フィリピン共和国
治水行政機能強化プロジェクト

終了時評価調査
報　告　書

平成 22 年 3 月

(2010 年)

独立行政法人　国際協力機構

地球環境部

環境
JR
11-047

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ミニッツ・評価報告書

略　語　表

BOC	建設局（公共事業道路省） Bureau of Construction (DPWH)
BOD	設計局（公共事業道路省） Bureau of Design (DPWH)
BOM	維持管理局（公共事業道路省） Bureau of Management (DPWH)
BORS	研究・基準局（公共事業道路省） Bureau of Research and Standards (DPWH)
C/P	カウンターパート Counterpart
DBM	予算管理省 Department of Budget and Management
DENR	環境天然資源省 Department of Environment and Natural Resources
DEO	現場事務所 District Engineering Office
DPWH	公共事業道路省 Department of Public Works and Highways
E.O.	大統領令 (Presidential) Executive Order
EMB	環境管理局 Environment Management Board
ENCA	（プロジェクト略称） Enhancement of Capabilities
F/S	フィージビリティスタディ Feasibility Study
FAO	国際連合食糧農業機関 Food and Agriculture Organization
FCSEC	治水・砂防技術センター Flood Control and Sabo Engineering Center
FFWSDO	ダム放流に関する洪水予警報システム Flood Forecasting and Warning System for Dam Operation
GIS	地理情報システム Geographic Information System
HEC-HMS	降雨流出解析モデル Hydrologic Engineering Center Hydrologic Modeling System
HEC-RAS	1 次元水理解析モデル Hydrologic Engineering Center River Analysis System
ICHARM	水災害・リスクマネジメント国際センター International Center for Water Hazard and Risk Management
JCC	合同調整委員会 Joint Coordinating Committee

JICA	国際協力機構 Japan International Cooperation Agency
LGU	地方自治体 Local Government Unit
M/M	協議議事録 Minutes of Meeting
MM	人月 Man-Month
MP	マスタープラン Master Plan
NDCC	国家災害調整委員会 National Disaster Coordinating Council
NEDA	国家経済開発庁 National Economic Development Authority
NWRB	国家水資源委員会 National Water Resources Board
ODA	政府開発援助 Official Development Assistance
OJT	オージェーティー On the Job Training
PAGASA	フィリピン気象庁 Philippine Atmospheric, Geophysical and Astronomical Services Administration
PDM	プロジェクト・デザイン・マトリックス Project Design Matrix
PHIVOLCS	フィリピン火山地震研究所 Philippine Institute of Volcanology and Seismology
PMO	プロジェクトマネジメントオフィス Project Management Office
PO	活動計画 Plan of Operation
PS	計画局（公共事業道路省） Planning Service (DPWH)
R/D	討議議事録 Record of Discussion
RO	地域事務所 Regional Office
TSG	技術指針 Technical Standards and Guidelines
TWG	テクニカルワーキンググループ Technical Working Group

評価調査結果要約表

１．案件の概要	
国名：フィリピン国	案件名：治水行政機能強化プロジェクト
分野：防災	援助形態：技術協力プロジェクト
所轄部署：地球環境部	協力金額（2010 年 3 月現在）：計：約 3.7 億円
協力期間：2005 年 7 月～2010 年 6 月	先方関係機関：公共事業道路省、治水砂防技術センター (英) Department of Public Works and Highways Flood Control and Sabo Engineering Center
	日本側協力機関名：国土交通省

1－1　協力の背景と概要

フィリピンは、その地理、気象、地質的条件により自然災害が多発しており、特に台風等による水害や土砂災害を受けやすい国である。しかしながら、総合的な洪水対策行政を所管する公共事業道路省には、治水・砂防事業を専管する統一された部局が存在しないために、治水分野においては質・量ともに不十分な状態が続いてきた。

このような背景のもと、フィリピン政府は、DPWH（公共事業道路省）に FCSEC（治水・砂防技術センター）を設立し、治水・砂防技術の能力強化を目的とした技術協力を日本政府に要請した。フィ国の協力要請に応じ、JICA は、DPWH ならびに DPWH の現場事務所に所属する技術者の能力強化を目的とした「治水・砂防技術力強化プロジェクト」を 2000 年 1 月から 3 年間にわたり実施した。2002 年 6 月に実施された終了時評価調査においては、ステージ 2 として 2 年間の延長期間を設けることが合意された。その後 2004 年 12 月に実施されたステージ 2 の終了時評価では、これまでの成果を踏まえた同国の治水･砂防行政機能の更なる強化と協力の継続の必要性が認識され、JICA は 2005 年 5 月に事前調査団を派遣した。両政府の協議の末、2005 年 6 月 2 日に「治水行政機能強化プロジェクト」の R/D 署名が行われ、2005 年 7 月から 2010 年 6 月にわたる 5 年間のプロジェクト実施に至った。

1－2　協力内容

2005 年 7 月から 5 年間にわたり、フィ国の技術者の研修、実験研究等の人材育成活動を担う治水砂防技術センター（FCSEC）や公共事業道路省（DPWH）の地方職員に対して、治水・砂防技術に係る計画から設計、施工監理、維持管理に関する技術基準やマニュアル等の整備を通して、治水・砂防技術の能力強化を図る。

(1) 上位目標　　：FCSEC で作成した技術基準、指針、マニュアルに沿って、より効果的かつ適切に設計された治水・砂防構造物／施設が DPWH によって実施される

(2) プロジェクト目標：DPWH の治水行政機能が、研究開発、研修、情報管理システム、パイロットプロジェクトの実施および内部支援システムの構築により強化される

(3) アウトプット：

アウトプット１
パイロットプロジェクトが、技術基準、指針、マニュアルを活用して実施される

アウトプット２
調査研究が、技術基準、指針、マニュアルの開発・改訂および治水・砂防の効果的な対策の評価のために実施される

アウトプット３
研修プログラムを通じて DPWH 職員の治水・砂防に関する知識と技術が向上する

アウトプット４
DPWH のより効果的な治水行政機能のために、情報管理システムが構築される

アウトプット５
治水・砂防技術分野に関する技術および組織の発展を確保するための内部支援メカニズムが構築される

1－3　投入（2010 年 2 月まで：総投入額　約 3.7 億円）

日本側：長期専門家派遣　6 名　　資機材供与　　約 10,557 千円
短期専門家派遣　12 名　　ローカルコスト負担　約 13,245 千円
研修員受入　　8 名

フィリピン側：カウンターパート配置　　延べ 27 名
土地施設提供　　執務室
ローカルコスト　　ローカルコスト負担　約 95,013 千円
パイロットプロジェクト　約 102,175 千円

２．終了時評価調査団の概要	
調査者	1. 中曽根愼良(団長)JICA 地球環境部　水資源･防災グループ　防災第一課長 2. 栗林大輔（河川技術）独立行政法人土木研究所水災害・リスクマネジメント国際センター　主任研究員

	3. 藤平大（砂防技術）国土交通省　国土交通省大臣官房　監察官 4. 小野済（評価計画）JICA 地球環境部　水資源・防災グループ　防災第一課　課員 5. 久保英之（評価分析）グローバルリンクマネージメント（株）社会開発部　研究員 6. Mr. Domingo C. Rosario, Engineer III, the Development Planning Division, Planning Service Department, DPWH 7. Ms. Madelyn B. Loyola, Engineer III, the Development Planning Division, Planning Service Department, DPWH	
調査期間	2010 年 2 月 9 日～2010 年 2 月 25 日	評価種類：終了時評価

３．評価結果の概要

3−1　実績の確認

アウトプット１：

二つのパイロットプロジェクトで治水に係る計画・設計・建設（護岸、水制）が完了し、現在は維持管理が行われている。一つ（砂防ダム）は建設中となっているが、プロジェクト終了時までに完成する予定で実施中となっており、成果指標の達成は概ね見込まれる。

パイロットプロジェクトの「計画」・「設計」は、日本人専門家の指導・助言を得ながら FCSEC 技術者が担い、「建設」は日本人専門家・FCSEC 技術者の指導・助言を得ながら、当該地域の現場事務所・建設業者が実施してきた。パイロットプロジェクトを統括する FCSEC 技術者によれば、パイロットプロジェクト実施に際して、JICA 治水・砂防技術力強化プロジェクト（2000 年～2005 年実施）において作成された 8 つの技術指針・マニュアルが活用された。

本プロジェクトの最大の特徴は、DPWH（FCSEC）の技術者が治水事業の全過程（すなわち、計画・設計・建設/施工・維持管理）に直接関与した点にある。治水分野におけるこれまでの援助事業では、援助機関が先進国のコンサルタントに計画・設計を依頼していたため、DPWH 技術者が治水事業の M/P・F/S 策定作業を担うことはなく、フィリピン人技術者は計画・設計に係る知見を蓄積してこなかった。本プロジェクトにおいて実施した Kinanliman 川の治水工事は、DPWH（FCSEC）技術者が直接 M/P・F/S 策定過程に関与した最初の機会であり、事業実施を通じて、本パイロットプロジェクトに従事した FCSEC 技術者は M/P・F/S 策定に係る知識と技術力を大幅に向上させた。

アウトプット２：

08 年 10 月に技術指針・マニュアル改訂作業のための技術作業部会が結成され、現在に至るまで、提案・改訂作業が行われており、また技術指針・マニュアルの使用・適用に係る技術報告書が 4 種類作成されている。さらに現場事務所・地方自治体からの要請に基づき、治水に係る実態調査などの技術協力が実施され、実地に見合った低価格の治水構造物の建設材料として、ソイルセメントが導入され、現場事務所への技術移転が行われている。このような状況に鑑み、成果指標はほぼ達成していると考えられる。

また、これまでに、治水構造物の効果や影響を評価するための水理実験が 6 回、低コスト治水構造物の適性を評価するための実験が 4 回、その他の治水に関わる評価実験が 6 回、水理実験棟を利用して実施された。この中には、パイロットプロジェクトで提案された治水構造物の評価実験も含まれており、その実験結果は、各パイロットプロジェクトの計画・設計・施工に反映されている。一連の実験を通じて、FCSEC 技術者は、実験に係る計画・設計・準備・データ収集の方法を習得し、日本人専門家の指導なしに実験を行える水準に到達している（但し、複雑な実験の場合には、日本人専門家の助言を必要とする場合もある）。

なお、フィリピン政府の行政機構において、FCSEC は治水技術を取り扱う唯一の機関であり、昨今、FCSEC の存在が広く認知され始めていることから、公共事業道路省の現場事務所や地方自治体からの治水対策事業に係る調査依頼が増加している。

アウトプット３：

これまでに、4 分野 22 コースの研修事業が実施され、のべ 558 名の現場事務所技術者が参加し、それぞれのコースで成果指標数以上の事務所が受講している。加えて、プロジェクト終了時までに 2 コースが実施される予定である。研修は、当初、日本人専門家がコース内容を企画したが、2 回目以降は FCSEC 技術者が企画実施を担っている。講師陣には、FCSEC 技術者・日本人専門家に加え、パイロットプロジェクトの施工管理を担った現場事務所の技術者も加わっている。また 22 コースのうち、6 コースについては、公共事業道路省の評価担当が研修実施 1 年後に事後評価を行っている。評価は、研修参加者およびその上司に対して、質問票を用いて行われた。評価対象コースの全参加者は 140 人で、このうち、質問票への回答をした参加者は 103 名（74%）であった。このうち現在も治水関連事業に従事していると回答した研修参加者は 80%、研修参加により実務能力が向上したと回答した研修参加者の上司は 85%であり、多くの研修参加者が研修成果を実務に活かしているものと考えられる。

アウトプット４：

治水構造物に関する全国規模のデータ収集を目的として、FCSEC は地域毎の行政地図を全国 138 ヵ所の現場事務所に配布し、担当区域内にある治水構造物の位置と種類等に関する情報を 2006 年末までに収集した。さらに 2009

年には、情報更新のため 180 以上の現場事務所に対して質問票を送付し、62%の事務所から回答を得ている。これらのデータは、エクセルファイル形式で電子保管されており、図面および写真についてはハードコピーが保管されており、データの更新は 2～3 年毎に行われる予定である。

FCSEC にある図書室は、以前、資料整理が行われていなかったが、現在では、全資料が項目ごとに整理されており、また、電子情報化が行われ、検索システムが構築されている。

また、PDM 1 に沿った治水技術に関する情報共有・提供として、水理実験結果に関するセミナー開催（2 回）、他機関が開催するワークショップへの参加、ニュースレターの発行（4 回）、プロジェクト報告書の国家経済開発庁（NEDA）提出、National Flood Management Framework Plan 策定と国家災害調整委員会（NDCC）閣僚会合での発表、FCSEC 技術者の日本の機関である水災害・リスクマネジメント国際センター（ICHARM）派遣、などの活動が実施された。

以上のことから情報管理システムの構築の成果目標は達成していると考えられる。

アウトプット５：

治水行政における FCSEC の発展を確保するため､合同調整委員会およびテクニカルワーキンググループ（TWG）などの内部メカニズムが作られた。合同調整委員会は、プロジェクト全体のモニタリングを目的とし、これまでに会合が 6 回開催されている。一方、TWG は、パイロットプロジェクトの実施に係る諸問題について議論することを目的とし、これまでに会合が 8 回開催されている。また DPWH は、2008 年から全国 12 河川流域の M/P・F/S 策定作業への取り組みを開始した。現在、この作業は治水分野における DPWH の主要調査事業となっている。2010 年 2 月 1 日、DPWH は通達によって当該 M/P・F/S 策定作業に係る運営委員会・技術諮問部会を設置した。運営委員会の委員長は計画局次官補、副委員長は FCSEC 所長である。一方、技術諮問部会の部会長は FCSEC の部長、さらに技術者 1 名がメンバーとして参画している。このことから、フィリピン政府の治水行政を担当している上位機関である DPWH の中で FCSEC が重要なポジションを担う政策決定が成されていると言える。

一方で、FCSEC は、DPWH の組織体制の中で Project Management Office という位置づけであり、基本的には、恒久化された組織ではないという前提である。この状況を改善するため、FCSEC・プロジェクト・日本大使館は、合同調整委員会において､DPWH 合理化プロセス において FCSEC の恒久化を確立するよう常に意見を表明してきたが、2010 年 2 月時点において、実現されていないため、引き続き恒久化にかかる必要性や重要性について申し入れることが必要となる。

プロジェクト目標：

本プロジェクトでは、パイロットプロジェクトの実施を通じて M/P および F/S 策定を 3 河川で実施し、FCSEC の担当技術者は、計画策定から治水構造物の設計・施工・維持管理までの全工程を担ってきたため、小規模河川規模の治水対策であれば、自らの判断で一連の作業を主導していける段階にまで技量が向上している。特に、パイロットプロジェクト（アウトプット１）および調査研究（アウトプット２）を担当した技術者の技量はプロジェクト実施を通じて飛躍的に向上している。また、2002 年に竣工した水理実験棟における実験研究では、特定の FCSEC 技術者が日本人技術者からの指導を一貫して受け続けてきたことにより、通常の水理実験であれば FCSEC 技術者が独自で実験の計画、設計、建設、実施、データ収集・分析を行える段階にまで到達している。

また FCSEC が策定した技術指針・マニュアルの使用状況を確認するため、現場事務所に対して質問票を送付した。調査期間の制約から、調査団の訪問時点における回答数は 10 であり、回答数が少ないため全国の平均的実態を表しているとは言い難いが、10 の回答のうち、8 の現場事務所が一つ以上の技術指針・マニュアルを参照しているとの回答があった。また三つのパイロットプロジェクトの現場事務所では、本マニュアルを活用してそれぞれの治水構造物建設が実施されており、FCSEC が策定した技術指針・マニュアルが適切な治水構造物建設のために現場事務所で活用されている実情はあるものと推察される。

