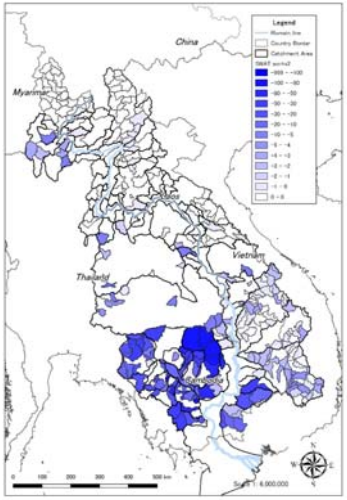
Step 2

(2) Extraction of "Hot spot 2"

Decrease in Peak Discharge (- % vs Baseline)



[Scenario-1 (deforestation)]



[Scenario-2 (recovery)]

Step 2

(2) Extraction of "Hot spot 2"

Extraction of "Hot spot 2"

- Though deforestation induces increase in surface flow to some extent (Scenario-1), the total runoff volume which consists of surface flow, lateral flow and return flow decrease comparing with baseline.
- Under the Scenario-1 that JST forecasts future forest cover area in 2040, it seems that there is not clear vulnerable areas against flooding and drought.

Step 3

3. Draft Final Report

Draft Final Report on Step-3

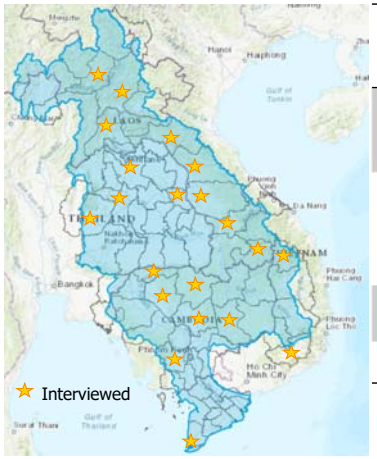
(1) Mitigations of deforestation

(2) Review of Council Study

Step 3-1

(1) Mitigations of Deforestation

Interviewed Provinces



Country	Interviewed Provinces
Cambodia	Kompong Speu 、 Siem Reap 、 Otdar Meanchey、Preah Vihear、Kampong Thom、Kratie
LAO PDR	Savannakhet、Khammouan、Bolikhamsai、Vientiane Province 、 Luang Prabang 、Oudomxay 、Luang Prabang 、Attapeu 、Salavan
Thailand	Khon Kaen、Chaiyaphum、Mukdahan、Udon Thani
Viet Nam	Ca mau、Lam dong、Kon Tum

Fig- Interviewed Provinces in LMB

Step 3-1

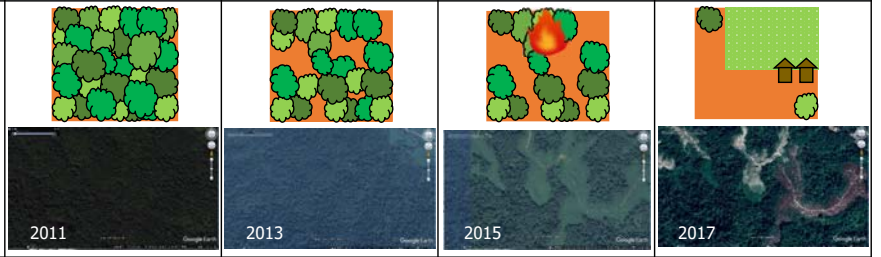
(1) Mitigations of Deforestation

Driver of deforestation and forest degradation in the LMB

Step 3-1

(1) Mitigations of Deforestation

Driver of deforestation and forest degradation in the LMB

Condition	Forest	Forest degradation[1]	Forest degradation[2]	Deforestation
Image				
Activity (Example)	–	-Wood extraction -Road extension for development	-Wood extraction -Unsustainable use of NTFPs -Forest fires -Shifting cultivation	-Change of land use to agricultural use and/or use for residences

Example Image : Gia Lai Province, Viet Nam

Step 3-1

(1) Mitigations of Deforestation

Issues

No.	Issue grouping	Related issues
1	Policy improvement, law enforcement, and capacity development for forest sector staff	1-1, 1-2, 2-3, 2-4, 2-5, 2-7, 2-10, 10-1, 10-6, 10-10
2	Lack of funds	2-1, 2-2, 2-3, 3-4, 5-3, 6-5, 10-4
3	Capacity improvement, resilience enhancement, and life stability of the local people	1-6, 2-6, 3-1, 3-2, 4-1, 4-2, 4-3, 4-4, 6-3, 6-4, 6-5, 6-6, 6-7, 6-11, 6-12, 8-4, 10-1, 10-2, 10-6, 10-12
4	Enhanced forest monitoring and data accumulation	1-2, 2-4, 2-5, 2-7, 2-8, 2-10, 3-1, 5-2, 9-2, 10-7
5	Increased demand for forest resources (construction wood, fuelwood, NTFPs, etc.)	2-11, 2-12, 3-1, 3-2, 3-3, 3-4, 3-5, 4-1, 4-2, 4-3, 4-4, 10-2, 10-5
6	Immature technology for forest regeneration and forestry (forestation and processing)	6-12, 9-1, 10-4, 10-8, 10-9, 10-11, 10-12
7	Lack of sectoral arrangement	1-3, 1-4, 2-3, 2-9, 6-2, 6-8, 6-9, 6-10, 6-11, 10-1, 10-3
8	Lack of cooperation between nations	2-10, 6-11, 10-8, 10-13
9	Increased occurrence of disasters (natural disasters and pollution)	5-1, 5-2, 6-1, 6-13, 7-1, 7-2, 7-3, 8-1, 8-2, 8-3, 8-4, 9-1
10	Decline of biodiversity	4-1, 4-4, 8-5

Step 3-1

(1) Mitigations of Deforestation

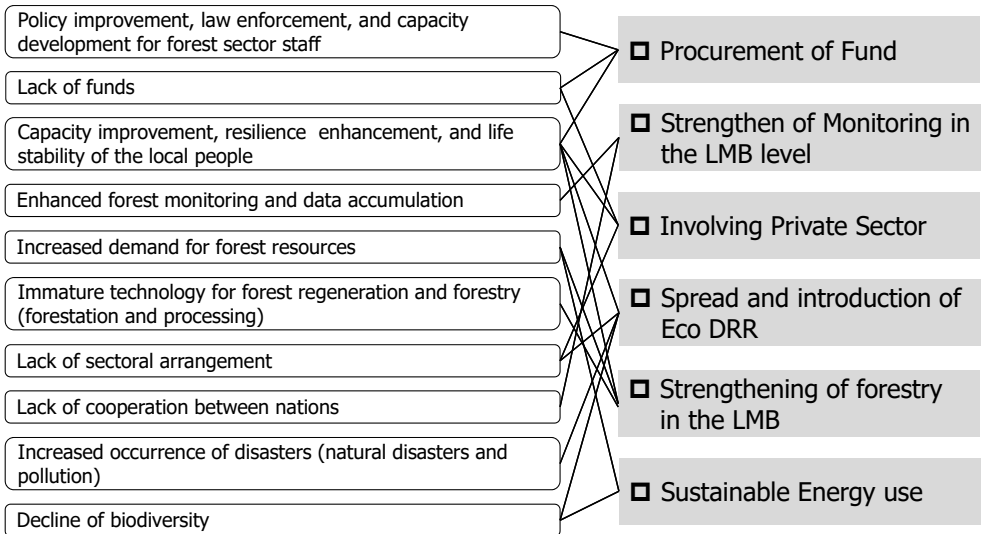
Proposed Approach

- Procurement of Fund
- Strengthen of Monitoring in the LMB level
- Involving Private Sector
- Spread and introduction of Eco DRR
- Strengthening of forestry in the LMB
- Sustainable Energy use

Step 3-1

(1) Mitigations of Deforestation

Relation of Issues and proposed approach



Step 3-2

(2) Review of Council Study

MRC has examined various issues for watershed management of LMB and prepared the reports as "Council Study". Since, "Council Study" includes many useful results for watershed management of LMB, JST has reviewed and extracted important topics for our study.

Step 3-2

(2) Review of Council Study

1. Current Condition (Catchment Area)

Table Catchment Area of Mekong River Basin

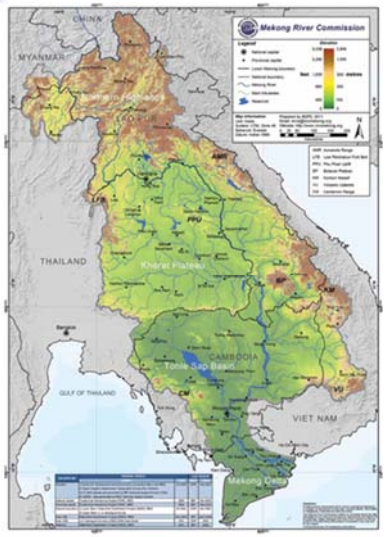
Country	Area (km²)	Share
1. China	165,000	20.8%
2. Myanmar	24,000	3.0%
3. Lao PDR	202,000	25.4%
4. Thailand	184,000	23.1%
5. Cambodia	155,000	19.5%
6. Vietnam	65,000	8.2%
Upper Mekong (Total of 1 & 2)	189,000	23.8%
Lower Mekong (Total of 3 to 6)	606,000	76.2%
Whole Basin (Total of 1 to 6)	795,000	100.0%

Source: Overview of the Hydrology of the Mekong Basin. MRC, Vientiane, Laos, 2005

Step 3-2

(2) Review of Council Study

1. Current Condition (Topography)



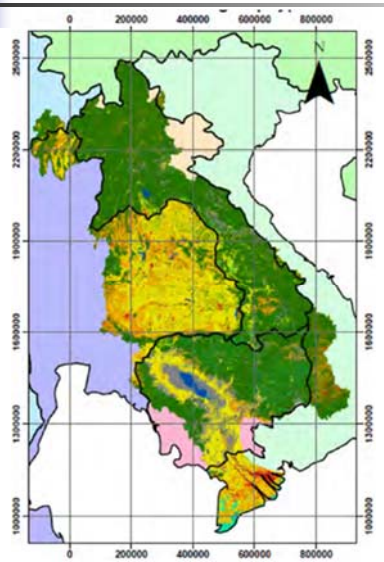
- LBM is broadly divided into four regions, namely

1) Northern Highlands,
2) Khorat Plateau,
3) Tonle Sap Basin and
4) The Mekong Delta.

Step 3-2

(2) Review of Council Study

1. Current Condition (Land use)



- As of the land use of 2007, the forest, the paddy and the agriculture areas are dominant.

Step 3-2

(2) Review of Council Study

1. Current Condition (Land use)

Table Present Rainfed Agriculture Area, Irrigated Paddy Area and Forest as of 2007

Country	Rainfed Agriculture Area		Irrigated Paddy Area		Forest	
	Area (ha)	Share	Area (ha)	Share	Area (ha)	Share
Cambodia	3,719,442	(16.8%)	273,337	(9.2%)	8,303,852	(25.9%)
Lao PDR	1,925,550	(8.7%)	209,116	(7.0%)	17,379,583	(54.3%)
Thailand	13,484,104	(60.8%)	776,980	(26.1%)	4,133,540	(12.9%)
Vietnam	3,057,033	(13.8%)	1,713,130	(57.6%)	2,204,119	(6.9%)
Total	22,186,129	(100.0%)	2,972,563	(100.0%)	32,021,094	(100.0%)

Table Future Rainfed Agriculture Area, Irrigated Paddy Area and Forest as of 2040

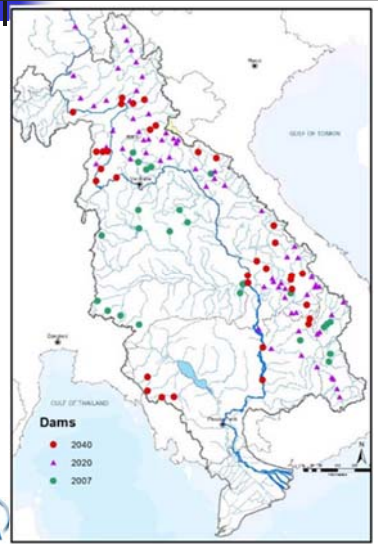
Country	Rainfed Agriculture Area		Irrigated Paddy Area		Forest	
	Area (ha)	Share	Area (ha)	Share	Area (ha)	Share
Cambodia	6,073,999	(24.1%)	678,030	(14.2%)	5,949,295	(19.5%)
Lao PDR	2,148,168	(8.5%)	597,893	(12.6%)	18,516,307	(60.8%)
Thailand	13,391,904	(53.2%)	1,810,650	(38.0%)	4,170,693	(13.7%)
Vietnam	3,565,749	(14.2%)	1,674,915	(35.2%)	1,842,196	(6.0%)
Total	25,179,820	(100.0%)	4,761,488	(100.0%)	30,478,491	(100.0%)

Source: The MRC Study

Step 3-2

(2) Review of Council Study

1. Current Condition (Hydropower dams)



- There exist 38 hydropower dams across the tributaries of the LMB.
- Two hydropower dams is under construction at mainstream of Mekong River, in Lao P.D.R

Table Number of Existing, On-going and Planned Hydropower Dam Projects in the LMB

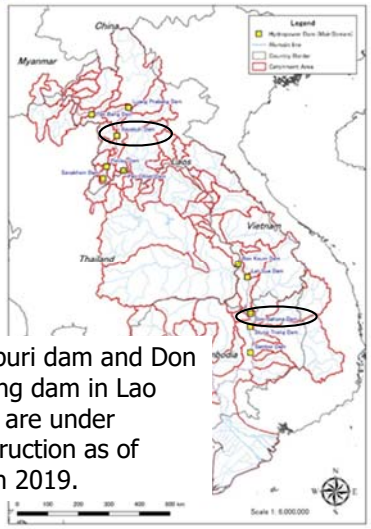
Country	Mainstream Dam				Tributary Dam			
	Existing	On-going	Planned	**Total**	Existing	On-going	Planned	**Total**
Cambodia	0	0	2	**2**	0	0	0	**0**
Lao PDR	0	2	7	**9**	23	20	0	**43**
Thailand	0	0	0	**0**	5	0	0	**5**
Vietnam	0	0	0	**0**	10	0	0	**10**
Total	**0**	**2**	**9**	**11**	**38**	**20**	**0**	**58**

Source: Greater Mekong Observatory

Step 3-2

(2) Review of Council Study

1. Current Condition (Hydropower dams)



Xayaburi dam and Don Sahong dam in Lao P.D.R are under construction as of March 2019.

Xayaburi Dam (Lao P.D.R)

Don Sahong Dam (Lao P.D.R)

Step 3-2

(2) Review of Council Study

1. Current Condition (Flood)

- The overflow of the Mekong River occurs almost every year and sometime, causes severe flood damages including losses of life.
- The flood inundation is confined within the limited extent along the riverine in Lao PDR and Thailand.
- In contrast, the extensive flood inundation tends to occur in Cambodia and Vietnam, especially the floodplain around Tole Sap in Cambodia and the Mekong Delta in Vietnam

Table Number of Fatalities and Value of Loss Recorded in Flood 2000 and 2011

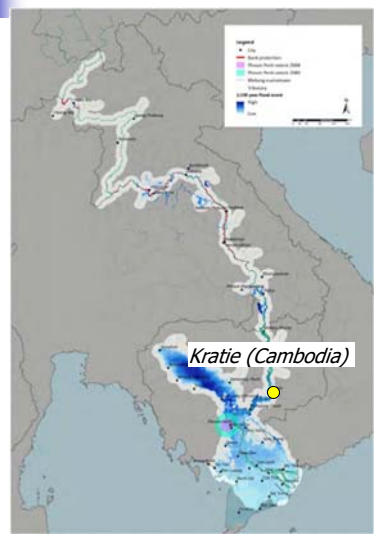
Country	2000 Flood		2011 Flood	
	Number of Fatalities	Value of Loss (million US$)	Number of Fatalities	Value of Loss (million US$)
Cambodia	350	159	250	634
Vietnam	320	125	104	260
Thailand	25	30	n.a.	n.a.
Lao PDR	15	21	42	208
Total	710	335	396	1,102

Source: The MCR Study

Step 3-2

(2) Review of Council Study

1. Current Condition (Flood)



- The characteristic of flood inundation upstream of Kratie (Cambodia) is much different from that of downstream of Kratie.
- This uneven distribution of the flood inundation also brings the uneven distribution of flood damages.