このようなことから、フィリピン政府（DPWH）の治水行政において技術的蓄積を担う唯一の組織である FCSEC の技術水準は、治水行政の政策決定に影響を及ぼす主要因の一つになるまで到達しており、この調査結果を勘案するとプロジェクト目標は達成されていると判断できる。

上位目標：

Kinanliman 川のパイロットプロジェクトを担当したケソン第一現場事務所では、パイロットプロジェクト終了後、技術指針・マニュアルに沿った治水構造物の建設を独自に行っている。当該現場事務所がパイロットプロジェクト以前に建設した堰堤は、計画・設計を行わず、他河川の堰堤設計図を使用していたことを考えると、パイロットプロジェクト実施の結果、ケソン第一現場事務所の技術者は、技術指針・マニュアルを使いこなす技量を着実に高めたと言える。また質問票調査の結果によれば、FCSEC が策定した技術指針・マニュアルに沿った治水構造物建設の事例が存在することが確認されたが、技術指針・マニュアルの初版が 2005 年までに配布されていることを考えると、現在の状況は十分に普及したとは言えない状況である。しかし、FCSEC の技術力が飛躍的に高まり始めたのはパイロットプロジェクトを開始した 3 年前からであり、今後、FCSEC の知名度向上と並行して、FCSEC 策定の技術指針・マニュアルを活用した治水構造物の建設数は徐々に増加していくものと考えられる。

また FCSEC は、National Flood Management Framework Plan を策定し、2006 年 2 月 28 日の国家災害調整委員会（NDCC）閣僚会合で発表した。但し、本計画は正式な承認を得るには至っていない。

一方で FCSEC は、National Flood Management Framework Plan を策定し、2006 年 2 月 28 日の NDCC 閣僚会合で発表したが、本計画は正式な承認を得るには至っていない。現在、FCSEC は Project Management Office という位置づけということもあり、FCSEC が継続して治水分野に係る政策提言を行うためにも、まず組織の恒久化が必要であると考えられる。

3－2　評価結果の要約

(1)　妥当性

本プロジェクトの妥当性は極めて高いと判断した。その根拠は以下の通りである。(a)フィリピンは洪水・斜面崩壊・土砂流出などの災害が極めて多い国であり、これらの損失を抑えるためには、治水行政が適切に機能することが極めて重要である。(b)プロジェクト目標・上位目標は、フィリピン政府の国家政策である中期公共投資プログラム（2005-2010 年）、および、DPWH 戦略計画（2004-2010 年）に合致している。(c)適切な治水行政を遂行するためには、治水計画・設計・施工・維持管理のすべてにおいて知見を持つ人材が必要であり、総合的な知見を持つ治水技術者を育成する本プロジェクトの意義は極めて高い。(d)本プロジェクトでは、諸活動を FCSEC 技術者がイニシアチブを取って実施するというアプローチを採用したが、これはプロジェクト目標を達成する上で妥当なアプローチであると考えられる。(e)プロジェクト目標・上位目標は、2008 年に策定された日本政府の対フィリピン援助政策に合致している。

(2)　有効性

本プロジェクトは、5 つのアウトプット達成によりプロジェクト目標が達成されていることから、有効性は高いと判断した。まず、本プロジェクトの目標は DPWH における治水行政機能強化であるが、既述の通り、FCSEC 技術者の能力向上は顕著であり、その意味において、DPWH の治水行政機能は着実に強化されていると結論づけられる。また、5 つのアウトプットの中でも、特にアウトプット１の地方のサイトであるパイロットプロジェクトの実施、アウトプット２の水理実験、技術指針・マニュアル改訂作業による技術のスタンダード化、現場事務所・地方自治体への技術援助、およびアウトプット３の地方職員向けの研修が、地方職員を含めた DPWH の包括的な治水行政能力強化を目指すプロジェクト目標の達成に大きく貢献した。またアウトプット４及び 5 を通して、一部成果目標を達成していない部分もあるが、その活動過程において内部支援システムが構築され、プロジェクト目標の達成に貢献した。

(3)　効率性

本プロジェクトは、投入において一部課題があったものの、アウトプットは概ね満足できる水準であることから、効率性は高いと判断した。まず、日本側の投入に関わる点としては、アプトプット１のパイロットプロジェクト実施に際して、FCSEC 技術者に対する技術移転のため、日本人専門家が FCSEC 技術者に助言・指導を行い、FCSEC 技術者が現場事務所の技術者を指導するという方法を取った。この方法は、FCSEC 技術者が、学ぶと共に指導するという二つの役割を同時に担うことにより、知識の習得および技量の向上を効率的に進めることに繋がったと考えられる。

フィリピン側投入に関わる点としては、C/P の不足および予算執行の遅れという投入の問題があったが、配置された C/P 及び日本人専門家の関係が良好であり、上記の通り効率的にプロジェクトが実施できたため、本プロジェクトのアウトプット１～４は十分に達成され、アウトプット５についても一定の成果が確認されている。一方で、Project Management Office であるため、C/P 技術者の待遇も所長・部長を除いて契約ベースであり、現在の技術者ポストがプロジェクト終了後も継続して維持されるという保証もないため、FCSEC 技術者がプロジェクトで得た成果を継続するためにも早急な改善が必要となっている。

(4)　インパクト

本プロジェクトによる正の波及効果は多分野にわたり、一方で、負の波及効果は生じていないことから、インパクトは大きいと判断した。まず、パイロットプロジェクトを実施したケソン第一現場事務所では、習得した技術を用いて独自に治水構造物の建設を行っており、他の現場事務所においても、少なくとも 4 ヵ所において技術指針・マニュアルを参照して治水事業が実施されている。次にプロジェクト期間中において、DPWH が行う全国 12 河川流域の M/P・F/S 策定作業において FCSEC が中心的な役割を担うことが決定された。これは、FCSEC が治水行政の中核的組織として主要な役割を担うことを上位機関である DPWH によって決定されたものと言える。また、Kinanliman 川のパイロットプロジェクトでは、現場において三つの波及効果が観察された。一点目は、現場事務所の技術者が、治水計画・設計・施工・維持管理という一連の作業に関する知識を習得し、技量を高めたこと。二点目は、2009 年 9 月 26 日の大規模台風の際にも洪水が発生せず、近隣住民は避難さえする必要がなかったこと。三点目は、市役所の技術担当者も FCSEC による技術的支援を高く評価し、維持管理における協力を検討していることである。さらに、Santa Fe 川のパイロットプロジェクトでは、ソイルセメントという低コストかつ環境への負荷

が低い材料が使用され、現場事務所技術者の高い評価を得た。

(5) 自立発展性

本プロジェクトでは、前提条件である「FCSEC の恒久化」が終了時評価の時点においても満たされていないことから、本プロジェクトを通じて得られた成果の自立発展性について、現時点（2010 年 2 月）での判断は困難である。FCSEC の恒久化が実現した場合、技術者の立場は契約職員から正規職員となり、かつ中長期にわたる戦略的な技術者育成が可能となるため、自立発展性は高まる。一方、恒久化が実現しない場合、プロジェクト終了後も、恐らく 2～3 年は 12 河川の M/P および F/S 作業のために FCSEC 組織は存在し続けられると推測されるが、その後については不明である。場合によっては、FCSEC は解散し、これまでに蓄積された知見・技能が離散してしまう可能性もある。このような事態が想定されるとしたら、自立発展性は極めて低いと言わざるを得ない。また、たとえ FCSEC 組織の恒久化が実現したとしても、DPWH 合理化の過程で技術者のポストが減ることは必須である。この際、熟練技術者が FCSEC の正規職員として残ることが肝要である。FCSEC の組織恒久化が実現しても、高い技量を持つ熟練技術者がポストを得られない場合には、これまでに得られた成果は流出することとなり、高い自立発展性は持ち得ない。また、本プロジェクトで外部条件である「維持・運営費の適時負担」がプロジェクト期間中において適時に状況改善が行われなかった点についても、自立発展性を阻害する要因となり、プロジェクト終了後に改善が望まれる。

3－3 効果発現に貢献した要因

(1) 計画内容に関すること

特になし

(2) 実施プロセスに関すること

フィリピン人技術者・日本人専門家の間でコミュニケーションギャップが生じることはなく、プロジェクトの運営・モニタリングは極めて適切に行われてきた。具体的には、日常的に行われるインフォーマルなコミュニケーション、毎月開かれるフォーマルな会議、パイロットプロジェクトや水理実験などの現場作業を通じた実務的コミュニケーションにより、意思疎通が円滑となり、相互信頼関係が醸成されてきた 。

3－4 問題点及び問題を惹起した要員

(1) 計画内容に関すること

特になし

(2) 実施プロセスに関すること

プロジェクト活動は、当初計画よりも遅延が見られる。主な遅延の理由は、C/P の不足、およびパイロットプロジェクトに関する予算執行の遅れである。例えば Santa Fe 川の砂防ダム施工については、2009 年 10 月に予算の一部執行を認める予算執行令が公布されたばかりであり、現在人員を集中させて施工中となっている。

3－5 結論

終了時評価実施時点において、アウトプットおよびプロジェクト目標の達成度は自立発展性の側面を除き十分な水準に達している。特筆すべきは、前プロジェクトから継続した支援により、FCSEC 技術者の知識・技量が大幅に向上、定着したのみならず、パイロットプロジェクトを通じて計画・設計・施工・維持管理の全過程を理解し、なおかつ地方の技術者に対して技術的指導が可能な人材が誕生したという点である。彼らの存在は、フィリピンにおける治水行政において真に貴重な財産であると言えよう。FCSEC の恒久化が実現されれば、自立発展性の問題も解決され、上位目標の達成も十分に見込まれる。

3－6 提言

評価結果を踏まえ、本終了時評価団はプロジェクト関係者に対して以下の提言を行った。

- 政策的側面：FCSEC の持つ知見・技術を、プロジェクト終了後も永続的に治水行政の中で活かすため、DPWH および政府関係機関は FCSEC の組織恒久化を実現する。
- 組織的側面：技術者の能力向上を実現するため（下記参照）、DPWH は適切な数の技術者ポストを FCSEC に割り当て、事業予算を確保する。さらに、これらの技術を組織内で保持するため、熟練技術者および中堅・若手が共に事業に携わり、技術が着実に次世代へと受け継がれていくシステムを構築する。
- Master Plan および Feasibility Study：FCSEC 水理実験棟の有効活用のため、DPWH は、全国 12 河川の M/P・F/S 策定過程において、水理実験による治水構造物試験の実施予算を計上する。
- 技術的側面：治水計画から設計・施工・維持管理までの全工程についての知見・技術を持つ技術者を育成するため、FCSEC および DPWH は、各技術者が河川事業において計画から維持管理までを担当できるような人事システムを構築する。また、この過程において、技術者はコンサルタントに業務を一任するのではなく、自ら

現場に足を運んで調査に参画し、図面を描き、施工・維持管理の陣頭指揮を執る機会を設ける。

- 日本人専門家による技術支援：全国 12 河川の M/P・F/S 策定作業において、FCSEC は全般的な作業監理をする立場にあるが、当該 12 河川の流域規模は本プロジェクトが対象としたパイロットプロジェクトの河川規模よりも大きいため、場合によっては、FCSEC 技術者の知見・技術では対応できないケースが発生する可能性もあり得る。このような事態に備え、JICA は、必要に応じて日本人専門家による FCSEC 技術者への助言が行えるよう調整しておく。また、このような役割を担う日本人専門家は、治水に関する総合的な技術的知見を保持すると同時に、FCSEC 技術者との間に信頼関係を築くコミュニケーション能力を持つ人材とする。

3－7　教訓

本プロジェクトの経験を通じ、類似の他案件にも適用し得ると考えられる教訓は以下のとおりである。

- 治水対策のような自然物である河川を対象とした技術には、個々の河川の特性や構造物に関わる河川の現象を把握し、個々の河川に応じた柔軟な対応・技術力が求められる。そのためには、計画・設計・施工・維持管理という一連の流れに関する系統的な知識を身につけ、これらの知識に基づいた実践経験を培うことが重要となる。特に FCSEC のように国の治水行政において技術の指導的立場にある組織には、治水計画・設計・施工・維持管理のすべてにおいて知見を持つ人材が必要であり、このような総合的な知見を持つ治水技術者を育成するためにも、プロジェクトを通して一連の作業において実践的経験を培うことが重要となる。

Summary of Terminal Evaluation

1. Outline of the Project	
Country : The Republic of the Philippines	**Project title** : Project for Strengthening the Flood Management Function of DPWH
Issue/Sector : Disaster Management	**Cooperation Scheme** : Technical Cooperation Project
Division in Charge : Global Environment Department	**Total cost**（As of May. 2010） Total: about 375Million JPY
Period of Cooperation : Jul. 2005 -Jun. 2010	**Partner Country's Implementing Organization** : Department of Public Works and Highways (DPWH) Flood Control and Sabo Engineering Center (FCSEC)
	Supporting Organization in Japan：Ministry of Economy, Trade and Industry (METI)
	Related Cooperation :

1-1 Background of the Project

The Government of the Philippines requested the Government of Japan to undertake a technical cooperation project in order to develop the capacities of flood control and sabo engineers by means of establishing the Flood Control and Sabo Engineering Center (FCSEC) within Department of Public Works and Highways (DPWH). In response to the request, Japan International Cooperation Agency (JICA) launched the project for Enhancement of Capabilities (ENCA) in flood control and sabo engineering of DPWH with its aim to enhance the capacities of the engineers of DPWH regional offices. The ENCA project operated for the period of three years from January 10, 2000 to January 9, 2003, and following the recommendations made by the terminal evaluation in July 2002, DPWH and JICA agreed to extend the project as ENCA Stage Two until June 30, 2005.

Based on the recommendation made by the terminal evaluation for ENCA Stage Two, JICA dispatched the Preparatory Study Team to the Philippines in May 2005. As a result of the Preparatory Study, the project for Strengthening the Flood Management Function of DPWH (hereinafter referred to as "the project") was proposed and the Record of Discussions (R/D) was signed on June 2, 2005. The project was launched on July 1, 2005, and will be completed on 30 June 2010.

1-2 Project Overview

(1) Overall Goal: More effective and appropriately designed flood control and sabo structures/facilities are implemented by DPWH in accordance with the technical standards, guidelines and manuals.

(2) Project Purpose: The flood management function of DPWH is strengthened through research and development, training, information management, implementation of pilot projects and creation of the internal support mechanism.

(3) Output :

Output 1
Pilot projects are implemented using the technical standards, guidelines and manuals.

Output 2
Research is conducted for developing/updating technical standards, guidelines and manuals; and assessing efficient countermeasures for flood control and sabo.

Output 3
Improve knowledge and skills of DPWH engineers on flood control and sabo through training programs.

Output 4
Information Management System is established for a more effective flood management function of DPWH.

Output 5
The internal support mechanism is created to sustain the development of technology and organization in the field of flood control and sabo engineering.

1-3 Inputs (As of Feb. 2010)

＜Japanese side＞

Long-term expert	6	Provision of equipment	App. JY10,557 thousand
Short-term expert	12	Operational cost	App. JY13,245 thousand
Acceptance of trainees in Japan	8		

＜Philippines side＞

Counterparts	27 (including those who were replaced during the project)	
Provision of facilities	Administrative and dormitory buildings	
Operational cost	For local operation	App. JY 95,013
	For pilot project	App. JY 102,175

2. Evaluation Team	
Members of Evaluation Team	1. Mr. Shiro Nakasone (Leader) Director, Disaster Management Division1, Water Resource and Disaster Management Group, Global Environment Department, JICA 2. Mr. Daisuke Kuribayashi (Technical Advisor for Flood Control) Senior Researcher, Public Works Research Institute, International Centre for Water Hazard and Risk Management

	3. Mr. Masaru Tohei (Technical Advisor for Sabo) Inspector, Minister's Secretariat, Ministry of land ,Infrastructure, Transport and Tourism 4. Mr. Wataru Ono (Evaluation Planning) Deputy Assistant Director, Disaster Management Division1, Water Resource and Disaster Management Group, Global Environment Department, JICA 5. Mr. Hideyuki Kubo (Evaluation Analysis) Global Link Management Co., Ltd. 6. Mr. Domingo C. Rosario, Engineer III, the Development Planning Division, Planning Service Department, DPWH 7. Ms. Madelyn B. Loyola, Engineer III, the Development Planning Division, Planning Service Department, DPWH	
Period of Evaluation	9 Feb. 2010 – 25 Feb. 2010	**Type of Evaluation:** Terminal evaluation

3. Results of Evaluation

3-1 Summary of Project Accomplishment

Output 1:

Three pilot projects have been implemented for the purpose of capacity building of engineers at FCSEC and DEO by applying TSG/Manual. Two of pilot projects have been already completed, and the other is under construction (It will be completed by the end of this project) In the course of the project implementation, FCSEC engineers have been fully involved in a series of professional work such as; planning (M/P and F/S), designing and construction supervision. According to the engineers involved, eight TSG/Manual were frequently referred to during the implementation of the pilot project.