Step 3-2

(2) Review of Council Study

1. Current Condition (Water Quality)

- MRC monitored 4 water quality parameters at 22 stations along of the Lower Mekong mainstream and its tributary.

Table Relationship between the Monitored Concentration Values of Water Quality Parameters and Threshold Values

Parameter	Threshold Value*	Results of monitoring in 2004
COD	5.0 mg/L	Seven water quality stations recorded the rather many values of the COD concentration above the threshold value.
TOTP	0.13 mg/L	All monitoring stations recorded values of the TOTP concentration above the threshold value,
NH_4	0.5 mg/L	All the monitored v alues except the value of monitored at Station No. 19 one time are below the threshold value. However, even the overtop value is 0.6mg/L exceeding by 0.1 mg/L only.
NO_{32}	5.0 mg/L	All the monitored values are below 1.2mg/L and well below the threshold value.

* : Threshold value set up in the"MRC Water Quality Guidelines for the Protection of Human Health and Aquatic Life.

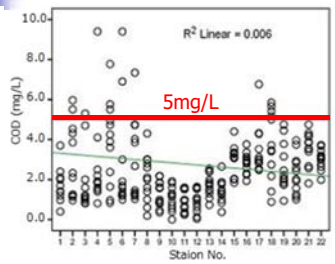
*Source: The MRC Study

Step 3-2

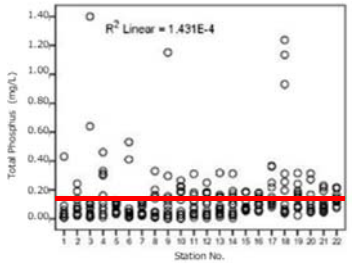
(2) Review of Council Study

1. Current Condition (Water Quality)

[COD]



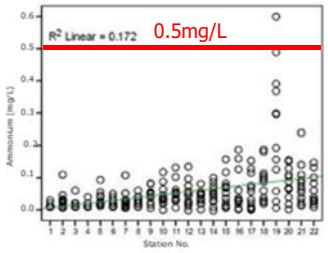
[T-P (TOTP)]



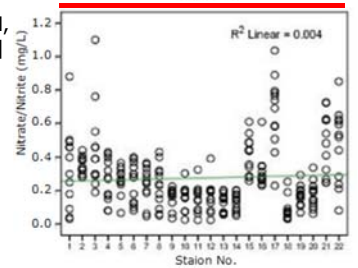
0.13mg/L

5 mg/L

[NH_4-N]



[NO_3-N, NO_4-N]



Step 3-2

(2) Review of Council Study

1. Current Condition (Wetland)

- MRC defines the wetland in the LMB covers 6 land use categories;

  i) seasonally inundated forest
  ii) seasonally inundated grassland
  iii) marsh, swamp, lake, pond
  iv) Mangrove
  v) rice field and
  vi) aquaculture area.

- Such wetland has a variety of functions, which are indispensable to the sustainable and resilient watershed management.

Step 3-2

(2) Review of Council Study

1. Current Condition (Fishery Resources)

- LMB is one of the major habitats for the inland fishes in the world.
- The fishes of 189 species at least inhabit in the LMB and 80% of them (165 species) make seasonal migration.
- During the dry season, the migratory fishes stay in the deep portions in the river, while at the beginning of the wet season, they move toward the floodplains from their dry season refuges for breeding and feeding.
- The maximum distance of this movement ranges over hundreds of kilometers on the mainstream of Mekong River.

Photo- Irrawaddy Dolphin

Source: https://jp.123rf.com/photo_20059528_%E3%82%A4%E3%83%A9%E3%83%AF%E3%82%B8%E5%B7%9D%E3%82%A4%E3%83%AB%E3%82%AB.html

(2) Review of Council Study

2. Scenarios on Water Resources Development

Table Scenarios of Water Resources Development, Land Development and Climate Changes Assumed in the MRC Study

Scenario	Basic Concept	Water resources development projects assumed in the scenario	Land Use States	Climate Change
M1	(i) Early development scenario (ii) Baseline scenario	The water resources development projects completed in 2007 is remained as it is without any further development in the future.	The present land use as of 2007	Not considered
M2	Definite future water resources development scenario	The ongoing and firmly committed water resources development is completed in 2020.	The future land use in 2020	Not considered
M3	Planned development scenario	The above M2 Scenario is realized in 2020, and further, all the planned water developments are completed in 2040.	The future land use in 2040	Not considered
M3CC	Planned development scenario (M3) affected by climate change	Same as Scenario M3	Same as Scenario M3	Considered (medium level of climate change (applying IPSL for GCM Model and RCP 4.5 for greenhouse gas emissions

Note: The MRC study further assumed a few sub-scenarios for each of the water resources development projects and the climate change in order to clarify the more sensitive impact on the LMB.

Source: The MRC Study

- MRC assessed the potential changes in the hydrology, the river morphology, the ecology and the socio-economy of the LRB affected by various scenarios of the water resources development projects, the land use and climate changes in the LMB.
- MRC set the four(4) scenarios as shown in left table.

(2) Review of Council Study

2. Scenarios on Water Resources Development

- MRC evaluated economical impacts of four (4) scenarios with Net Present Value (NPV).

Table Net Present Value (NPV) for Water Resources Development Sectorsunder Development Scenarios M1, M2 and M3

(Unit: Million US$)

Development Sector	NPV for Scenarios of M1, M2 and M3			Increment from M1 (2007) to	
	M1 (States in 2007)	M2 (States in 2020)	M3 (States in 2040)	M2 (2007 to 2020)	M3 (2007 to 2040)
Hydropower	9.1	72.3	160.8	63.2	151.7
Agriculture	358.2	449.8	461.7	91.6	103.5
Fishery	72.9	56.3	50.2	-16.6	-22.7
Navigation	7.3	12.2	76.2	4.9	68.9

Source: The MRC Study

(2) Review of Council Study

3. Impacts of Future Development

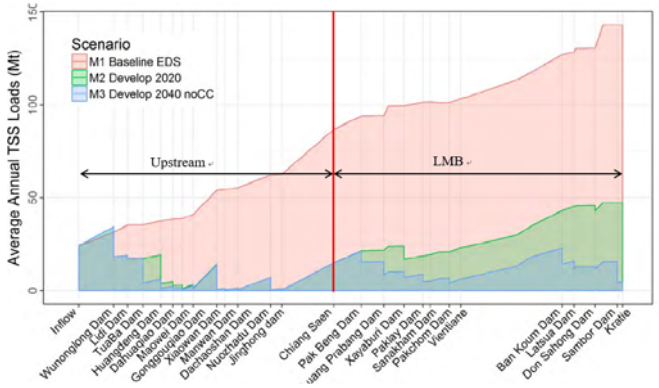
(1) Impact of Hydropower Development

- MRC evaluates that development of hydropower (construction of hydropower dam) much contributes to regional economy in LMB.
- However, negative impacts on ecology and morphology on Mekong River at the same time, MRC states.
- MRC concerns the impacts on resettlement of residents for construction of hydropower dams.
- In addition, MRC evaluates the sediment runoff volume increase by hydropower development but the dams capture much of sediment, which can cause riverbank erosion downstream.

(2) Review of Council Study

3. Impacts of Future Development

- Regarding the average annual TSS load of scenario M1 (baseline in 2007), the sediment supplied to downstream is estimated to be 143 million tons.
- However, under scenario M3 (2040), sediment will ONLY reach 4 million tons because hydropower dams developed in mainstream capture the sediment.



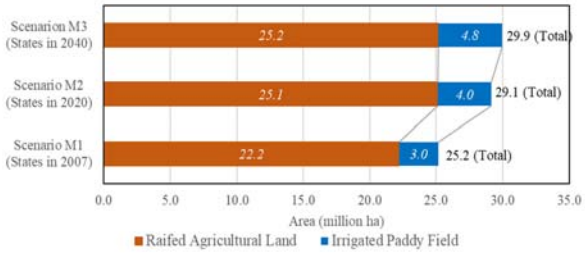
Source: MRC Council Study

(2) Review of Council Study

3. Impacts of Future Development

(2) Impact of Agricultural Development

- Agriculture development of LMB supports to the regional economy surely. However, agricultural development will reach a plateau due to limitations of potential lands and farmers.
- On the other hand, increase of population in LMB is expected and improvement of production capacity of food (rice) might be required.



(2) Review of Council Study

3. Impacts of Future Development

(2) Impact of Agricultural Development

- MRC concerns the river water can be polluted by using fertilizers and agricultural chemicals accompanied with agricultural development near future.
- MRC estimated about 82% of the inhabitant in Cambodia and 55% in Lao PDR use the raw water of the Mekong River for drinking. So, effective countermeasures for improvement of water environment might be required.

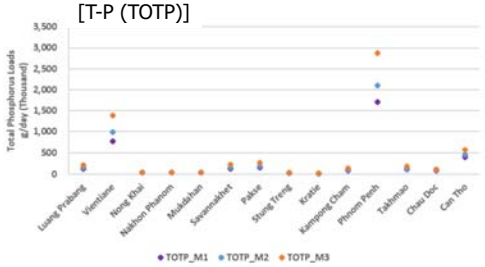
(2) Review of Council Study

3. Impacts of Future Development

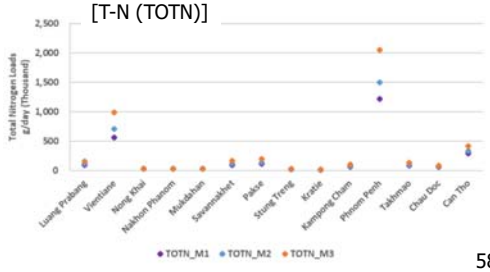
(3) Impact of Domestic and Industrial Wastewater

- According to the water quality monitoring by MRC, river has been somewhat polluted by the wastewater of the domestic and industrial water use and/or the agricultural chemical runoff.
- Under development scenarios (M1 to M3), it is expected that values of T-P and T-N is increased, especially at big city such as Phnom Penh, Cambodia. Therefore, comprehensive countermeasures for water quality control might be required.

[T-P (TOTP)]



[T-N (TOTN)]



(2) Review of Council Study

3. Impacts of Future Development

(4) Impact of Climate Change

- MRC estimated the impact of Climate Change comparing M3 and M3CC scenarios, evaluate the negative impacts on agriculture, ecology and flooding.
- In order to examine the impacts of climate changes in detail, the MRC Study further assumed the following sub-scenario C2 and C3.

  C2 is oriented to **wetter climate** than M3CC applying GFDL for general circulation model (GCM) and RCP 4.5 for green-house gas emissions.

  C3 is oriented to **dryer climate** than M3CC applying GISS for general circulation model (GCM) and RCP 4.5 for green-house gas emissions.
- MRC evaluate that the most vulnerable areas to both the drought and the flood are the floodplain in and around **Tole Sap in Cambodia** and the **Mekong Delta in Vietnam**. The Mekong Delta is also suffered from the severe salinity intrusion during a dry season.

Thank you for your attention and your kind cooperation.

Feel free to contact JST
mekong@ctii.co.jp

Session II: Further Study

"Data Collection Survey on the Basin Management and Environmental Conservation in Mekong River Basin"

Final Workshop

26th July 2019

JICA Study Team (JST)

Introduction

Outline of Session II

- In the afternoon session, firstly JST will explain the recommendations and/or proposals for watershed management and forest preservations based on the study results explained and discussed in Session I.
- After presentation from JST, all participants will start discussing about the further studies for improvement of watershed management and forest reservations of LMB.
- Finally, JST will provide the schedule after this workshop including Study Tour in Japan, etc.

Step 4

1. Draft Final Report

Draft Final Report on Step-4

(1) Recommendations for Future Watershed Management

(2) Propose of Effective Forest Management

Step 4

(1) Recommendations for future watershed management

JST has examined impacts of deforestation on flow regime of Mekong River and found the deforestation reduce the river flow to some extent, but it is thought that impacts of developments in LMB such as hydropower dams is higher than deforestation. Therefore, JST decided to provide suggestions and recommendations for effective watershed management of LMB based on the Council Study released by MRC on May 2018.

In Council Study, examined are the most likely dominant impacts on the socio-economic and natural environment of the LMB associated with the four basin external forces of:

(i) hydropower development

(ii) agriculture development

(iii) wastewater generated by the domestic and industrial water development

(iv) climate change

Step 4

(1) Recommendations for future watershed management

As the results of examination on the impacts, the following 4 topics are concluded as the major concerns of the watershed management for the LMB.

1. Securing Ecology and Morphology of Mekong River
2. Securing Food Security of the LMB
3. Securing Water Security of Mekong River
4. Adaptation of Climate Changes

Step 4

(1) Recommendations for future watershed management

1.Securing Ecology and Morphology of Mekong River

- The hydropower development would largely contribute to the future economic growth of the LMB.

Table Net Present Value (NPV) for Water Resources Development Sectorsunder Development Scenarios M1, M2 and M3

(Unit: Million US$)

Development Sector	NPV for Scenarios of M1, M2 and M3			Increment from M1 (2007) to	
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Navigation	7.3	12.2	76.2	4.9	68.9

Source: The MRC Study

Step 4

(1) Recommendations for future watershed management

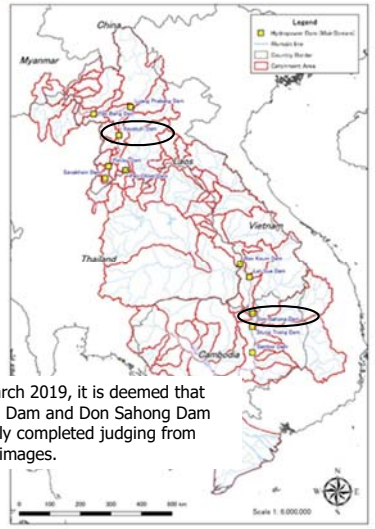
1.Securing Ecology and Morphology of Mekong River

- However, the economic growth brought by the hydropower dam project will accompany with the extremely significant damages to the river ecology as well as river morphology.
- That is, the hydropower development would cause the fatal impacts on the irreversible resources of the aquatic lives (i.e. *Irrawaddy Dolphin*), especially the migratory inland fishes.
- The hydropower dam development would also trap large volume of the river sediment flow causing the serious river channel erosion and coastal erosion downstream.
- The flow regime of Mekong River would be significantly affected by the hydropower dams, depending on the design of dams. These adverse impacts by the hydropower dam projects are not counted in the above economic growth contributed by the hydropower dam projects.

Step 4

(1) Recommendations for future watershed management

1.Securing Ecology and Morphology of Mekong River



As of March 2019, it is deemed that Xayaburi Dam and Don Sahong Dam are nearly completed judging from satellite images.

Xayaburi Dam (Lao P.D.R)

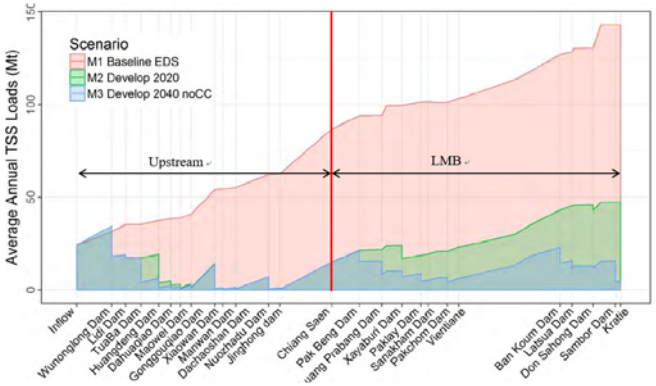
Don Sahong Dam (Lao P.D.R)

Step 4

(1) Recommendations for future watershed management

1.Securing Ecology and Morphology of Mekong River

- Regarding the average annual TSS load of scenario M1 (baseline in 2007), the sediment supplied to downstream is estimated to be 143 million tons.
- However, under scenario M3 (2040), sediment will ONLY reach 4 million tons because hydropower dams developed in mainstream capture the sediment.