It should be noted that the case of Kinanliman river is the very first experience of DPWH/FCSEC to develop M/P and F/S for flood control through the direct involvement of their engineers (the Santa Fe case is the first hands-on experience for sabo dam construction). With the technical guidance provided by Japanese experts, the engineers involved in the work have largely improved their understanding and skills on the M/P and F/S development and acquired knowledge and skills on a new type of countermeasures.

Output 2:

Since October 2008, the revision process of the TSG/Manuals that were produced during the first phase JICA project (i.e. ENCA) has been undertaken. Weekly technical meetings have been organized in which staff from FCSEC, BOD, BOC, PS, BORS and BOM participate. In the meetings, participants examine sentence by sentence in each of TSG/Manual and revise them so as to make them more comprehensive in content and user friendly in expression. Then four kind of technical report regarding TSG/Manual have been made by FCSEC so far. Moreover, based on request from district office, Soil Cement Method has been introduced as economical method and implemented technical transfer to district officers.

A range of research experiments have been conducted at the Hydraulic Laboratory in order to assess the appropriateness of countermeasures for flood control and to experiment proposed low-cost structures. In total, 16 experiments were conducted during the project period in which 6 were for the former purpose and 4 were for the latter including the assessment of soil cement techniques. The results of the experiments for the assessment of proposed countermeasures at three pilot sites were reflected to the actual operations of the pilot projects. It should be noted that planning, designing, development and data collection of the research experiments can now be managed by FCSEC engineers unless experiments are too complicated.

Output 3:

So far 22 training courses have been organized for four major topic areas and the number of total participants is 558. The result of the ex-post evaluation that was conducted by DPWH one year after the training implementation for 6 training courses includes (the total number of training participants is 140 for the 6 courses and interviewees of the ex-post evaluation were 103; i.e. 74% of the total participants): (a) 36% of participants say they apply knowledge in their current work much/very much which they learned during the course and 59% say they apply skills; and (b) 85% of participants' supervisors say the training has improved overall performance of the trainees by a large extent.

Output 4:

For gathering data on flood control inventory throughout the country, the project/FCSEC distributed a jurisdiction map to 138 DEOs nationwide in 2006 and requested them to provide with location and concerned data of existing flood control structures within their coverage area. The response rate was 100% for the first inventory. The second round of data collection (i.e. data updating) was conducted in 2009. The rate was 62% for the second time. These data are incorporated into the electric file in the excel format and drawings and photographs are stored as a hard copy. It is expected that data updating operation will be conducted every 2-3 years.

The library at the FCSEC building was upgraded. Books and materials concerning flood control have been stored pertinently, the list of these books and materials was elaborated and a computer retrieving system was developed.

Output 5:

Internal mechanisms of supporting and elaborating effective functioning of FCSEC for flood control with the support of concerned branches of DPWH have been created through the establishment of JCC and TWG. JCC has been convened for 6 times as of February 2010. Overall monitoring of the project activities and their progress is the main topic of discussion. TWG has been organized for 8 times and addressed issues on pilot project implementation.

DPWH launched the preparation process of M/P and F/S for 12 river basins nationwide and created a steering committee and technical working group for the conduct of M/P and F/S. In the steering committee, Head of FCSEC serves as vice-chairperson. In the technical working group, project manager of FCSEC serves as chairperson and one engineer is a

group member.

The status of FCSEC is "Project Management Office", which implies that the Office might be closed upon the project termination. FCSEC/JICA/Embassy of Japan have repeatedly expressed the requirement of the FCSEC permanency at JCC meetings in order to utilize quality knowledge and skills of FCSEC for addressing flood control issues of the country. However, the permanency has not been realized yet.

Project Purpose:

The interviews to the C/P by the evaluation team revealed that some C/P who have been involved in the pilot project and research teams have substantially enhanced their professional capacity through the project implementation. The former acquired knowledge and skills in formulating M/P and F/S on flood control on which he could not address before the project started, and the latter can now manage the planning, designing and execution of research experimentation at the hydraulic laboratory even without external technical advice. When the laboratory was constructed in 2002, he could not manage the work at all. Aside from these C/P, the Japanese experts confirmed that most of C/P gradually improved their knowledge and skills related to flood control in various fields such as planning, designing, construction supervision, research and information management.

A survey result regarding the use of TSG/Manual by DEO indicates that there are at least several cases in which DEO refers to TSG/Manual for planning, designing and construction of flood control structures.

Overall Goal:

The Quezon 1st DEO, that was in charge of the pilot project implementation at the Kinanliman, has extended flood control work at the Kinanliman river with their own initiative beyond the pilot project. DEO engineers, who used to construct flood control structures without planning and due designing, are now applying new knowledge and skills which they have learned through the pilot project and able to construct more effective and appropriately designed flood control structures in accordance with TSG/Manual.

FCSEC presented the outline and concept of National Flood Management Framework Plan at the NDCC cabinet meeting on Feb.28, 2006, which is the highest coordination body for disaster preparedness, disaster operations and rehabilitation from disaster. However, the Plan has not yet been taken into considerations officially.

On the other hand, FCSEC is still tentative Project Office. It is necessary that FCSEC becomes permanent organization so that the role of FCSEC will be functioned appropriately in Government of Philippines.

3-2 Evaluation Results

(1) Relevance

Relevance of the project is very high based on the following reasons. First, floods, slope failure and debris flow have caused loss of more than 700 lives and 8 billion pesos annually in the Philippines so that flood control activities are critically important to address the issue. Second, flood control is relevant in the context of national policies in the Philippines including the Medium-Term Public Investment Program (2005-2010) and the Strategic Plan of DPWH (2004-2010). Third, the identification of project target group is highly appropriate. Principal target group of the project is DPWH staff at the level of RO/DEO as well as FCSEC engineers. Since the project purpose is to strengthen technical and administrative capacity of DPWH, it is appropriate that their staff at field level are the main target group. Fourth, an approach adopted in the project is highly pertinent for the achievement of project purpose. The project was designed in such a way that Japanese experts build up the technical capacity of FCSEC engineers with hands-on experiences and FCSEC engineers then enhance knowledge and skills of local DPWH staff at the RO/DEO level. This approach is pertinent in relation to the project purpose as it leads to strengthening the capacity of DPWH staff. Fifth, the project is highly relevant to aid policy of the Japanese government. The country assistant program for the Philippines stipulates environmental protection and disaster prevention as one of four priority areas of cooperation.

(2) Effectiveness

Effectiveness of the project is high based on the following reasons. First, the project purpose is achieved at the certain level in a sense that (1) knowledge and skills of FCSEC engineers have been enhanced to a large extent in terms of planning (i.e. MS and F/S), designing and construction supervision of flood control projects (relatively small-scale); research; training; and information management compared with their capacity five years ago; and (2) eight out of ten RO/DEO which responded to a questionnaire already utilize TSG/Manual that were produced by FCSEC/ENCA. Second, the causal relationship of five outputs and project purpose is strong and they contributed toward the achievement of project purpose. Among others, one of the most important aspects in the project implementation is the direct involvement of FCSEC engineers in the entire process of planning, designing and construction supervision (and maintenance that will be followed in coming months) .This has successfully enabled to strengthen the capacity of FCSEC.

(3) Efficiency

Efficiency of the project is high based on the following reasons. First, four outputs are produced at the satisfactory level and one (output 5) at the moderate level at the time of the terminal evaluation. Second, in producing output 1, the strategy of the pilot project implementation is very appropriate. Japanese experts (both long-term and short-term) provided technical and management guidance and suggestions to FCSEC engineers and the engineers then provided the same to DEO engineers and contractors in the field. This strategy has efficiently functioned for FCSEC engineers to digest technical knowledge and enhance their skills. Third, shortage of C/P and slow disbursement of local budget negatively affected the effective implementation of project activities and the achievement of outputs. In addition, the PMO status of FCSEC also negatively

affected the project implementation because the employment of FCSEC engineers is on the temporal basis so that they need to worry about a new employment opportunity toward the end of the project. It is likely that the technical capacity of FCSEC engineers could have been further strengthened if these obstacles were removed. Despite these difficulties regarding the provision of inputs (from the Philippines side), activities have been conducted and outputs are being produced. This is largely thanks to strenuous efforts by FCSEC engineers and Japanese experts. It should be noted, however, that the shortage of inputs cannot be justified even though activities are conducted and outputs are produced.

(4) Impact

Impact of the project is high based on the following reasons. First, during the survey by the evaluation team, no negative effects are identified or reported that are brought about by the project. Second, the following positive effects are identified: (A) some RO/DEO are reportedly using TSG/Manuals produced by FCSEC/ENCA for designing and constructing flood control structures within their jurisdiction area; (B) FCSEC plays a crucial role in developing M/P and F/S for 12 river basin throughout the country, which is the major study of DPWH at the moment; and (C) the following positive effects are observed at respective pilot project sites: a) In the Kinanliman river pilot project, engineers at the DEO have acquired new knowledge and skills regarding flood control through the 1st and 2nd phases of the Kinanliman flood control project (which are the pilot project supported by the JICA project). They have then applied such knowledge and skills at the 3rd phase of the Kinanliman flood control project (which is the DEO's own work beyond the JICA project). In addition, residents nearby the site highly appreciate the construction of the flood control structure as has removed the risk of flood at the site. This was already demonstrated on September 26, 2009 when large typhoon hit the area. Residents were no longer required to evacuate but could just stay at home. B) In the Santa Fe pilot project, engineers at the DEO have learned cost-effective and low-emission soil cement techniques and they now plan to use the technique for the construction of flood control structures. An idea of applying the soil cement technique at other DEOs is also emerging.

(5) Sustainability

Sustainability of the project is ambiguous at the time of the terminal evaluation because the organizational support to FCSEC by the government is not clear as of mid-February 2010. If the rationalization plan is endorsed by the government and FCSEC holds permanent status, human resource and finance are secured even after the termination of the project. Hence, FCSEC could function toward overall goal and sustainability can be considered as high. If the FCSEC permanency is not realized, provision of human resource and finance would continue over the next couple of years thanks to the study on 12 river basin but the shortage of staff and slow disbursement of budget would prevail as the case of now. Furthermore, the role of the FCSEC and its expertise will not be sustained after the termination of the M/P and F/S development unless the permanency is realized. There is a serious risk that the enhanced capacity of FCSEC might fade away if the engineers are moved to other positions inside or outside DPWH upon the termination of M/P and F/S development process. Sustainability is considered as low in such a case.

3-3 The factors that promoted the realization of effects

(1) Factors that concerning to Planning

None

(2) Factors that concerning to the Implementation Process

Project management and monitoring have functioned appropriately. Communication among Japanese experts and C/P has been smooth and status and progress of project activities are effectively shared through formal monthly meetings as well as informal discussions. All the Japanese experts and C/P mention that project decision making process has been satisfactory within FCSEC/the project. FCSEC compiled a project progress report every three months and submitted it to NEDA as a formal monitoring report.

C/P engineers have been seriously and actively involved in the project activities. This perception is supported by all the Japanese experts. Questionnaire survey and individual interviews to C/P clearly indicate that the method of technology transfer by Japanese experts is very appropriate and all of the C/P, including FCSEC director, appreciate the work and effort of the Japanese experts.

One critical issue is the decision making by DPWH regarding budget disbursement and C/P assignment. With repeated requests from FCSEC/the project, these issues are to some extent improved at early 2010.

3-4 The factors that impeded the realization of effects

(1) Factors that concerning to Planning

None

(2) Factors that concerning to the Implementation Process

Due to shortage of C/P and slow disbursement of local budget, the implementation of project activities has been delayed compared with the original plan. In particular, the implementation of pilot project activities was affected. The lack of C/P assignment also caused the existing C/P to address many different jobs in parallel. Despite such difficulties, all the planned activities will be completed by the end of the project. There is one concern, however, that the construction of sabo dam at Santa Fe river, one of the pilot project sites, might not be completed by the end of the project if the release of remaining budget (5 million pesos) is delayed.

3-5 Conclusion

We conclude the project is very positive overall, at the time of the terminal evaluation, and the five evaluation criteria results are favorable, except that sustainability is dependent on the policy choice by the government of the Philippines. Furthermore, we find that the enhanced knowledge and skills of FCSEC engineers, which were materialized through their actual experiences of the project implementation, are truly precious assets in addressing flood control issues in the Philippines as there is no such quality expertise within the country other than in FCSEC. If permanency of FCSEC is realized, sustainability would be improved and overall goal would be achieved.