Source: MRC Council Study

Step 4

(1) Recommendations for future watershed management

1.Securing Ecology and Morphology of Mekong River

- Despite the above serious damages caused by the hydropower dam development, the drastic measures to mitigate the damages have not been invented yet.
- Hence, it is concluded that there will be no choice but to suspend implementation of the nine hydropower dams on the Mekong River mainstream, which are now under planning stage unless the acceptable mitigation measure is clearly indicated.

Step 4

(1) Recommendations for future watershed management

2. Securing Food Security of the LMB

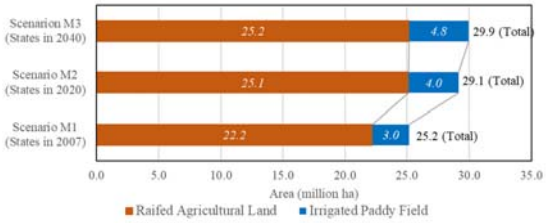
- The agricultural development plays as the principal role to sustain the economic value of the LMB through exporting of the agricultural commodities especially the rice products in the LMB.
- At the same time, the agricultural development sustains the food security and the livelihood of the inhabitants in the LMB through supplying of the rice as the staple food and securing of job opportunities for agriculture.
- The agricultural development may have another advantage such that it will have the marginal adverse impacts on the natural conditions of the LMB. (*Note: the agriculture chemicals and fertilizers used for the agriculture contains the potential risk of polluting the river water quality of Mekong River. However, the risk has not been confirmed in the previous relevant studies yet*)

Step 4

(1) Recommendations for future watershed management

2. Securing Food Security of the LMB

- Despite the important role of the agricultural development for the LMB, the agricultural development would gradually decline in the future due to the limit of the available land and labor forces for agriculture



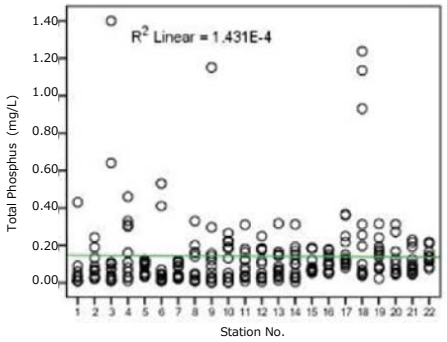
- While the population dependent on the agriculture in the LMB will gradually increase taking the demography of the member countries of LMR into account.
- Hence, the member countries of the LMB would be required to review agricultural area expansion policies in due consideration of securing the food security of the LMB together with the agricultural economic viability and the available labor forces for the agriculture sector in the future.

Step 4

(1) Recommendations for future watershed management

3. Securing Water Security of Mekong River

- According to the result of water quality monitoring by MRC, the annual average concentration value of T-P of LMB was 0.058mg/L in 2000, while the value in 2014 highly increased to 0.13mg/L, which has already beyond the threshold value.
- The high concentration values of T-P monitored in LMB in 2004 suggests that the river has been somewhat polluted by the domestic/industrial wastewater and/or the agricultural chemicals.
- Moreover, the large increment of concentration values of T-P from 2000 to 2014 suggests that the pollution of river water is getting worse year by year.



Step 4

(1) Recommendations for future watershed management

3. Securing Water Security of Mekong River

- MRC estimated about 82% of the inhabitant in Cambodia and 55% in Lao PDR use the raw water of the Mekong River for drinking. Considering such water use of the Mekong River and the aggravation of the river water quality, the holistic water quality management of LMB would be indispensable to promise the water security for the inhabitants in the LMB.
- MRC has already examined the impacts of the domestic/industrial wastewater on the water quality of Mekong River. However, the Study did not capture the impacts of the agricultural chemicals and fertilizer, which are largely increasing as the rice production increase.
- Accordingly, the comprehensive water quality management would need the approach to the whole major pollutant sources including the domestic/industrial wastewater as well as the agricultural chemicals and other major point/non-point pollutant sources, if any.

Step 4

(1) Recommendations for future watershed management

4. Adaptation of Climate Changes

- Among the three scenarios, the C3 (dryer climate change) will cause the severest drought associated with the least precipitation and the largest reduction of agricultural products.
- The drought in the scenario C3 will also significantly lower the water level of the Tonle Sap depriving the habitats of aquatic life. On the other hand, the C2 (wetter climate) will increase frequency of flood occurrences, the flood peaks and the flood duration causing the sever flood damage especially in the LMB.
- The most vulnerable areas to both the drought and the flood will emerge in the floodplain in and around Tole Sap Lake in Cambodia and the Mekong Delta in Vietnam. The Mekong Delta is also suffered from the severe salinity intrusion during a dry season.

Step 4

(1) Recommendations for future watershed management

4. Adaptation of Climate Changes

- The climate changes, especially changes of rainfall and sea level rise will be relatively slow and highly uncertain. The climate changes will also have the transboundary influences throughout all member countries of the LMB, whereby the climate change adaptations for the member countries will closely interrelates each other. From these points of view, the plan for the climate adaptations for the LMB will need to be formulated and implemented based on the common concepts and strategies of the member countries of the LMB. Hence, highlighted is the Mekong Adaptation and Strategy Plan (MASAP), which was jointly developed by the member countries of the LMB.
- There is a need to confront the impacts of climate changes at national, regional and international levels through a coordinated way. The MASAP sets out the strategic priorities and actions at basin level through which MRC can contribute to addressing climate change risks and strengthen basin wide resilience.

Step 4

(1) Recommendations for future watershed management

Future Expected Activities

For the implementation of effective watershed management in LMB, implementation of following studies are recommended.

- Study on the river sediment system in Lower Mekong Basin including improvement of the bedload monitoring; risk analysis regarding bank erosion and coastal erosion at the downstream countries, etc.
- Study on improvement of water environment plan in LMB including the improvement of water quality monitoring; the estimation of contamination loads by point source and plane source; preservations of wetland, etc.
- Study on environmental impacts by basin development in Lower Mekong Basin including re-evaluations of hydropower dam, climate change, agricultural development, etc.
- Hydro-met data collection and storage in the database of MRC to verify the simulation model based on the recent observed data; new installation of hydro-met stations in LMB, etc.

Step 4

(2) Proposal of Effective Forest Management

Proposed Approach

- Procurement of Fund
- Strengthen of Monitoring in the LMB level
- Involving Private Sector
- Spread and introduction of Eco DRR
- Strengthening of forestry in the LMB
- Sustainable Energy use

Step 4

(2) Proposal of Effective Forest Management

Procurement of Fund

Findings

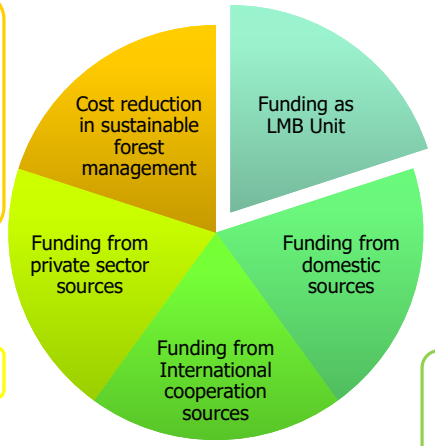
- Each LMB country is working to develop policies and programs, strengthen enforcement, and promote field activities for sustainable forest management
- Japan and other international partner have widely supported these policy development activities.
- The funds to carry out these activities, however, are in short supply, which will make it difficult to achieve all of the activities now planned.
- Even if a policy is well developed, it cannot achieve outcomes without the budget to carry it out.

Step 4

(2) Proposal of Effective Forest Management

Procurement of Fund

✔ Improve Forest monitoring and management system using drones and/or ICT
✔ Development of breeding technology for seedlings



✔ Establishment of the Fund
✔ Procurement of donation fund
✔ Access to the External funds

✔ National budget
✔ Tax revenue
✔ PES

✔ CSR activities

✔ International Partners
✔ Carbon Credit (GCF, JCM, VCS, etc.)
✔ External funds (GCF, GEF etc.)

Step 4

(2) Proposal of Effective Forest Management

Procurement of Fund

Establishment of the Fund and Procurement of donation fund

☛ Example of Japan system

Forest Fund for Greenery and water

Donation from Energy Sector other related Sectors (Forestry, Chemistry, etc.)

Investment Fund (161,000,000 USD)

Interest (3,200,000 USD/year)

Researches | Educations | Disseminations

Greenery Fund

Donation from Family, Company, Office, School, etc.

917,800 USD (1953)
19.3million USD (2018)

National Land Afforestation Promotion Orgar ation

Plantation | Tree Maintenance

Step 4

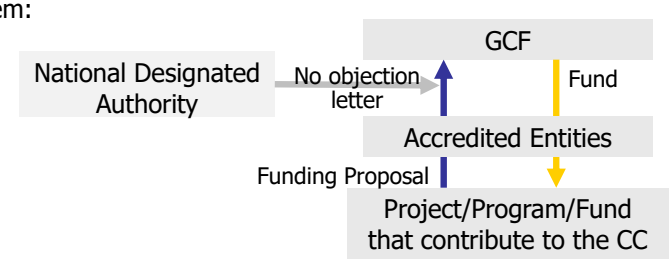
(2) Proposal of Effective Forest Management

Procurement of Fund

Access to the External funds

☛ Example of GCF

- Aim:To catalyze a flow of climate finance to invest in low-emission and climate-resilient development.
- Fund:10.3 billion USD（Pledged）
- Fund distribution：50:50 balance between mitigation and adaptation investments
- System:



Step 4

(2) Proposal of Effective Forest Management

Mobilization of the private sector

Findings

- The forest conservation activities conducted so far have been implemented mainly by the governments, local residents, NGOs, international partners, etc.
- Participation from the private sector has mainly focused on industrial tree plantation and a number of CSR activities.
- The activities that lead to deforestation and forest degradation, namely, development projects, illegal timber exportation, and agricultural production, are largely linked to the activities of the private sector.

Step 4

(2) Proposal of Effective Forest Management

Mobilization of the private sector

Promotion and utilization of CSR	• Establishment of a CSR contact point within forest • Matching of CSR activities based on government strategies and plans
Support of sustainable efforts by the private sector	• Establishment of opportunities for dialogue and opinion exchanges with companies • Clarification of forest classifications, forest boundaries, and land ownership • Establishment of a production and transportation system for raw materials that are not required for deforestation • Differentiation of raw materials that are not required for deforestation • Construction of an information platform
Introduction of an award system	• Evaluation of the efforts of companies to conserve the environment and forests • Commendation of companies that have contributed to the conservation of forests and the environment

Step 4

(2) Proposal of Effective Forest Management

Mobilization of the private sector

NY declaration
(Zero Deforestation)

ESG Investing

Step 4

(2) Proposal of Effective Forest Management

Mobilization of the private sector

- Forest definition
- Local People
- Contact
- Access to the product produced sustainably
- Data
- Transparency

Step 4

(2) Proposal of Effective Forest Management

Mobilization of the private sector

- Organize information
- Facilitate and support communication with Local people
- Close communication
- Differentiation of products that are produced sustainably
- Providing data
- Information disclosure

Step 4

(2) Proposal of Effective Forest Management

Strengthen of Monitoring in the LMB level

Findings

- Forest in the LMB is decreasing
- Forest degradation of the LMB is most likely to be progressing, but there is no data.
- Increase of illegal logging with Dam development and tendency of companies not to implement the reforestation activities required under development contracts are pointed out as issues of forest management
- Since sediment deposition data was not obtained, the relationship between forests and watersheds, such as the volume of sediment to rivers and dams due to deforestation, was not analyzed objectively.

Step 4

(2) Proposal of Effective Forest Management

Strengthen of Monitoring in the LMB level

Forest cover monitoring in the LMB	• Implementation of forest cover monitoring with a unified forest definition in the LMB • Monitoring of forest degradation in the LMB • Grasping of data on forest fires and illegal logging in the countries of the LMB
Accumulation of scientific knowledge for sustainable LMB Management	• Accumulation of forest cover monitoring data • Accumulation of scientific knowledge on forest hydrology and soil erosion from the forests in the LMB • Calculation of the monetary value of forest functions that can be quantitatively evaluated
Monitoring of development projects in the LMB	• Monitoring of the implementation status of reforestation activities required under contracts with companies • Disclosure of social and environmental impact assessment reports for development projects • Strengthened monitoring of illegal logging when hydropower dams are constructed.
Development of a database platform to disclose information	• Disclosure of monitoring results and the information grasped through monitoring • Assured transparency of development through information disclosure on LMB Development
Recommendation and activity support for individual countries and companies	• Recommendations and warnings to countries and companies based on the results of monitoring and data collection • Corrective advice and guidance when inappropriate behavior is detected by monitoring. • Support for countries and companies in their activities to develop LMB sustainably

Step 4

(2) Proposal of Effective Forest Management

Spread and introduction of Eco DRR

Findings

- Increase of soil erosion, flood, drought was pointed out
- There are differences in recognition of forest value between sectors
- In the field survey, it was confirmed at various places that the soil erosion is progressing

Step 4

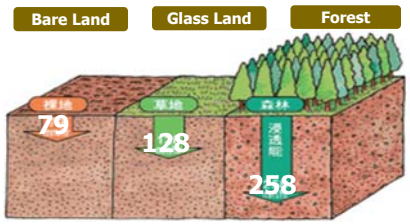
(2) Proposal of Effective Forest Management

Spread and introduction of Eco DRR

For the sustainable development and conservation of the LMB, it is necessary to

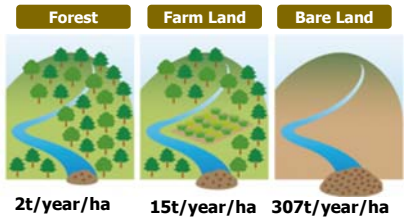
- ✓ Accumulating data on the Eco-DRR function of forests in the LMB
- ✓ Quantify forest functions based on scientific data
- ✓ Efficient use of forest Eco-DRR

Penetration ability



Source: Hiroshi MURAI and Yuaku IWASAKI: Studies on the Water and Soil Conservation Function based on Forest Land (1975)

Soil conservation ability



Source: Maruyama Ganzo, "Forest Hydrology" (1970, University of Practical Forestry)

Step 4

(2) Proposal of Effective Forest Management

Spread and introduction of Eco DRR

Strengthening of the prevention of mountain disasters and soil preservation	• Expansion of forests and root forest networks by reforestation and restoration in deforested areas • Management measures for healthy forests such as thinning for artificial forests • Installation of structures such as erosion control dams • Reduction of bare land areas by the introduction of early greening technology
Improvement of watershed protection	• Identification of important watershed forests in the LMB • Conservation and restoration of important watershed forests to improve the watershed preservation function • Appropriate forest maintenance measures such as thinning to improve the watershed preservation function • Promotion of rainfall penetration by revegetation of bare land and bare slopes
Utilization of the damage mitigation function for disaster control	• Alleviation of floods by the establishment and maintenance of detention basins • Mitigation of storm surges by developing coastal forests (watershed forests) • Utilization of the air-purification function of forests by expanding green areas within urban and industrial areas

Step 4

(3) Private Promotion and Business Partnership

Background

- Generally, there have been strong demands for land-use conversion from forest to other for "production use" since the initial phase of the economical development from local residents including indigenous people, local private sectors, local government, global private sector, central government and others in Mekong River Basin.
- It is virtually impossible to control all above stakeholders only by public sectors including foreign AID/Official Development Assistance (ODA).
- Therefore, it is expected to have more efficient cooperation and better conditions by working in cooperation/partnership with private sector.
- In addition, the importance of the activities of private sector in the region become much stronger because the sector can contribute to the sustainable development by generating job opportunities, enhancing the capacity of human resources and technology development.