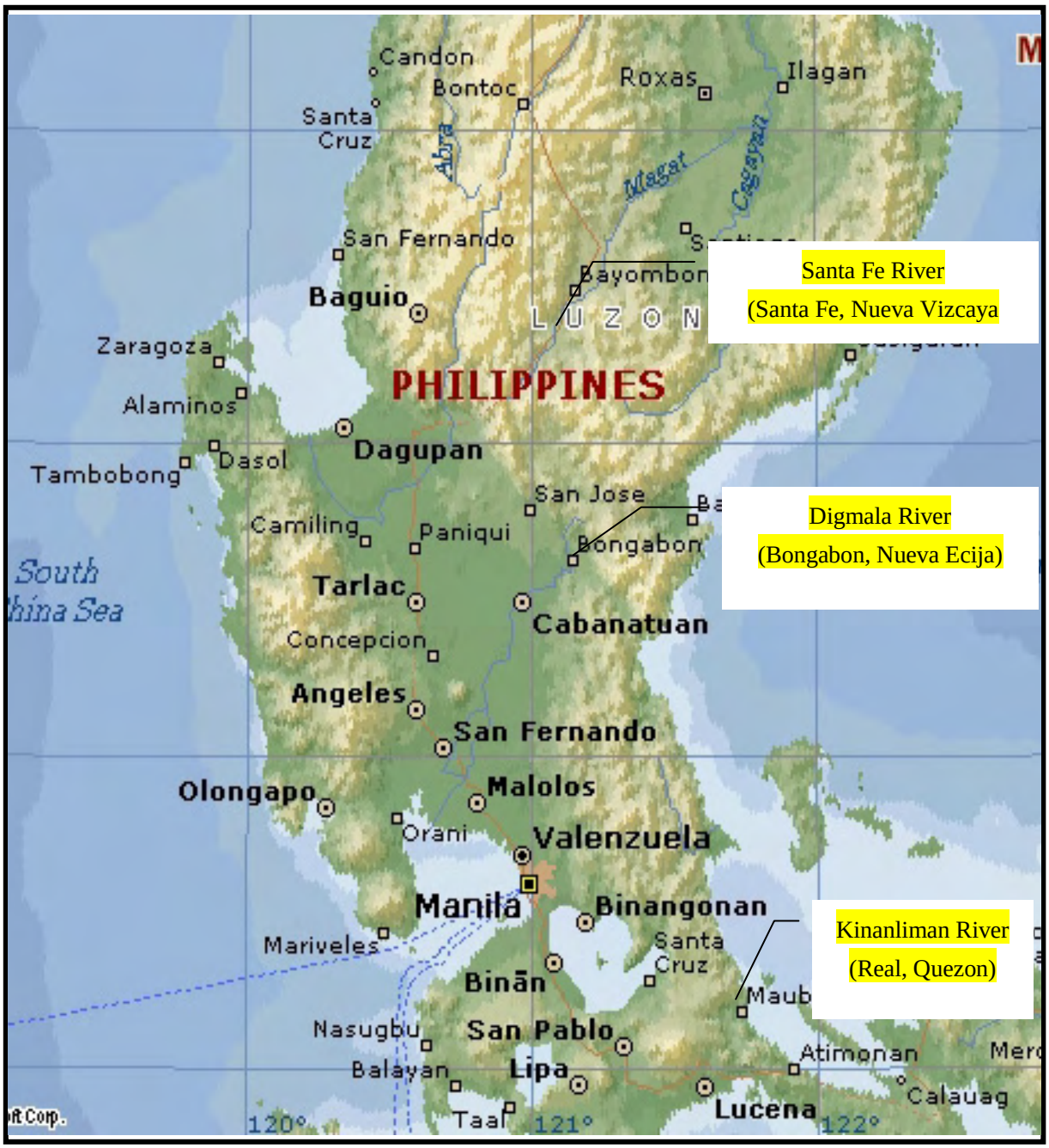
3-5 Recommendations

- Policy aspect: DPWH and other concerned agencies are strongly requested to make their best efforts to realize the FCSEC permanency in order to address flood control issues in the Philippines through the utilization of quality knowledge and skills of FCSEC, which are the best capacity in the country. Furthermore, DPWH is requested to pay more attention to the importance of addressing flood control and allocate more budget to its activities at the RO/DEO level.
- Technical aspect: FCSEC and DPWH are requested to adopt human resource policy at FCSEC that its engineers acquire a range of knowledge and skills regarding flood control from planning to designing, construction supervision and maintenance. This has to be materialized through their direct involvement in the actual experiences in the project implementation in the field, as the current pilot project is doing. Furthermore, DPWH is strongly advised to effectively utilize knowledge and skills that are stored at FCSEC in addressing flood control issues throughout the country.
- Organizational aspect: In order to ensure capacity building of FCSEC engineers as mentioned above, DPWH and FCSEC are requested to allocate a number of positions at FCSEC and secure the budget for its operation. It is also suggested that skilled, mid-level and young engineers are working together in order to share quality knowledge and skills for future generation in the country.
- M/P and F/S: In the process of M/P and F/S of the 12 river basin, DPWH is requested to assign FCSEC to be in charge of the implementation of M/P and F/S and also to provide fund for modeling and testing proposed countermeasures at the Hydraulic Laboratory.
- Technical advice by a Japanese expert: JICA is requested to support the provision of technical advice by a Japanese expert to FCSEC engineers when it is required since the scale of M/P and F/S of the 12 river basin is rather large compared with that of the three pilot projects. The expert should hold due capacity in terms of both technical expertise and communication skills for the establishment of respectful interpersonal relationships with FCSEC engineers.

3-6 Lessons Learned

- Capacity building of local engineers in flood control can be more effective if local engineers have direct involvement of in the entire process of flood control activities such as planning, designing and construction supervision with technical advices by Japanese experts.

プロジェクト位置図


Santa Fe River
(Santa Fe, Nueva Vizcaya
Digmala River
(Bongabon, Nueva Ecija)
Kinanliman River
(Real, Quezon)
Candon
Bontoc
Roxas
Ilagan
Santa Cruz
Abra
Magat
Cagayan
San Fernando
Bayombon
Baguio
LUZON
Zaragoza
PHILIPPINES
Alaminos
Dagupan
Dasol
Tambobong
San Jose
Camiling
Paniqui
Bongabon
South China Sea
Tarlac
Cabanatuan
Concepcion
Angeles
San Fernando
Olongapo
Malolos
Orani
Valenzuela
Manila
Binangonan
Mariveles
Santa Cruz
Binān
Nasugbu
San Pablo
Balayan
Lipa
Taal
Lucena
Atimonan
Calauag
120°
121°
122°

第1章　終了時評価調査の概要

1-1　終了時評価調査の背景・目的

フィリピンは、その地理、気象、地質的条件により自然災害が多発しており、特に台風等による水害や土砂災害を受けやすい国である。しかしながら、総合的な洪水対策行政を所管する公共事業道路省には、治水・砂防事業を専管する統一された部局が存在しないために、治水分野においては質・量ともに不十分な状態が続いてきた。

このような背景のもと、フィリピン政府は、DPWH（公共事業道路省）に FCSEC（治水・砂防技術センター）を設立し、治水・砂防技術の能力強化を目的とした技術協力を日本政府に要請した。フィ国の協力要請に応じ、JICA は、DPWH ならびに DPWH の現場事務所に所属する技術者の能力強化を目的とした「治水・砂防技術力強化プロジェクト」を 2000 年 1 月から 3 年間にわたり実施した。2002 年 6 月に実施された終了時評価調査においては、ステージ 2 として 2 年間の延長期間を設けることが合意された。その後 2004 年 12 月に実施されたステージ 2 の終了時評価では、これまでの成果を踏まえた同国の治水・砂防行政機能の更なる強化と協力の継続の必要性が認識され、JICA は 2005 年 5 月に事前調査団を派遣した。両政府の協議の末、2005 年 6 月 2 日に「治水行政機能強化プロジェクト」の R/D 署名が行われ、2005 年 7 月から 2010 年 6 月にわたる 5 年間のプロジェクト実施に至った。

本終了時評価調査は、プロジェクト終了に際し、これまでの実績を確認し、必要な提言を行うことを目的とした。

1-2　プロジェクト概要

（1） 協力期間：2005 年 7 月 1 日～2010 年 6 月 30 日（5 年間）

（2） C/P 機関：公共事業道路省（DPWH）治水砂防技術センター（FCSEC）

（3） PDM 1 概要（2008 年 2 月改訂版）

上位目標		FCSEC で作成した技術基準、指針、マニュアルに沿って、より効果的かつ適切に設計された治水・砂防構造物／施設が DPWH によって実施される
プロジェクト目標		DPWH の治水行政機能が、研究開発、研修、情報管理システム、パイロットプロジェクトの実施および内部支援システムの構築により強化される
アウトプット	1	パイロットプロジェクトが、技術基準、指針、マニュアルを活用して実施される
	2	調査研究が、技術基準、指針、マニュアルの開発・改訂および治水・砂防の効果的な対策の評価のために実施される
	3	研修プログラムを通じて DPWH 職員の治水・砂防に関する知識と技術が向上する
	4	DPWH のより効果的な治水行政機能のために、情報管理システムが構築される
	5	治水･砂防技術分野に関する技術および組織の発展を確保するための内部支援メカニズムが構築される

1-3 評価調査団構成

	担当分野	氏名	役職
日本側			
1	団長	中曽根　慎良	JICA 地球環境部　水資源・防災グループ　防災第一課長
2	技術参与 （河川技術）	栗林　大輔	独立行政法人　土木研究所　水災害・リスクマネジメント国際センター　主任研究員
3	技術参与 （砂防技術）	藤平　大	国土交通省　国土交通省大臣官房　監察官
4	評価計画	小野　済	JICA 地球環境部　水資源･防災グループ 防災第一課 課員
5	評価分析	久保　英之	グローバルリンクマネージメント株式会社　研究員
フィリピン側			
1	Ms. Madelyn B. Loyola		Engineer III, the Development Planning Division, Planning Service Department, DPWH
2	Mr. Domingo C. Rosario		

1-4 調査日程

日順	日付	曜日	業務・移動内容			滞在
			評価分析	団長・評価計画	技術参与	
1	2/9	火	→ マニラ、JICA 打合せ			マニラ
2	2/10	水	終日　FCSEC インタビュー			マニラ
3	2/11	木	午前　FCSEC インタビュー 午後　DPWH データ収集			マニラ
4	2/12	金	終日　FCSEC インタビュー			マニラ
5	2/13	土	終日　情報分析・報告書取り纏め			マニラ
6	2/14	日	午前　報告書取り纏め 午後　団内打合せ	→ マニラ 午後　団内打合せ		マニラ
7	2/15	月	終日　マニラ→レアル（ケソン州） 夕方　DEO 打合せ、現場訪問			レアル
8	2/16	火	午前　LGU 打合せ 午後　レアル→マニラ		→ マニラ	マニラ
9	2/17	水	午前　マニラ→バヨンボン（ヌエバビスカヤ州） 午後　DEO 打合せ			サンタフェ
10	2/18	木	午前　バヨンボン→サンタフェ、現場訪問、LGU 打合せ 午後　サンタフェ→ボンガボン（ヌエバエシハ州）、現場訪問			ボンガボン
11	2/19	金	午前　DEO 打合せ 午後　LGU 打合せ、ボンガボン→マニラ			マニラ
12	2/20	土	終日　報告書取り纏め			マニラ
13	2/21	日	終日　報告書取り纏め			マニラ
14	2/22	月	午前　FCSEC 打合せ 午後　JICA 打合せ			マニラ
15	2/23	火	午前　DPWH 打合せ 午後　JICA 打合せ			マニラ
16	2/24	水	午前　JCC 午後　JICA 打合せ			マニラ
17	2/25	木	マニラ→			

1-5 主要面談者

組織	氏名	役職
DPWH	Ms. Maria Catalina E. Cabral, PhD	Assistant Secretary for Planning
	Mr. Melvin B. Navarro	Director III, Planning Service
	Ms. Rebecca T. Gatsuta	Division Chief, Planning Service
FCSEC	Mr. Resito V. David	Project Director
	Ms. Dolores M. Hipolito	Project Manager II
	Mr. Gil I. Iturralde	Engineer V
	Mr. Galileo Fortaleza	Engineer V
	Mr. Alexander B. Borja	Engineer IV
	Mr. Michael T. Alpasan	Engineer IV
	Mr. Jessie C. Felizardo	Engineer IV
	Ms. Lourdes F. Aninipot	Engineer IV
	Mr. Grecil Christpher R. Damo	Engineer III
	Mr. Harold Uyap	Engineer III
	Mr. Adolfo Rey	Information Technology Officer III
プロジェクト	中村伸也	チーフアドバイザー
	長谷部進一	砂防技術
	古川惇一	調整員
第一ケソン現場事務所	Mr. Alfredo M. Peñamante, Sr	District Engineer
	Mr. Freddie M. Combalicer	Project Engineer
レアル市役所	Mr. Manuel M. Merana	Executive Assistant and Municipal Administrator
第二ヌエバビスカヤ現場事務所	Mr. Rodolfo M. Torralba, Jr.	District Engineer
	Mr. Glenn Miguel	Project Engineer
サンタフェ市役所	Florante S. Gerdan	Mayor
第二ヌエバエシハ現場事務所	Mr. Ulysses C. LLado	District Engineer
	Mr. Eduardo Hernandez	Project Engineer
ボンガボン市役所	Ms. Amelia Gamilla	Mayor
日本大使館	吉野広郷	二等書記官
JICA フィリピン事務所	松田教男	所長
	永石雅史	次長
	野村陽子	Project Formulation Adviser
	Mr. Kessy A. Reyes	Program Officer

第2章　評価の方法

本終了時評価は、『JICA事業評価ガイドライン（2004 年 1 月：改訂版）』に基づいて実施した。その骨子は、(1)PDMに基づく評価のデザイン、(2)プロジェクトの実績を中心とした必要情報・データの収集、(3)「妥当性」、「有効性」、「効率性」、「インパクト」、「自立発展性」という観点（評価 5 項目：「2-3　情報・データ分析方法」で詳述）からの情報・データ分析、(4)分析結果を踏まえた提言･教訓の導出、である。

2-1　評価のデザイン

評価のデザインを策定するにあたり、R/D、M/M、PDM、PO、業務進捗報告書、その他プロジェクト関連文書等に基づき、評価項目案を作成し、評価グリッド（評価調査計画表）に取り纏めた。主な評価項目は、以下の通りである。なお、本終了時評価の実施に際しては、2008 年 2 月 6 日に改訂された PDM 1 を使用した。また、評価グリッドの結果は付属資料 ミニッツ（ANNEX V）に取り纏めた。

評価項目	評価設問	
	大項目	小項目
実績の検証	投入の実施状況	日本側投入（①長期専門家、②短期専門家、③機材供与、④カウンターパート研修）は計画通り実施されたか？
		フィリピン側投入（①人員、②建物・施設、③予算）は計画通り実施されたか？
	アウトプットの達成状況	アウトプット１：パイロットプロジェクトが、技術基準、指針、マニュアルを活用して実施されているか？
		アウトプット２　：調査研究が、技術基準、指針、マニュアルの開発・改訂および治水・砂防の効果的な対策の評価のために実施されているか？
		アウトプット３：研修プログラムを通じて DPWH 職員の治水･砂防に関する知識と技術が向上しているか？
		アウトプット４：DPWH のより効果的な治水行政機能のために、情報管理システムが構築されているか？
		アウトプット５：治水・砂防技術分野に関する技術および組織の発展を確保するための内部支援メカニズムが構築されているか？
	プロジェクト目標の達成状況	DPWH の治水行政機能が、研究開発、研修、情報管理システム、パイロットプロジェクトの実施及び内部支援システムの構築により、強化されているか？
	上位目標の達成予測	FCSEC で作成した技術基準、指針、マニュアルに沿って、より効果的かつ適切に設計された治水・砂防構造物／施設が DPWH によって実施されているか？
実施プロセス	活動計画の進捗	活動計画は予定通りに実施されたか？
	モニタリングの実施	モニタリングはどのように実施されたか？
	コミュニケーション	プロジェクト内（専門家, C/P, RO）のコミュニケーションは十分か？
		プロジェクトと外部機関のコミュニケーションは十分か？
	意思決定	プロジェクトの計画・実施における意思決定過程は適切か？
	オーナーシップ	プロジェクトに対する C/P・関係行政機関の関心・関与は十分か？
	技術移転の方法	技術移転の方法は適切か？
	実施運営体制	プロジェクトの実施運営体制は適切か？
		C/P の配置は適切か？
	中間評価における提言の実施状況	C/P の空きポジションおよびパイロットプロジェクト担当のポジションは埋められたか？
		パイロットプロジェクトの実施予算は増額されたか？
		FCSEC の恒久化に関する見通しはたったか？
		水理実験棟の利用改善は進んだか？
妥当性	政策・ニーズとの整合性	プロジェクトはフィリピン政府の政策と整合性が取れているか？
		プロジェクトは日本の開発援助政策と整合性が取れているか？
		プロジェクトは受益者のニーズに対応しているか？
	戦略・アプローチ	受益者の選定は適切か？
		事業実施機関の選定は適切か？
		プロジェクトのアプローチは上位目標・プロジェクト目標を達成する手段として適切か？
		JICA の技術力と経験は上位目標・プロジェクト目標を達成するのに十分か？

評価項目	評価設問	
	大項目	小項目
有効性	プロジェクト目標の達成予測	プロジェクト終了時までに、プロジェクト目標は達成されるか？
		プロジェクト目標の達成を促進・阻害する要因はあるか？
	アウトプットとプロジェクト目標との因果関係	５つのアウトプットはプロジェクト目標を達成するのに十分か？
		アウトプットからプロジェクト目標に至るまでの外部条件は現在でも有効か？
	外部リソースの活用	プロジェクトは関係機関が持つリソースを有効活用したか？
効率性	アウトプットの達成度	アウトプットの達成度は十分か？
		アウトプット達成を促進・阻害した要因はあるか？
	投入・活動・アウトプットの因果関係	投入からアウトプットに至るまでの外部条件は現在でも有効か？
		アウトプットを達成するための投入（時期、量・コスト、質）は適切か？
インパクト	上位目標の達成見込み	上位目標は達成されるか？
		上位目標の達成を促進・阻害する要因はあるか？
	波及効果	政策・経済・社会文化的側面・環境への影響はあるか？
		本プロジェクト実施による負の影響はあるか？　それを軽減する対策は取られているか？
	因果関係	プロジェクト目標から上位目標に至るまでの外部条件は現在でも有効か？
自立発展性	政策面	治水分野における政府の政策支援はプロジェクト終了後も継続するか？
		FCSEC に対する政府の政策支援はプロジェクト終了後も継続するか？
	組織面	上位目標達成のため、C/P 機関において必要な組織・人員・財政的な措置が行われるか？
	技術面	本プロジェクトにより投入された資機材の維持管理は適切に行われるか？
		本プロジェクトで導入された治水関連技術は DPWH 内部で定着しているか？
	阻害要因	自立発展性に影響を与える負の影響はあるか？

2-2 情報・データ収集方法

上記の評価デザインに従い、以下の情報源および情報・データ収集手法を用いて、PDM 記載事項の実績に係る関連情報を収集した。

- R/D、M/M、PDM、P/O 等のプロジェクト計画文書
- 業務報告書・短期専門家報告書・出張報告書等のプロジェクト関連資料
- フィリピン政府の政策関連文書
- 日本人専門家・C/P への質問票および聞き取り調査
- パイロットプロジェクトサイトの視察
- 関係機関（DEO、LGU）への聞き取り調査
- その他プロジェクトによる記録及び成果品

2-3 情報・データ分析方法

上記の方法によって収集した情報をもとに、プロジェクトのアウトプット・目標の達成状況と実施プロセスを確認し、評価 5 項目に沿った評価分析を行った。なお、評価 5 項目の概要は以下の通りである。

妥当性	プロジェクトの目指している効果（プロジェクト目標や上位目標）が、評価を実施する時点において妥当か（相手国と日本側の政策との整合性はあるか、問題や課題の解決策として適切か、受益者のニーズに合致しているか、など）、および、プロジェクトの戦略やアプローチが効果をあげる方法として適切か、確認する。
有効性	プロジェクト目標の達成度合い、及びアウトプットがプロジェクト目標の達成度にどの程度結びついているかを検討する。
効率性	投入から生み出されるアウトプットの程度が、タイミング、質、量の観点から妥当であったか、当初計画を踏まえて分析する。
インパクト	上位目標の達成可能性を検討すると同時に、プロジェクトが実施されたことにより生じる正・負の波及効果を、当初予期しなかった効果も含め検討する。
自立発展性	プロジェクト終了後、プロジェクトによってもたらされた成果や効果が持続されるか、あるいは拡大されていく可能性があるかどうかを予想するために、政策・制度的側面、財政的側面、技術的側面からプロジェクトの自立発展性の見込みを考察する。

第3章　プロジェクトの実績と現状

3-1 投入実績

プロジェクトが開始された 2005 年 7 月から 2010 年 2 月中旬までの日本側･フィリピン側の投入実績は、以下のとおりである。なお、詳細については評価報告書 Annex IV を参照のこと。

（1） 日本側の投入実績

専門家	長期専門家 6 名（2010 年 6 月のプロジェクト終了時までの投入総計は 170.2MM）および短期専門家 12 名（これまでの投入は計 59.5MM）が派遣された。
本邦研修	8 名の研修員が本邦での研修に参加した。
資機材供与	コンピューター、調査用資機材などが供与された。合計金額は 5,342,503 ペソ（約 114,364 米ドル）である。
ローカルコスト	現地業務費として合計 6,875,344.88 ペソ（約 147,176 米ドル）が支出された。

（2） フィリピン側の投入実績

C/P の配置	2010 年 2 月現在の配置は、技術者 14 名および事務 7 名である。2005 年 7 月から現在までの延べ人員は 27 名である。
ローカルコスト	通常経費として合計 49,300,832 ペソ（約 1,055,353 ドル）、パイロットプロジェクト経費として合計 53 百万ペソ（約 1,134,904 ドル）が支出された。
施設の提供	C/P 機関である FCSEC 内にプロジェクトの事務所スペースが確保された。

3-2 アウトプットの達成状況

本評価の実施時点における各アウトプットおよび指標の達成状況は以下の通りである。

アウトプット 1	
パイロットプロジェクトが、技術基準、指針、マニュアルを活用して実施される	
指標	達成状況
1-1：少なくとも 3 パイロットプロジェクト（護岸、水制、砂防ダム）が計画、設計、建設、維持管理される	二つのパイロットプロジェクトで治水に係る計画・設計・建設（護岸、水制）が完了し、現在は維持管理が行われている。一つ（砂防ダム）は建設中であり、プロジェクト終了時までに完成する予定である。

パイロットプロジェクトの「計画」・「設計」は、日本人専門家の指導・助言を得ながら FCSEC 技術者が担い、「建設」は日本人専門家・FCSEC 技術者の指導・助言を得ながら、当該地域の現場事務所・建設業者が実施してきた。パイロットプロジェクトを統括する FCSEC 技術者によれば、パイロットプロジェクト実施に際して、JICA 治水・砂防技術力強化プロジェクト（2000 年～2005 年実施）において作成された以下の技術指針・マニュアルが活用された。

- TSG for planning and design, Vol.1: Flood control
- TSG for planning and design, Vol.3: Sabo Works
- Manual on flood control planning
- Manual on design of flood control structures
- Manual on non-uniform flow computation with HEC-RAS

- Manual on runoff computation with HEC-HMS
- Typical design drawings of flood control structures
- Manual on construction supervision of flood control projects

また、本終了時評価の実施時点におけるパイロットプロジェクトの進捗状況は次の通りである。

サイト	達成状況
Kinanliman 川	工事完了（維持管理/モニタリング実施中）
Digmala 川	工事完了（維持管理/モニタリング実施中）
Santa Fe 川	M/S・F/S 完了（工事中）

Kinanliman 川および Digmala 川の維持管理/モニタリングに際しては、DPWH 現場事務所の技術者に加え、当該地域の市役所担当者も関与している。

本プロジェクトの最大の特徴は、DPWH（FCSEC）の技術者が治水事業の全過程（すなわち、計画・設計・建設/施工・維持管理）に直接関与した点にある。治水分野におけるこれまでの援助事業では、援助機関が先進国のコンサルタントに計画・設計を依頼していたため、DPWH 技術者が治水事業の M/P・F/S 策定作業を担うことはなく、フィリピン人技術者は計画・設計に係る知見を蓄積してこなかった。本プロジェクトにおいて実施した Kinanliman 川の治水工事は、DPWH（FCSEC）技術者が直接 M/P・F/S 策定過程に関与した最初の機会であり、事業実施を通じて、本パイロットプロジェクトに従事した FCSEC 技術者は M/P・F/S 策定に係る知識と技術力を大幅に向上させた。

アウトプット２	
調査研究が、技術基準、指針、マニュアルの開発・改訂および治水・砂防の効果的な対策の評価のために実施される	
指標	達成状況
2-1 : 技術基準、指針、マニュアルの改訂のための提案が行なわれる	2008 年 10 月に技術指針・マニュアル改訂作業のための技術作業部会が結成され、現在に至るまで、提案・改訂作業が行われている。
2-2 : 実地の要求に即した適切な対応策が提言される	現場事務所・地方自治体からの要請に基づき、治水に係る実態調査などの技術協力が実施され、提言が行われている。
2-3 : 代替的な低価格の治水・砂防構造物が開発される	低価格の治水構造物の建設材料として、ソイルセメントが導入され、現場事務所への技術移転が行われている。
2-4 : 技術基準、指針、マニュアルの使用・適用に関する報告書が作成される	技術指針・マニュアルの使用・適用に係る技術報告書が 4 種類作成されている。

08 年 10 月に技術指針・マニュアル改訂作業のための技術作業部会が結成され、現在に至るまで、提案・改訂作業が行われており、また技術指針・マニュアルの使用・適用に係る技術報告書が 4 種類作成されている。さらに現場事務所・地方自治体からの要請に基づき、治水に係る実態調査などの技術協力が実施され、実地に見合った低価格の治水構造物の建設材料として、ソイルセメントが導入され、現場事務所への技術移転が行われている。このような状況に鑑み、成果指標はほぼ達成していると考えられる。

また、これまでに、治水構造物の効果や影響を評価するための水理実験が 6 回、低コスト治水構造物の適性を評価するための実験が 4 回、その他の治水に関わる評価実験が 6 回、水理実験棟を利用して実施された。この中には、パイロットプロジェクトで提案された治水構造物の評価実験も含まれており、その実験結果は、各パイロットプロジェクトの計画・設計・施工に反映されている。一連の実

験を通じて、FCSEC 技術者は、実験に係る計画・設計・準備・データ収集の方法を習得し、日本人専門家の指導なしに実験を行える水準に到達している（但し、複雑な実験の場合には、日本人専門家の助言を必要とする場合もある）。

なお、フィリピン政府の行政機構において、FCSEC は治水技術を取り扱う唯一の機関であり、昨今、FCSEC の存在が広く認知され始めていることから、公共事業道路省の現場事務所や地方自治体からの治水対策事業に係る調査依頼が増加している。以下は、現場事務所および地方自治体からの依頼に応じた治水関連技術協力（Technical Assistance）の一覧である。

年度	依頼先機関	調査内容
2006	Province of Southern Leyte	Landslide in Guinsaugon, St. Bernard
2007	RO-V	Field investigation for planning and implementation of urgent sabo and flood projects around Mayon volcano
2008	Municipality of Buguey Province of Cagayan	Massive erosion of the coastal areas along Buguey, Cagayan
2009	DPWH 3rd Pangasinan DEO	Flooding problem at urdaneta city, Pangasinan
2009	DPWH Aklan DEO	Flood damage in Aklan river
2009	Province of Occidental Mindoro	Study on sabo and flood control project on Amnay-Patrick river
2009	Olongapo City	F/S on the desilting/dredging of Kalaklan river Olongapo

アウトプット３	
研修プログラムを通じて DPWH 職員の治水・砂防に関する知識と技術が向上する	
指標	達成状況
3-1：治水構造物の計画・設計研修を受講した少なくとも 100 事務所の技術職員の習熟レベルが向上する	これまでに 111 事務所の技術職員が研修を受講した。
3-2：砂防事業の計画・設計研修を受講した少なくとも 40 事務所の技術職員の習熟レベルが向上する	これまでに 45 事務所の技術職員が研修を受講した。
3-3：治水・砂防プロジェクトの施工管理研修を受講した少なくとも 100 事務所の技術職員の習熟レベルが向上する	これまでに 107 事務所の技術職員が研修を受講した。
3-4：治水・砂防構造物の維持管理研修を受講した少なくとも 100 事務所の技術職員の習熟レベルが向上する	これまでに 109 事務所の技術職員が研修を受講した。

これまでに、4 分野 22 コースの研修事業が実施され、のべ 558 名の現場事務所技術者が参加し、それぞれのコースで成果指標以上の事務所が受講している（下記一覧表参照）。加えて、プロジェクト終了時までに 2 コースが実施される予定である。研修は、当初、日本人専門家がコース内容を企画したが、2 回目以降は FCSEC 技術者が企画実施を担っている。講師陣には、FCSEC 技術者・日本人専門家に加え、パイロットプロジェクトの施工管理を担った現場事務所の技術者も加わっている。

研修事業	コース日時	対象地域	参加 事務所数	参加者数
治水構造物計画・設計研修（講義）	November 7-11, 2005	V	12	30
	August 14-18, 2006	VI	16	28
	July 9-13, 2007**	IV-B &X	23	24
	November 5-9, 2007**	VIII & XI	23	26
	September 15-19, 2008	IX & XIII	17	23
	August 17-21, 2009	VII & XII	20	21
		Total	111	152
治水構造物計画・設計研修（OJT）	August 21-22, 2008	V	12	25
	July 6-10, 2009	VI	13	23
	March 2010	IV-B		
	May 2010	X		
		Total	25	48

治水・砂防プロジェクト施工管理研修	November 21-23, 2005	V	12	42
	September 4-6, 2006	VI	16	30
	July 18-20, 2007**	IV-B & X	17	19
	November 14-16, 2007**	VIII & XI	22	23
	September 22-24, 2008	IX & XIII	19	22
	October 14-16, 2009	VII & XII	21	24
		Total	107	160
治水・砂防構造物維持管理研修	November 23-25, 2005	V	12	27
	September 06-08, 2006	VI	15	31
	July 20-22, 2007**	IV-B & X	20	23
	November 26-28, 2007**	VIII & XI	22	25
	Sep.29-Oct.1, 2008	IX & XIII	19	21
	Feb. 3-5 2010	VII & XII	21	23
		Total	109	150
砂防事業計画・設計研修	June 1-5, 2009	Nationwide	22	23
	November 16-20, 2009	Nationwide	23	25
		Total	45	48

上記研修のうち、**印のコースについては、公共事業道路省の評価担当が研修実施 1 年後に事後評価を行っている。評価は、研修参加者およびその上司に対して、質問票を用いて行われた。評価対象 6 コースの全参加者は 140 人で、このうち、質問票への回答をした参加者は 103 名（74%）であった。このうち、現在も治水関連事業に従事していると回答した研修参加者は 80%であり、研修参加により実務能力が向上したと回答した研修参加者の上司は 85%であり、多くの研修参加者が研修成果を実務に活かしているものと考えられる。

アウトプット 4	
DPWH のより効果的な治水行政機能のために、情報管理システムが構築される	
指標	達成状況
4-1 : データ共有と連携の改善のために他の関係機関／組織とのネットワークが構築される	治水構造物に係る全国規模のデータ収集に際しては 138 ヵ所の現場事務所と連携し、データ共有は多様な政府機関と行っている。
4-2 : 少なくとも年に 1 回、治水・砂防行政に関する調整会議、セミナーが他の関連機関／組織と共同で開催される	治水・砂防技術に関するパイロットプロジェクトの知見を共有するため、これまでに 2 回のセミナーが開催されている。
4-3 : 十分なデータ、情報が収集、分析され、データベースに蓄積される	全国 138 ヵ所の現場事務所のデータが収集・分析され、データベースに蓄積されており、データの更新も行われている。
4-4 : 年次報告書が年末に提出され、FCSEC ニュースレターが年に 2 回発行される	四半期毎に報告書が NEDA に提出されている。また、これまでに 4 冊のニュースレターが発行されている。

治水構造物に関する全国規模のデータ収集を目的として、FCSEC は地域毎の行政地図を全国 138 ヵ所の現場事務所に配布し、担当区域内にある治水構造物の位置と種類等に関する情報を 2006 年末までに収集した。2009 年には、情報更新のため 180 以上の現場事務所に対して質問票を送付し、62%の事務所から回答を得た。これらのデータは、エクセルファイル形式で電子保管されており、図面および写真についてはハードコピーが保管されている。なお、データの更新は 2～3 年毎に行われる予定である。

FCSEC にある図書室は、以前、資料整理が行われていなかったが、現在では、全資料が項目ごとに整理されており、また、電子情報化が行われ、検索システムが構築されている。

また、PDM 1 に沿った治水技術に関する情報共有・提供として、これまでに以下の活動が実施されている。

- パイロットプロジェクトにおいて建設する治水構造物の水理実験結果を広く共有するため、FCSEC はセミナーを 2 回開催した。このセミナーには、公共事業省各局、NEDA、気象庁、NWRB、PHIVOLCS、地方自治体、大学、NGO の関係者が参加した。
- FCSEC 技術者は、他機関（NDCC、NEDA、気象庁、NWRB、PHIVOLCS、EMB、フィリピン大学）が開催するワークショップ・セミナーに参加し、治水技術に関する知見を共有した。
- これまでにニュースレターを 4 回発行した。
- プロジェクト進捗に関する四半期毎の報告書を NEDA に提出してきた。
- National Flood Management Framework Plan を策定し、2006 年 2 月 28 日の NDCC 閣僚会合で発表した。
- 治水分野の国際機関である ICHARM（本部：筑波）と覚書を交わし、情報の共有、FCSEC 技術者の能力向上を進めることで合意した。なお、現在、FCSEC 技術者 1 名が、「Water-Risk Management Course of Disaster Management Policy Program」の研修生として ICHARM に派遣されている。