Step 4

(3) Private Promotion and Business Partnership

Tasks

- Collecting the information regarding the interests/plans of developing business in the Mekong River Basin mainly from Japanese-affiliated company
- Findings any business related activities, mainly focused on Japanese company including NGOs, which could contribute to diminish deforestation.
- Review surrounding business environment and its issues and explore possible measures, policies, or any which promote the activities.

Step 4

(3) Private Promotion and Business Partnership

Study Method

- Target Area of the Business Activities：Area within Mekong River Basin in 5 countries initially.
- Due to no Japanese-affiliated companies has been conducting business in Mekong River Basin in Myanmar, those who have interest or have being operating in 4 countries are targeted for having interviews of this Study.
- Request letters with questionnaires for 55 organizations issued and sent.
- 41 responded and 38 were interviewed.
- Interviews had been conducted from December 2017 to July 2019.
- While conducting above, forest conditions also have been checked through interviews with public sectors, NGOs and conducting field reconnaissance.

Step 4

(3) Private Promotion and Business Partnership

Types of the Business Targeted

- Deforestation Driver related
- Non-Timber Forest Products : NTFPS related
- Enhancing Added-Value related
- Timber Value Chain related
- Alternative Energy related
- Disaster Prevention Technology related
- Eco-Tourism related
- CSR, SDGs related
- Others

Step 4

(3) Private Promotion and Business Partnership

Good Practices

- Kurata Pepper by branding and organic agriculture
- NGOs and Lemon Firm NGOs by creating local market, Lemon Firm market in city and connecting farmers and the market
- WWF-Cambodia Partnership with Global Retailer H&M for sustainable development goals (SDGs) by promoting the use of sustainable energy materials in the textile industry and supporting the resilience of ecosystem
- Eco-tourism is one of the method to deliver the money to the local people while there are certain difficulties.
- CSR activities started being connect with SDGs and it leads to more long-term and concrete actions. E.g. Suntory has been conducting
- Some part of the supply chain can be controlled through ESG investment using CDPs or other related reports by deciding investment/ divestment on the related enterprises.

Step 4

(3) Private Promotion and Business Partnership

Findings

- Building the supply chain between the markets where there is economical disparity have positive effects on the business as far as the supplier has developed own sales channel.
- Heightening Added Value by branding and organic agriculture have positive effects on the business and securing safety and security of the products.
- Limitation of production area promotes the competitiveness of the business. On the other hand, this gives the restrictive condition of applying the same business model to other places in Mekong River basing.
- For the local residents connecting with global market by producing cash crops could bring them to very unstable economical condition due to the fluctuation of commodity price as well as serious dependency on cash.
- Because most of above residents are small scale farmer and they do not have control of the price of their crops while the middle man(s) and global market control it. Thus, with very low price of their crops, the farmer tends to expands their land while the land of the rice which is principal diet for them becomes less and less. This is one of the deforestation drivers. Also, this conditions lead many farmer in Isan went bankrupt.
- In such case, building supply chain and value chain within the local scale works much better regarding livelihood improvement and local economy. Producing organic way heighten the value of their products by giving safety and security of the foods in local market.
- So far, advanced technology for disaster prevention, construction, heightening survival rate of nursery do not fit for the market due to their cost regarding the sustainability of the business.
- CSR activities considering SDGs became to be seen and this could lead to huge impact on global market as well as local market.
- Stakeholders can control the behavior of the enterprises by their decision of investment / divestment on them with the information of CDPs reports.
- REDD+, JCM and PES scheme work as good source of fund for management of the forestry sector while there has been very little fund spend on this sector.

Step 4

(3) Private Promotion and Business Partnership

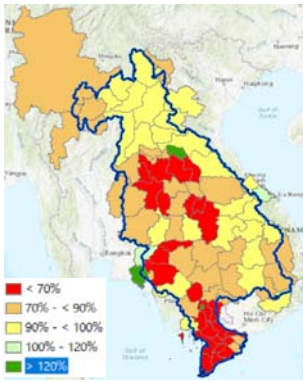
Issues

- Generally, local residents and the market are very vulnerable toward global market due to the lack of controls of price of the crops.
- Fluctuations of governmental policy as well as the disparities of enforcement of regulations between local and central government can jeopardize or hinder sustainability of particular business model and livelihood of the local resident.
- To secure the competitiveness or advantage for particular product or crops, applying same business model to other area can be limited.
- For small to medium size enterprise, due to its limited financial capacity as well as the size of the expected risks in Mekong region enterprises mostly hesitate to expand their business
- Without having own sales channel, business by small to medium size utilizing economic disparity between the market is difficult to be sustainable.
- To build sustainable supply chain, securing traceability in each part of the chain with certification system are indispensable. On the other hand, due to the complexity of the supply chain, securing traceability is very difficult.
- As one eco-tour group succeeded, copiers start. Often, the services of the latter cases do not satisfy the actual needs of the customer due to their lack of caring of local communities, cultures and natural. There must be advantages of local people by conducting tours.
- Generally, CSR activities by Japanese firms are often conducted as social contribution which is not directory connect to their business. Thus, there are not many activities conducted as sustainable manner. Now, the conditions has been changing incorporating with increased importance of ESG investment in the global market.
- It is virtually impossible to fully control market as well as peoples behaviors only by regulatory method because the behaviors are deeply originated from the economic demands or incentives while the regal system, financial and resource are not sufficient enough. Thus any contributions from private sector is badly needed.

Step 4

(3) Private Promotion and Business Partnership

Background of the Deforestation

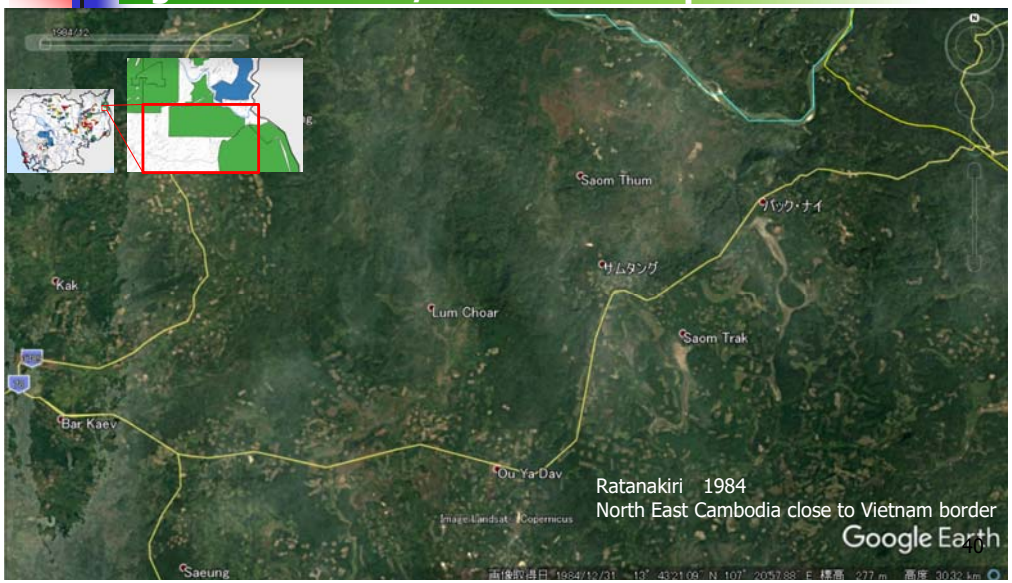


- Population of the agricultural sector is the largest in all countries while GDP of the sector remain relatively small. Generally, cultivation area per household and the production are not big.
- For rice production, cash can only be get only in harvested time, one or two, while growing rubber tree gives more chance to get money.
- There has/had been a strong motive for natural resource exporting for each country as in initial phase of economic development.
- In deforestation areas selected for the project in Vietnam and Cambodia, rubber is the dominant crop.
- Improper alteration of natural forests could jeopardize the abundance of natural resources, biodiversity, livelihood of local residents, food safety & security, and resilience against natural disasters.
- The alteration has been going on through out the Mekong River Region.
- Due to the climate change and less sand supply (most probably), rapid coastal erosion is going on at the river mouth of the Mekong River.