以上のことから情報管理システムの構築の成果目標は達成していると考えられる。

アウトプット５	
治水・砂防技術分野に関する技術および組織の発展を確保するための内部支援メカニズムが構築される	
指標	達成状況
5-1 : 本プロジェクトの目標・上位目標の達成を支援する決定が合同調整委員会で承認される	合同調整委員会では、FCSEC 恒久化に関する議論が行われてきたが、正式な決議は採択されていない。
5-2 : 本プロジェクトの達成を持続するための計画書が DPWH の中枢に提出され承認される	DPWH 合理化計画において、DPWH 中枢は FCSEC の恒久化を盛り込んだと報告されているが、これまでのところ、FCSEC 恒久化の承認を示す DPWH 文書は発行されていない。

治水行政における FCSEC の発展を確保するため、合同調整委員会およびテクニカルワーキンググループ（TWG）などの内部メカニズムが作られた。合同調整委員会は、プロジェクト全体のモニタリングを目的とし、これまでに会合が 6 回開催されている。計画局の次官補が議長を務め、DPWH 内の主要部局（計画局、設計局、研究・基準局、維持管理局）もメンバーとなっている。一方、TWG は、パイロットプロジェクトの実施に係る諸問題について議論することを目的とし、これまでに会合が 8 回開催されている。メンバーは DPWH 主要部局であり、パイロットプロジェクトの実施に係る諸情報を DPWH 内でタイムリーに共有する役割を果たしてきた。

2008 年、DPWH は全国 12 河川流域の M/P・F/S 策定作業への取り組みを開始した。現在、この作業は治水分野における DPWH の主要調査事業となっている。2010 年 2 月 1 日、DPWH は通達によって当該 M/P・F/S 策定作業に係る運営委員会・技術諮問部会を設置し、運営委員会の委員長は計画局次官補、副委員長は FCSEC 所長であり、技術諮問部会の部会長は FCSEC の部長、さらに技術者 1 名がメンバーとして参画している。このことから、フィリピン政府の治水行政を担当している上位機関である DPWH の中で FCSEC が重要なポジションを担う政策決定が成されていると言える。

一方で、FCSECは、DPWHの組織体制の中でProject Management Officeという位置づけであり、基本的には、恒久化された組織ではないという前提である。この状況を改善するため、FCSEC・プロ

ジェクト・日本大使館は、合同調整委員会において、DPWH合理化プロセス[1]においてFCSECの恒久化を確立するよう常に意見を表明してきたが、2010 年 2 月時点において、実現されていないため、引き続き恒久化にかかる必要性や重要性について申し入れることが必要となる。

3-3 プロジェクト目標の達成状況

本評価の実施時点におけるプロジェクト目標および指標の達成状況は以下の通りである。

プロジェクト目標	
DPWH の治水行政機能が、研究開発、研修、情報管理システム、パイロットプロジェクトの実施および内部支援システムの構築により強化される	
指標	達成状況
1: FCSEC の提言を反映した DPWH の政策・規定	FCSEC の治水行政に係る政策提言を反映した国レベルにおける DPWH の政策・規定は発表されていないが、DPWH の中で治水分野に係る重要なポジションを担う FCSEC の能力は強化された。
2：地域・地区事務所における技術基準、指針、マニュアルの利用状況	現場事務所のいくつかは、FCSEC が策定した技術指針・マニュアルを利用している。

フィリピンにおけるこれまでの治水行政は､豪雨時の流量予測や河川の特徴に即した治水対策の検討を行っておらず、計画なしに治水構造物を建設してきたというのが実情である（FCSEC技術者によると、この状況は、大半の現場事務所において現在も同様である）。本プロジェクトでは、パイロットプロジェクトの実施を通じてM/PおよびF/S策定を 3 河川で実施し、FCSECの担当技術者は、計画策定から治水構造物の設計・施工・維持管理までの全工程を担ってきたため[2]、小規模河川の治水対策であれば、自らの判断で一連の作業を主導していける段階にまで技量が向上している。特に、パイロットプロジェクト（アウトプット１）および調査研究（アウトプット２）を担当した技術者の技量はプロジェクト実施を通じて飛躍的に向上している。また、2002 年に竣工した水理実験棟における実験研究では、特定のFCSEC技術者が日本人技術者からの指導を一貫して受け続けてきたことにより、通常の水理実験であればFCSEC技術者が独自で実験の計画、設計、建設、実施、データ収集・分析を行える段階にまで到達している。

また FCSEC が策定した技術指針・マニュアルの使用状況を確認するため、現場事務所に対して質問票を送付した。調査期間の制約から、調査団の訪問時点における回答数は 10 であり、回答数が少ないため全国の平均的実態を表しているとは言い難いが、10 の回答のうち、8 の現場事務所が一つ以上の技術指針･マニュアルを参照しているとの回答があった。また三つのパイロットプロジェクトの現場事務所では、本マニュアルを活用してそれぞれの治水構造物建設が実施されており、FCSEC が策定した技術指針･マニュアルが適切な治水構造物建設のために現場事務所で活用されている実情はあるものと推察される。なお DPWH 省令 28 号（2005 年）では、治水行政に関わる DPWH 技術者に対して本マニュアルの使用を義務付けている。

[1] DPWH合理化計画は、2004 年 10 月に公布された省令を根拠としたもので、効率的な行政を目指すため、組織のスリム化を行う計画である。

[2] 治水とは、自然物である河川を対象とした工学であることから、効果的かつ効率的な治水を行うためには、常に生成変化する河川を観察・考察して個々の河川の特性を把握し、構造物に関わる現実の河川の現象をより深く極め、よりよい技術のあり方を常に模索する態度が求められる（高橋裕、1990、「河川工学」、東京大学出版会）。このような姿勢・技術力を持つ技術者を養成するためには、計画・設計・施工・維持管理という一連の流れに関する統一的な知識を身につけ、これらの知識を長年に亘って実践した経験を培うことが極めて重要である（中村伸也、投稿中、フィリピン雑感、「国建協情報」）。

このようなことから、フィリピン政府（DPWH）の治水行政において技術的蓄積を担う唯一の組織である FCSEC の技術水準は、治水行政の政策決定に影響を及ぼす主要因の一つになるまで到達しており、この調査結果を勘案するとプロジェクト目標は達成されていると判断できる。

3-4 上位目標の達成見込み

本評価の実施時点における上位目標および指標の達成見込みは以下の通りである。

上位目標	
FCSEC で作成した技術基準、指針、マニュアルに沿って、より効果的かつ適切に設計された治水・砂防構造物／施設が DPWH によって実施される	
指標	達成状況
1：FCSEC によって考案・作成された技術基準、指針、マニュアルに準拠して新たに設計・建設された治水・砂防構造物／施設の数	少なくとも、4 ヵ所の現場事務所において、FCSEC が作成した技術指針・マニュアルに準拠した治水構造物が建設されている。
2：FCSEC の提言を反映した災害軽減計画	FCSEC は National Flood Management Framework Plan を NDCC 閣僚会合で発表したが、当該計画が承認されるには至っていない。

Kinanliman 川のパイロットプロジェクトを担当したケソン第一現場事務所では、パイロットプロジェクト終了後、技術指針・マニュアルに沿った治水構造物の建設を独自に行っている。当該現場事務所がパイロットプロジェクト以前に建設した堰堤は、計画・設計を行わず、他河川の堰堤設計図を使用していたことを考えると、パイロットプロジェクト実施の結果、ケソン第一現場事務所の技術者は、技術指針・マニュアルを使いこなす技量を着実に高めたと言える。

以下の表は、FCSECが策定した技術指針・マニュアルに沿って治水構造物の建設が行われた事例の一覧である。上記3-3同様、現場事務所に送付した質問票の回答（サンプル数 10）に基づくものであり、本終了時評価ではこれらの現場事務所を訪問していないため、各事業における計画・設計の内容については定かではない。

現場事務所	事業名	使用した技術指針・マニュアル
Region X Bulua	Construction of flood control at Lugait river	Manual on design control structures
	Construction of Opol flood control	Manual on flood control planning
	Construction of Napaliran revetment	Determination of design discharge
	Hydrologic analysis of proposed bridge	River planning / Runoff analysis
Region X Gingoon	Hubangon river control	Implementation and design
	Agono river control	Implementation and design
	Mahmog line canal	Implementation and design
	Construction of slope stabilization	TSG Vol.IV
	Napanran flood control	TSG Vol.I
	Santa Ines flood control	TSG Vol.I
	Nedina flood control	TSG Vol.I
	Ginedog flood control	TSG Vol.I
Region VIII Southern Leyte	Maasin river control	Manual on construction supervision
	Ilag road slip	Manual on construction supervision
Region I, Ifugao	Lawig river control	Manual on design

技術指針・マニュアルの初版が 2005 年までに配布されていることを考えると、現在の状況は十分に普及したとは言えない状況である。しかし、FCSEC の技術力が飛躍的に高まり始めたのはパイロットプロジェクトを開始した 3 年前からであり、今後、FCSEC の知名度向上と並行して、FCSEC 策定の技術指針・マニュアルを活用した治水構造物の建設数は徐々に増加していくものと考えられる。

一方でFCSECは、National Flood Management Framework Planを策定し、2006 年 2 月 28 日のNDCC[3]閣僚会合で発表したが、本計画は正式な承認を得るには至っていない[4]。現在、FCSECはProject Management Officeという位置づけということもあり、FCSECが継続して治水分野に係る政策提言を行うためにも、まず組織の恒久化が必要であると考えられる。

3-5 プロジェクトの実施過程について

3-5-1 活動進捗

プロジェクト活動は、当初計画よりも遅延が見られるものの、最終的には予定通りに完了するものと見込まれる。主な遅延の理由は以下の通りである。

- C/P の不足：当初計画では、フィリピン側の C/P として 17 名の技術者が配置される予定であった。しかし、常時配置されていた技術者は 11～12 名であり（2010 年初頭に 3 名増員され、現在は 14 名）、その結果、プロジェクト活動の進捗は全般的な遅延を余儀なくされた。
- 予算措置の遅れ：最終的に、フィリピン側の予算は当初計画通りに執行される見込みであるが、これまで、財務省による予算執行令の公布が常に遅れてきたため、プロジェクト活動の遅延につながった。特に大きな影響を受けたのがパイロットプロジェクトである。Kinanliman 川および Digmala 川の事業は遅延しながらも既に施工は完了しているが、Santa Fe 川の砂防ダム施工については、2009 年 10 月に予算の一部執行を認める予算執行令が公布されたばかりであり、現在人員を集中させて施工中となっている。

3-5-2 プロジェクト運営

フィリピン人技術者・日本人専門家の間でコミュニケーションギャップが生じることはなく、プロジェクトの運営・モニタリングは極めて適切に行われてきた。具体的には、日常的に行われるインフォーマルなコミュニケーション、毎月開かれるフォーマルな会議、パイロットプロジェクトや水理実験などの現場作業を通じた実務的コミュニケーションにより、意思疎通が円滑となり、相互信頼関係が醸成されてきた[5]。

3-5-3 中間評価における提言へのフォローアップ状況

本プロジェクトの中間評価では４つの提言が行われたが、各々の提言への取り組み状況は次の通りである。

- C/P 増員：DPWH は 2008 年 7 月に C/P を 3 名増員し、2010 年 1 月／2 月に 3 名増員した。一方、パイロットプロジェクトへの C/P 増員は行われていない。
- パイロットプロジェクト予算：5 千万ペソの予算はすべて承認されたが、執行時期は遅れている。
- FCSEC の恒久化：2010 年 2 月現在において実現されていない。

[3] 災害に関するフィリピン政府の調整機構は国家災害調整委員会（NDCC）である。NDCCは、防衛大臣を長とし、関係省庁の長がメンバーである。
[4] FCSECスタッフによると、本計画の担当行政は、その後、FCSEC/DPWHからDENRに移管されている。
[5] この点については、日本人専門家・C/P双方からの質問票回答が顕著に示している。日本人専門家は、大半のC/Pが真摯に治水業務に従事していることを高く評価し、C/P側も日本人専門家による技術移転が非常に有効であることを高く評価している。

- 水理実験棟の利用：FCSEC は、大学など、外部組織に水理実験棟の利用機会を提供してきた。但し、水理実験は、一度の実験に 2～3 か月程度の準備期間を要するため、利用頻度は必然的に限られてくる。

3-6 貢献・阻害要因の総合的検証

プロジェクトの効果発現に貢献した要因：

- FCSEC の技術者は、大半が前フェーズより JICA の技術協力プロジェクトに従事してきたスタッフであるため、本プロジェクトの開始時点において、既に一定程度の技術的知見を保持していた。このため、現場でのパイロットプロジェクトは技術者が既に持っていた知見を実践する場として機能し、彼らの能力を効率的に向上させることに繋がった。
- 本プロジェクトの日本人専門家は、独立したプロジェクト事務所を設けるのではなく、C/P 機関である FCSEC の事務所内に机を構えてプロジェクトを実施するという体制を取った。このため、日本人専門家と C/P 間のコミュニケーションは極めて良好に行われ、C/P が日常的に得る専門家からのアドバイスは、彼らのモチベーションを保つことに貢献した。

プロジェクトの効果発現を阻害した要因：

- 上述したように、C/P の不足および予算措置の遅れは、プロジェクトの進捗に負の影響を与えてきた。また、FCSEC の恒久化が実現されていないため、技術者は正規職員になることができず、彼らのモチベーションに悪影響を与えてきた。

第4章　評価結果

評価調査団は、本終了時評価の全調査活動を通じて得られた情報を基に、プロジェクトの妥当性、有効性、効率性、インパクト、自立発展性について検討した。その結果、評価団として以下のような判断を下すことで合意した。

4-1 妥当性

本プロジェクトは日比両国の政策に合致し、適切なアプローチを採用していることから、妥当性は極めて高いと判断した。具体的な根拠は以下の通りである。

(1) フィリピンは洪水・斜面崩壊・土砂流出などの災害が極めて多い国であり、毎年、700 名以上の人命が失われ、被害額は 80 億ペソに上ると推定される。これらの損失を抑えるためには、治水行政が適切に機能することが極めて重要である。

(2) プロジェクト目標・上位目標は、フィリピン政府の国家政策に合致している。第一に、中期公共投資プログラム（2005-2010 年）において、治水分野への投資は 10 の主要戦略の一つとなっている。第二に、DPWH 戦略計画（2004-2010 年）において、FCSEC の治水業務は DPWH の主要戦略の一つとして位置づけられている。

(3) 本プロジェクトのターゲットグループは DPWH の技術者であるが、これは DPWH の治水行政機能を強化する上で非常に有効である。適切な治水行政を遂行するためには、治水計画・設計・施工・維持管理のすべてにおいて知見を持つ人材が欠かせないが、これまで、DPWH はこのような人材育成を行ってこなかった。その結果、特定河川における適切な治水対策は何か、という課題に妥当な解答を示せる人材は育たず、場当たり的な治水構造物建設が全国で繰り返されてきた。その意味で、総合的な知見を持つ治水技術者を育成する本プロジェクトの意義は極めて高い。

(4) 本プロジェクトでは、パイロットプロジェクトや研究調査などの諸事業を FCSEC 技術者がイニシアチブを取って実施するというアプローチを採用した。治水分野における過去の援助事業を見ると、治水計画・設計は外国人コンサルタントが実施し、フィリピン人技術者は施工管理の一部を担うに過ぎなかった。このため、治水に関する技術向上に繋がらなかった。本プロジェクトでは、一貫して FCSEC 技術者の On-The-Job Training が実施されてきており、プロジェクト目標を達成する上で妥当なアプローチであると考えられる。

(5) プロジェクト目標・上位目標は、日本政府の対フィリピン援助政策に合致している。2008 年に策定された対フィリピン国別援助計画では、4 つの重点分野が示されているが、「環境保全と防災」はそのうちの一つに位置づけられている。さらに、「治水・砂防インフラの整備・維持管理について支援する」と明記されている。

4-2 有効性

本プロジェクトは 5 つのアウトプットが一部を除いて概ね達成されていること、また以下に挙げる事由から、有効性は高いと判断した。

(1) 本プロジェクトの目標はDPWHにおける治水行政機能強化であるが、上記3-3で述べたように、FCSEC技術者の能力向上は顕著であり、その意味において、DPWHの治水行政機能は着実に強

化されていると結論づけられる。特に、治水計画・設計に係る知識と技量、水理実験、研修実施、治水構造物に関する情報管理については、プロジェクトを実施した5年間での改善が目覚ましい。

(2) 5つのアウトプットの中でも、特にアウトプット1のパイロットプロジェクト、アウトプット2の水理実験、技術指針・マニュアル改訂作業、現場事務所・地方自治体への技術援助、およびアウトプット3の研修がプロジェクト目標の達成に大きく貢献した。またアウトプット4及び5を通して、一部成果目標を達成していない部分もあるが、その活動過程において内部支援システムが構築され、プロジェクト目標の達成に貢献した。

4-3 効率性

本プロジェクトは、投入において一部課題があったものの、アウトプットは概ね満足できる水準であることから、効率性は高いと判断した。具体的な根拠は以下の通りである。

日本側の投入に関わるもの：

アプトプット1のパイロットプロジェクト実施に際して、本プロジェクトでは、FCSEC 技術者に対する技術移転のため、日本人専門家が FCSEC 技術者に助言・指導を行い、FCSEC 技術者が現場事務所の技術者を指導するという方法を取った。この方法は、FCSEC 技術者が、学ぶと共に指導するという二つの役割を同時に担うことにより、知識の習得および技量の向上を効率的に進めることに繋がったと考えられる。

フィリピン側投入に関わるもの：

上記3-5で述べたとおり、本プロジェクトではC/Pの不足および予算執行の遅れという投入の問題があったが、配置されたC/P及び日本人専門家の関係が良好であり、上記の通り効率的にプロジェクトが実施できたため、本プロジェクトのアウトプット1～4は十分に達成され、アウトプット5についても一定の成果が確認されている。一方で、FCSECはProject Management Officeであるため、C/P技術者の待遇も所長・部長を除いて契約ベースであり、現在の技術者ポストがプロジェクト終了後も継続して維持されるという保証はないため、FCSEC技術者がプロジェクトで得た成果を継続するためにも早急な改善が必要となっている。

4-4 インパクト

本プロジェクトによる正の波及効果は多分野にわたり、一方で、負の波及効果は生じていないことから、本プロジェクトのインパクトは高いと判断した。実際に観察された正の波及効果は以下の通りである。

(1) 上記3-4で述べたように、パイロットプロジェクトを実施したケソン第一現場事務所では、習得した技術を用いて独自に治水構造物の建設を行っており、他の現場事務所においても、少なくとも4ヵ所において技術指針・マニュアルを参照して治水事業が実施されている。これらは、プロジェクトの直接的な働き掛けによるものではなく、プロジェクトの成果を、現場事務所が自主的に利用しているものである。

(2) プロジェクト期間中において、DPWH が行う全国 12 河川流域の M/P・F/S 策定作業において FCSEC が中心的な役割を担うことが決定された。これは、FCSEC が治水行政の中核的組織として主要な役割を担うことを上位機関である DPWH によって決定されたものと言える。

（3） Kinanliman 川のパイロットプロジェクトでは、三つの波及効果が観察された。一点目は、現場事務所の技術者が、治水計画・設計・施工・維持管理という一連の作業に関する知識を習得し、技量を高めたこと。二点目は、2009 年 9 月 26 日の大規模台風の際にも洪水が発生せず、近隣住民は避難さえする必要がなかったことから、彼らはプロジェクトを高く評価していること。三点目は、市役所の技術担当者も FCSEC による技術的支援を高く評価し、維持管理における協力を検討していることである。

（4） Santa Fe 川のパイロットプロジェクトでは、ソイルセメントという低コストかつ環境への負荷が低い材料が使用された。パイロットプロジェクトを担当する現場事務所は、ソイルセメントの経済性を高く評価し、他の治水事業においてもソイルセメントを材料として使用することを検討している。また、ソイルセメントの有効性は、セミナーなどを通じて他の現場事務所にも共有されつつあり、国内で広く使用される可能性が芽生えつつある。

4-5 自立発展性

本プロジェクトを通じて得られた成果の自立発展性について、現時点（2010 年 2 月）での判断は困難である。これは、FCSEC が DPWH の中で恒久的組織として位置づけられるか否か、が定かではないことによる。FCSEC の恒久化が実現した場合、技術者の立場は契約職員から正規職員となり、かつ中長期にわたる戦略的な技術者育成が可能となるため、自立発展性は高まる。一方、恒久化が実現しない場合、プロジェクト終了後も、恐らく 2～3 年は 12 河川の M/P および F/S 作業のために FCSEC 組織は存在し続けられると推測されるが、その後については不明である。場合によっては、FCSEC は解散し、これまでに蓄積された知見および技能が離散してしまう可能性もある。このような事態が想定されるとしたら、自立発展性は極めて低いと言わざるを得ない。

また、たとえFCSEC組織の恒久化が実現したとしても、DPWH合理化の過程で技術者のポストが減ることは必須である。この際、上記3-3で述べたようなプロジェクトを通じて技量を高めた熟練技術者がFCSECの正規職員として残ることが肝要である。FCSECの組織恒久化が実現しても、高い技量を持つ熟練技術者がポストを得られない場合には、これまでに得られた成果は流出することとなり、高い自立発展性は持ち得ない。

第5章　結論

終了時評価実施時点において、アウトプットおよびプロジェクト目標の達成度は概ね十分な水準に達している。また、5 項目評価についても、自立発展性を除き高いという判断となった。前プロジェクトから継続した支援により、FCSEC 技術者の知識・技量が大幅に向上、定着したのみならず、パイロットプロジェクトを通じて計画・設計・施工・維持管理の全過程を理解し、なおかつ地方の技術者に対して技術的指導が可能な人材が誕生したという点である。彼らの存在は、フィリピンにおける治水行政において真に貴重な財産であると言えよう。

第6章　提言と教訓

6-1 提言

評価結果を踏まえ、本終了時評価団はプロジェクト関係者に対して以下の提言を行った。

- 政策的側面：FCSEC の持つ知見・技術を、プロジェクト終了後も永続的に治水行政の中で活かすため、DPWH および政府関係機関は FCSEC の組織恒久化を実現する。

- 組織的側面：技術者の能力向上を実現するため（下記参照）、DPWH は適切な数の技術者ポストを FCSEC に割り当て、事業予算を確保する。さらに、これらの技術を組織内で保持するため、熟練技術者および中堅・若手が共に事業に携わり、技術が着実に次世代へと受け継がれていくシステムを構築する。

- Master Plan および Feasibility Study：FCSEC 水理実験棟の有効活用のため、DPWH は、全国 12 河川の M/P・F/S 策定過程において、水理実験による治水構造物試験の実施予算を計上する。

- 技術的側面：治水計画から設計・施工・維持管理までの全工程についての知見・技術を持つ技術者を育成するため、FCSEC および DPWH は、各技術者が河川事業において計画から維持管理までを担当できるような人事システムを構築する。また、この過程において、技術者はコンサルタントに業務を一任するのではなく、自ら現場に足を運んで調査に参画し、図面を描き、施工・維持管理の陣頭指揮を執る機会を設ける。

- 日本人専門家による技術支援：全国 12 河川の M/P・F/S 策定作業において、FCSEC は全般的な作業監理をする立場にあるが、当該 12 河川の流域規模は本プロジェクトが対象としたパイロットプロジェクトの河川規模よりも大きいため、場合によっては、FCSEC 技術者の知見・技術では対応できないケースが発生する可能性もあり得る。このような事態に備え、JICA は、必要に応じて日本人専門家による FCSEC 技術者への助言が行えるよう調整しておく。また、このような役割を担う日本人専門家は、治水に関する総合的な技術的知見を保持すると同時に、FCSEC 技術者との間に信頼関係を築くコミュニケーション能力を持つ人材とする。

6-2 教訓

本プロジェクトの経験を通じ、類似の他案件にも適用し得ると考えられる教訓は以下のとおり。

- 水対策のような自然物である河川を対象とした技術には、個々の河川の特性や構造物に関わる河川の現象を把握し、個々の河川に応じた柔軟な対応・技術力が求められる。そのためには、計画・設計・施工・維持管理という一連の流れに関する系統的な知識を身につけ、これらの知識に基づいた実践経験を培うことが重要となる。特に FCSEC のように国の治水行政において技術の指導的立場にある組織には、治水計画・設計・施工・維持管理のすべてにおいて知見を持つ人材が必要であり、このような総合的な知見を持つ治水技術者を育成するためにも、プロジェクトを通して一連の作業において実践的経験を培うことが重要となる。

以上

MINUTES OF MEETINGS
BETWEEN
JAPANESE TERMINAL EVALUATION TEAM
AND
AUTHORITIES CONCERNED OF THE GOVERNMENT OF
REPUBLIC OF THE PHILIPPINES
ON
JAPANESE TECHNICAL COOPERATION PROJECT
FOR
STRENGTHENING THE FLOOD MANAGEMENT FUNCTION
OF DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS (DPWH)

The Japanese Terminal Evaluation Team (hereinafter referred to as "the Team") organized by the Japan International Cooperation Agency (hereinafter referred to as "JICA"), headed by Mr. Shiro Nakasone, visited the Republic of the Philippines from February 9 to 25, 2010, for the purpose of conducting terminal evaluation of the Project for Strengthening the Flood Management Function of Department of Public Works and Highways (hereinafter referred to as "the Project").

During its stay, the Team and the Philippines side formulated the Joint Evaluation Team, conducted a field survey, exchanged views and had a series of discussion with the Philippine authorities concerned.

As a result of the discussions, the Team submitted the terminal evaluation report as attached ANNEX I and both side agreed upon the descriptions of the report.

Manila, February 24, 2010

Mr. Shiro Nakasone
Leader,
The Terminal Evaluation Team,
Japan International Cooperation Agency

Ms. Maria Catalina E. Cabral. PhD.
Assistant Secretary for Planning
Department of Public Works and Highways
Republic of the Philippines

ANNEX I

JOINT TERMINAL EVALUATION REPORT

ON

PROJECT FOR STRENGTHENING THE FLOOD MANAGEMENT FUNCTION OF DPWH

IN

THE REPUBLIC OF THE PHILIPPINES

Manila, Philippines

February 24, 2010

Joint Evaluation Team

CONTENTS

ANNEX

ABBREVIATIONS

BOC	Bureau of Construction (DPWH)
BOD	Bureau of Design (DPWH)
BOM	Bureau of Maintenance (DPWH)
BORS	Bureau of Research and Standards (DPWH)
C/P	Counterpart
DBM	Department of Budget and Management
DEO	District Engineering Office
DPWH	Department of Public Works and Highways
E.O.	(Presidential) Executive Order
EMB	Environment Management Bureau
ENCA	Enhancement of Capabilities
F/S	Feasibility Study
FCSEC	Flood Control and Sabo Engineering Center
FFWSDO	Flood Forecasting and Warning System for Dam Operation
GIS	Geographic Information Systems
HEC-HMS	Hydrologic Engineering Center Hydrologic Modeling System
HEC-RAS	Hydrologic Engineering Center River Analysis System
ICHARM	International Center for Water Hazard and Risk Management
JCC	Joint Coordinating Committee
JICA	Japan International Cooperation Agency
JOCV	Japan Overseas Cooperation Volunteer
LGU	Local Government Unit
MM	Man-Month
M/P	Master Plan
NDCC	National Disaster Coordinating Council
NEDA	National Economic Development Authority
NWRB	National Water Resources Board
OJT	On the Job Training
PAGASA	Philippine Atmospheric, Geophysical and Astronomical Services Administration
PCM	Project Cycle Management
PDM	Project Design Matrix
PHIVOLCS	Philippine Institute of Volcanology and Seismology
PMO	Project Management Office
PO	Plan of Operation
PS	Planning Service (DPWH)
R/D	Record of Discussion
RIDF	Rainfall Intensity Duration Frequency
RO	Regional Office
TSG	Technical Standards and Guidelines
TWG	Technical Working Group

1. Introduction

The "Project for Strengthening the Flood Management Function of DPWH" (hereinafter referred to as the "the project") started in July 2005 and will come to the end of the five-year cooperation in June 2010. According to the JICA guideline, the terminal evaluation needs to be conducted before the end of the project.

1.1 Objective of the Evaluation

The following are the main objectives of the terminal evaluation;

- To verify the accomplishments of the project compared to those planned;
- To identify obstacles and/or facilitating factors that have affected the implementation process;
- To analyze the project in terms of the five evaluation criteria (i.e. Relevance, Effectiveness, Efficiency, Impact, and Sustainability); and
- To make recommendations on the project regarding the measures to be taken for the remaining and the post-project periods.

1.2 Members of the Evaluation Team

The evaluation team consists of both Japanese and the Philippines members as follows:

(1) Japanese Side

Mr. Shiro Nakasone (Leader)	Director, Disaster Management Division1, Water Resource and Disaster Management Group, Global Environment Department, JICA
Mr. Daisuke Kuribayashi (Technical Advisor for Flood Control)	Senior Researcher, Public Works Research Institute, International Centre for Water Hazard and Risk Management
Mr. Masaru Tohei (Technical Advisor for Sabo)	Inspector, Minister's Secretariat, Ministry of land ,Infrastructure, Transport and Tourism
Mr. Wataru Ono (Evaluation Planning)	Deputy Assistant Director, Disaster Management Division1, Water Resource and Disaster Management Group, Global Environment Department, JICA
Mr. Hideyuki Kubo (Evaluation Analysis)	Global Link Management Co., Ltd.

(2) Philippines Side

Mr. Domingo C. Rosario	Engineer III, the Development Planning Division, Planning Service Department, DPWH
Ms. Madelyn B. Loyola	Engineer III, the Development Planning Division, Planning Service Department, DPWH

1.3 Schedule of the Evaluation

The evaluation study was conducted from February 9 to 25, 2010. The joint evaluation team (hereinafter referred to as the "team") collected the information through a series of interviews with Japanese experts and Philippines Counterparts of FCSEC and DPWH. The team also conducted field observation at (a) Kinanliman river, Real, Quezon province, (b) Santa Fe river, Nueva Viscaya province and (c) Digmala river, Bongabon, Nueva Ecija province. Based on these results, the team prepared a draft report and finalized it on February 24, 2010. The detailed schedule is attached (Annex I).

2. Outline of the Project

2.1 Background of the Project

Averagely 20 typhoons approach the Philippines, and half of them land annually. As a result, the country frequently experiences localized torrential rainfall. Since mountainous districts have been destroyed by the major volcanic eruptions and deforestation, slope failure, debris flow and lahar are frequently triggered by heavy rain. Under these circumstances, more than 700 people are killed and approximately 8 billion pesos are lost due to disasters on an annual average. Frequent damages to the infrastructure such as agriculture and transportation seriously affect economic activities over the long term and are regarded as a cause of the increasing disparities among regions and the inflow of poor people into urban districts.