Step 4

(3) Private Promotion and Business Partnership

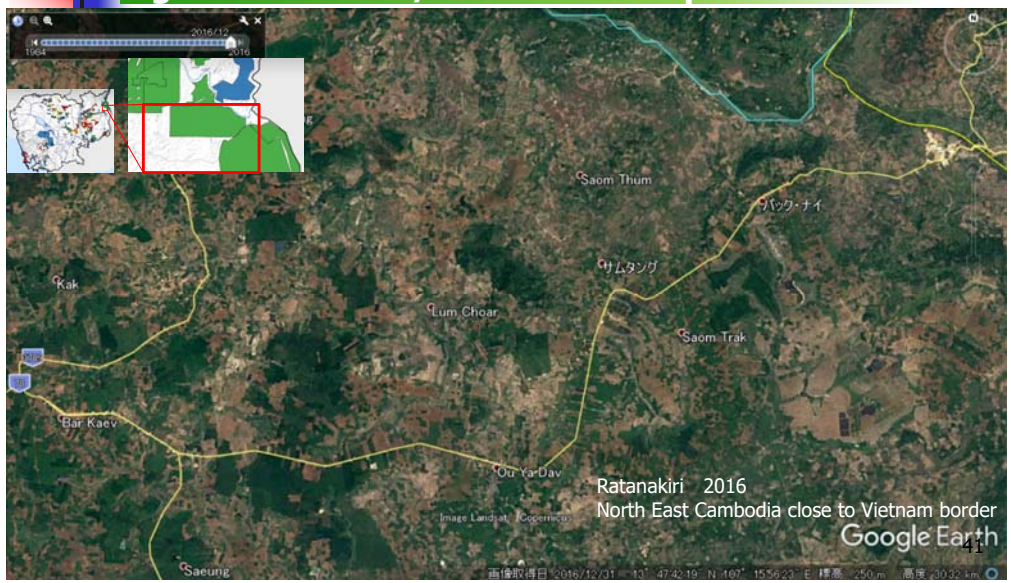
Deforestation due to Conversion of Forest to agricultural land/industrial tree plantation



Step 4

(3) Private Promotion and Business Partnership

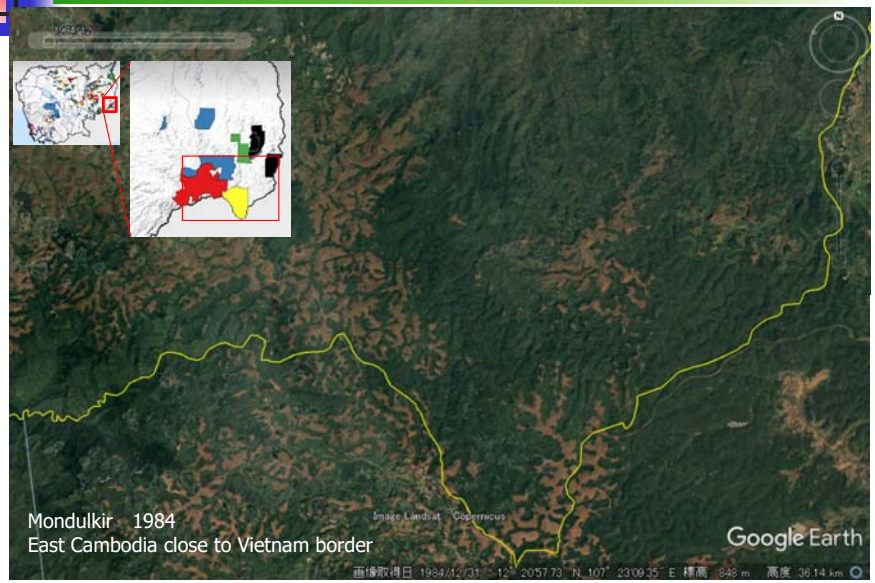
Deforestation due to Conversion of Forest to agricultural land/industrial tree plantation



Step 4

(3) Private Promotion and Business Partnership

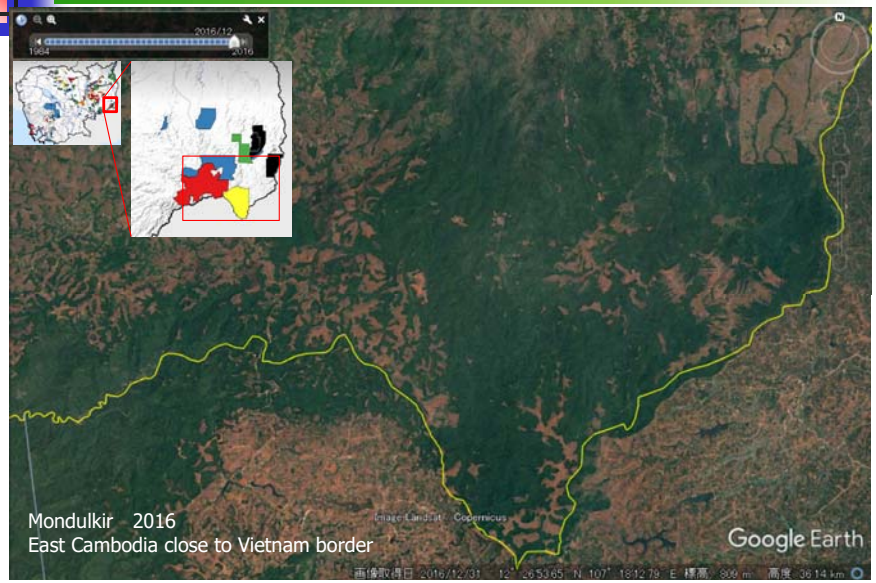
Wood extraction –before-



Step 4

(3) Private Promotion and Business Partnership

Wood extraction -after-



Step 4

(3) Private Promotion and Business Partnership

Costal Erosion

Step 4

(3) Private Promotion and Business Partnership

Constrains

- 1. There is little incentives for preserving forest but strong incentive for cultivating for local residents due to their financial conditions.
  (Illegal logging, land-use alternation to cash crops, degradation due to improper logging.)
- 2. Budget for Forest Sector is very small.
- 3. This leads to insufficient administrative force for protecting forest especially in remote area where rich forests exist.
  (Low for preserving the forests are basically prepared but the enforcement of the low is weak.)
- 4. Those residents are vulnerable to external economy, especially to economic fluctuations of it.
- 5. Generally, it is quite difficult to control the voraciousness of private sectors as a whole by current administrative bodies which has lots of difficulties.

Step 4

(3) Private Promotion and Business Partnership

Strategy Recommended

- 1. Adding Value or Heightening Added Value
  (technical assistance, training for production & quality management/control, organic farming, finding items)
- 2. Formulation and beneficial change of Supply Chain
  (formulation of local organic market, promote active utilization of certification system in the chain, promote ESG investment, formulation of value chain)
- 3. Enhancing or Raising the consciousness of the people regarding the importance and the value of the natural forest
  (environmental education, Movies, Media Mix or any)
- 4. Generating the fund for Forestry Sector
  (PES, REDD+, JCM or any)

Step 4

(3) Private Promotion and Business Partnership

Recommendation to MRC

- Monitoring more detailed hydrological/hydraulic condition including sediment and forest conditions in Mekong River Basins focusing more on climate change and biodiversity.
- Active delivering of possessed/analyzed information to public/private sector.
- Conducting Campaign for enhancing the consciousness of forest.

2. Points to be considered

- Further studies necessary for watershed management of LMB
- Further studies necessary for forest management of LMB
- Future cooperation between MRC and JICA (to be discusses in Japan study tour.

3. Others

- Schedule of Japan Study Tour from 5th to 9th on August
- Submission of Draft final Report to MRC & NMCs

Thank you for your attention and your kind cooperation.

Feel free to contact JST

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