The Government of the Philippines requested the Government of Japan to undertake a technical cooperation project in order to develop the capacities of flood control and sabo engineers by means of establishing the Flood Control and Sabo Engineering Center (FCSEC) within Department of Public Works and Highways (DPWH). In response to the request, Japan International Cooperation Agency (JICA) launched the project for Enhancement of Capabilities (ENCA) in flood control and sabo engineering of DPWH with its aim to enhance the capacities of the engineers of DPWH regional offices. The ENCA project operated for the period of three years from January 10, 2000 to January 9, 2003, and following the recommendations made by the terminal evaluation in July 2002, DPWH and JICA agreed to extend the project as ENCA Stage Two until June 30, 2005.

Based on the recommendation made by the terminal evaluation for ENCA Stage Two, JICA dispatched the Preparatory Study Team to the Philippines in May 2005. As a result of the Preparatory Study, the project for Strengthening the Flood Management Function of DPWH (hereinafter referred to as "the project") was proposed and the Record of Discussions (R/D) was signed on June 2, 2005. The project was launched on July 1, 2005, and will be completed on 30 June 2010.

2.2 Summary of the Project

Overall Goal	More effective and appropriately designed flood control and sabo structures/facilities are implemented by DPWH in accordance with the technical standards, guidelines and manuals.
Project Purpose	The flood management function of DPWH is strengthened through research and development, training, information management, implementation of pilot projects and creation of the internal support mechanism.
Output 1	Pilot projects are implemented using the technical standards, guidelines and manuals.
2	Research is conducted for developing/updating technical standards, guidelines and manuals; and assessing efficient countermeasures for flood control and sabo.
3	Improve knowledge and skills of DPWH engineers on flood control and sabo through training programs.
4	Information Management System is established for a more effective flood management function of DPWH.
5	The internal support mechanism is created to sustain the development of technology and organization in the field of flood control and sabo engineering.

3. Methodology of Evaluation

The terminal evaluation was carried out by the joint evaluation team as described in 1.2. In the first step of the evaluation, the team reviewed the progress and achievements of the project referring to the PDM attached in Annex III. In the next step, the team analyzed and evaluated the project from the viewpoints of 'Relevance', 'Effectiveness', 'Efficiency', 'Impact' and 'Sustainability'. Finally, the team made recommendations for activities in the remaining period of and after the completion of the project.

3.1 Evaluation Questions

Evaluation criteria, items of investigation and evaluation questions are indicated in the Evaluation Grid, which is the grand design of detailed study (the assessment result of the Evaluation Grid is attached in Annex V).

3.2 Data Collection Method and Analysis

3.2.1 Data Collection Method

The team collected necessary data/information in the following manners: (1) collection of relevant documents from FCSEC and the project, (2) questionnaire survey to counterparts and Japanese experts, (3) key informant interview for Counterparts and Japanese experts and (4) field visits to three pilot project sites.

3.2.2 Criteria of Evaluation for Analysis

The evaluation was conducted based on the following five criteria which are the principal framework for the analysis and assessment of any JICA-supported technical cooperation projects.

Relevance	Relevance of the project is assessed by the validity of the project purpose and overall goal in connection with the policy framework of the Government of the Philippines and Japanese aid policy and the needs of beneficiaries.
Effectiveness	Effectiveness is assessed by analyzing the probability to accomplish the project purpose by the end of the project term and the extent to which outputs contribute to the achievement of the project purpose.
Efficiency	Efficiency of the project implementation is analyzed with the emphasis on the relationship between outputs and inputs in terms of timing, quality and quantity.
Impact	Impact of project activities is identified by examining both positive and negative effects that are caused or likely to be caused by the project. They included the effects that were not originally expected in the project plan.
Sustainability	Sustainability of the project is assessed by analyzing the extent to which the achievement of the project will be sustained or expanded after the project ends. The analysis is made from organizational, financial, technical, social and environmental viewpoints.

4. Accomplishment of the Project

Accomplishment of the project is measured in terms of inputs, outputs, project purpose and overall goal, all of which are in accordance with the R/D, PDM and PO.

4.1 Inputs

The following is the list of inputs provided for the project implementation. More detail information is described in Annex IV.

(1) Japanese Side

Experts	The Japanese side dispatched 6 long-term experts and 12 short-term experts in various fields by the time of the terminal evaluation. The total engagement by the end of the project will be 170.2 MM for the long-term experts and 59.5 MM for the short-term experts (the MM for the short-term experts will be increased if another dispatch is arranged in 2010).
Training of C/P in Japan	Eight counterparts were trained in Japan.
Provision of Equipment	A number of equipment were provided by JICA for the effective and smooth implementation of the project with the total cost of 5,342,503 Pesos (approximately equivalent to US$114,364).
Operational Cost	The total operational cost supported by the Japanese side is estimated to be 6,875,344.88 Pesos (approximately equivalent to US$147,176).

(2) Philippines Side

Assignment of C/P	As of mid-February 2010, 14 engineers and 7 administrators/drivers/ laborers are assigned as counterparts. In total, 27 counterparts have been assigned from July 2005 to mid-February 2010.
Budgetary allocation by the Philippines side	The Philippines side provided a part of the operational expenses from the budget allocated to FCSEC. The total operational cost supported by the Philippines side is estimated to be 49,300,832 Pesos (approximately equivalent to US$1,055,353). In addition, the Philippines side bore the cost for pilot project at three sites with the total amount of 53 million Pesos.
Provision of Land, Buildings and Facilities	The Philippines side has provided the administration and dormitory buildings with necessary utilities for the project.

4.2 Achievement of Outputs

Findings regarding the achievement of the expected outputs as of the time of the terminal evaluation are as follows:

Output 1: Pilot projects are implemented using the technical standards, guidelines and manuals.	
Indicator 1-1: At least 3 pilot projects (revetment, spur dike and sabo dam) are planned, designed, constructed and maintained.	Result: Two pilot projects have already been completed and one is currently under construction and will be completed by the end of the project.

Three pilot projects have been implemented for the purpose of capacity building of engineers at FCSEC and DEO by applying TSG/Manual. Countermeasures for flood control that were adopted at each site are; dike and revetment (for the Kinanliman river case); revetment and spur dike (for the Digmala river case); and sabo dam (for the Santa Fe river case) respectively. The Kinanliman river and the Digmala river cases already completed the process of planning (M/P and F/S), design and construction, and monthly monitoring work is currently conducted by a DEO engineer in collaboration with an engineer from Municipality government. For the Santa Fe river case, construction is on-going and will be completed by the end of the project.

In the course of the project implementation, FCSEC engineers have been fully involved in a series of professional work such as; planning (M/P and F/S), designing and construction supervision. According to the engineers involved, the following TSG/Manual were frequently referred to during the implementation of the pilot project:

- TSG for planning and design, Vol.1: Flood control
- TSG for planning and design, Vol.3: Sabo Works
- Manual on flood control planning
- Manual on design of flood control structures
- Manual on non-uniform flow computation with HEC-RAS
- Manual on runoff computation with HEC-HMS

- Typical design drawings of flood control structures
- Manual on construction supervision of flood control projects

It should be acknowledged that the case of Kinanliman river is the very first experience of DPWH/FCSEC to develop M/P and F/S for flood control through the direct involvement of their engineers (the Santa Fe case is the first hands-on experience for sabo dam construction). With the technical guidance provided by Japanese experts, the engineers involved in the work have largely improved their understanding and skills on the M/P and F/S development process and acquired knowledge and skills on a new type of countermeasures.

One difficult thing that needs to be emphasized is on the issue of safety standards. The level of local safety standard was low at all the three sites, compared with the level of TSG/Manual, and this seems to be the general situation throughout the country. FCSEC engineers have already recognized the issue of safety standards through the participation of training courses in Japan and actual operational experiences in the field. The engineers, however, face difficulties to share this new perception with local contractors in the field. It should be noted that changing certain perception that is socially taken for granted and shared among concerned people is extremely difficult.

Output 2: Research is conducted for developing/updating technical standards, guidelines and manuals; and assessing efficient countermeasures for flood control and sabo.	
Indicator 2-1: Recommendation is made for the revision/ modifications/updating of the technical standards, guidelines and manuals.	Result: Recommendation on and revision/ modifications/ updating of technical standards, guidelines and manuals have been made through TWG discussions.
Indicator 2-2: Appropriate countermeasures based on actual field requirements are recommended.	Result: Based on actual field requirements, countermeasures have been recommended to concerned agencies.
Indicator 2-3: Alternative low cost flood control and sabo structures are developed.	Result: Various low cost food control and sabo structures and technologies (e.g. soil cement) have been developed and utilized.
Indicator 2-4: Reports on the usage/applicability of the technical standards, guidelines and manuals are prepared.	Result: Technical reports have been developed regarding usage/applicability of the technical standards, guidelines and manuals.

A range of research experiments have been conducted at the Hydraulic Laboratory in order to assess the appropriateness of countermeasures for flood control and to experiment proposed low-cost structures. In total, 16 experiments were conducted during the project period in which 6 were for the former purpose and 4 were for the latter including the assessment of soil cement techniques. The results of the experiments for the assessment of proposed countermeasures at three pilot sites were reflected to the actual operations of the pilot projects. It should be noted that planning, designing, development and data collection of the research experiments can now be managed by FCSEC engineers unless experiments are too complicated.

Since October 2008, the revision process of the TSG/Manuals that were produced during the first phase JICA project (i.e. ENCA) has been undertaken. Weekly technical meetings have

been organized in which staff from FCSEC, BOD, BOC, PS, BORS and BOM participate. In the meetings, participants examine sentence by sentence in each of TSG/Manual and revise them so as to make them more comprehensive in content and user friendly in expression.

Since technical capacity of FCSEC on flood control is getting recognized by concerned agencies, an increasing number of technical assistance have been requested by DEO and LGU. There are at least 14 assistances provided during the project implementation in which countermeasures were suggested to them based on field survey. In addition, 7 technical reports and manuals were produced by the time of the terminal evaluation and distributed to concerned agencies and offices.

Output 3: Improve knowledge and skills of DPWH engineers on flood control and sabo through training programs.	
Indicator 3-1: Increased level of proficiency of engineers of more than 100 offices through the training on planning and design of flood control structures.	Result: Training on planning and design of flood control structures has been organized for participants from more than 100 DEO offices and participants' knowledge and skills are improved.
Indicator 3-2: Increased level of proficiency of engineers of 40 offices through the training on planning and design of sabo works engineering.	Result: Training on planning and design of sabo works engineering has been organized for participants from more than 40 DEO offices.
Indicator 3-3: Increased level of proficiency of engineers of more than 100 offices through the training on construction supervision of flood control and sabo projects.	Result: Training on construction supervision of flood control and sabo projects has been organized for participants from more than 100 DEO offices and participants' knowledge and skills are improved.
Indicator 3-4: Increased level of proficiency of engineers of more than 100 offices through the training on maintenance of flood control and sabo structures.	Result: Training on maintenance of flood control and sabo structures projects has been organized for participants from more than 100 DEO offices and participants' knowledge and skills are improved.

The following training programs have been organized as of February 2010 in order to enhance knowledge and skills of technical staff at RO/DEO:

Training Program	Batch	Participating RO/DEO	Participant Number
1. Planning and Design of Flood Control Structures (Lecture)	6	111	152
2. Planning and Design of Flood Control Structures (OJT)	2	25	48
3. Construction Supervision of Flood Control Structures	6	107	160
4. Maintenance of Flood Control Structures	6	109	150
5. Planning and Design of Sabo Works	2	45	48

Two more courses are currently planned for Planning and Design of Flood Control Structures (OJT) in March and May 2010. These training programs are organized with the initiative of FCSEC engineers with some technical advices from Japanese experts. The experiences of the pilot project are also incorporated into the training programs.

The result of the ex-post evaluation that was conducted by DPWH one year after the training implementation (for 6 batches of three training program No.1, 3 & 4 that were conducted

in 2007) is as follows (The total number of training participants is 140 for the 6 batches and interviewees of the ex-post evaluation were 103; i.e. 74% of the total participants):

- 80% of participants say they are currently involved in flood control activities.
- 36% of participants say they apply knowledge in their current work much/very much which they learned during the course
- 59% of participants say they apply skills in their current work much/very much which they learned during the course
- 85% of participants' supervisors say the training has improved overall performance of the trainees by a large extent

Output 4: Information Management System is established for a more effective flood management function of DPWH.	
Indicator 4-1: Networks with other related agencies/ organizations are established for improved data sharing and coordination.	Result: Flood control data throughout the country has been collected through the network of concerned organizations and shared with organizations in different sectors.
Indicator 4-2: Coordination meetings /seminars on flood and sabo management are held with other related agencies/organizations at least once a year.	Result: Various seminars have been organized to share flood control and sabo management technologies with other related organizations.
Indicator 4-3: Adequate data and information are collected, analyzed and compiled in the database.	Result: Database on flood control structures throughout the country has become operational and updated.
Indicator 4-4: Annual Report is submitted at the end of the year. FCSEC Bulletin is published twice a year.	Result: Formal quarterly reports have been submitted to NEDA. FCSEC newsletter has been issued.

The work of data/information collection and distribution related to flood control has been conducted for the purpose of effective functioning of FCSEC and its knowledge sharing with other concerned agencies.

For gathering data on flood control inventory throughout the country, the project/FCSEC distributed a jurisdiction map to 138 DEOs nationwide in 2006 and requested them to provide with location and concerned data of existing flood control structures within their coverage area. The response rate was 100% for the first inventory. The second round of data collection (i.e. data updating) was conducted in 2009. The response rate was 62% for the second time. These data are incorporated into the electric file in the excel format and drawings and photographs are stored as a hard copy. It is expected that data updating operation will be conducted every 2-3 years.

The library at the FCSEC building was upgraded. Books and materials concerning flood control have been stored pertinently, the list of these books and materials was elaborated and a computer retrieving system was developed.

As information sharing and dissemination operations, the project/FCSEC has been engaged in the following activities:

- Organized two seminars and disseminated the result of research experimentation regarding the assessment of proposed countermeasures at two pilot projects and others. The seminars

were attended by concerned agencies and organizations such as various branches of DPWH, NEDA, PAGASA, NWRB, PHIVOLCS, LGU, Universities and NGOs;

- Attended 22 coordinating meetings and workshops that were organized by NDCC, NEDA, PAGASA, NWRB, PHIVOLCS, EMB and UP;
- Issued four newsletters; and
- Submitted formal quarterly reports to NEDA on the progress of project activities following the PDM framework.
- Presented the outline and concept of National Flood Management Framework Plan at the NDCC cabinet meeting on Feb. 28, 2006.

FCSEC has entered into agreement with International Center for Water Hazard and Risk Management (ICHARM), which is the international organization concerned with issues on water-related disaster mitigation, located in Japan, in order to elaborate technical cooperation between two organizations and capacity building of FCSEC engineers. ICHARM accepts one FCSEC engineer as a trainee of "Water-Risk Management Course of Disaster Management Policy Program" from October 2009 to September 2010.

Output 5: The internal support mechanism is created to sustain the development of technology and organization in the field of flood control and sabo engineering.	
Indicator 5-1: Resolutions in support of the project objectives/goals are approved by the JCC.	Result: In the JCC meetings, suggestions have been made to DPWH that the FCSEC permanency should be realized. However, no resolution has been approved.
Indicator 5-2: Plan/document on the sustainability of the project gains is submitted to and approved by DPWH management.	Result: In the rationalization process of DPWH, its management committee has reportedly agreed with the FCSEC permanency and submitted the proposal to DBM. However, no formal statement regarding the FCSEC permanency has been made by DPWH management.

Internal mechanisms of supporting and elaborating effective functioning of FCSEC for flood control with the support of concerned branches of DPWH have been created through the establishment of JCC and TWG. JCC, headed by the Assistant Secretary for Planning and with the participation of other principal branches such as PS, BOD, BORS and BOM, has been convened for 6 times as of February 2010. Overall monitoring of the project activities and their progress is the main topic of discussion. TWG has been organized for 8 times and addressed issues on pilot project implementation. Participants include staff from concerned branches of DPWH as described above so that processes and experiences of the pilot project implementation have been timely shared within DPWH.

In 2008, DPWH launched the preparation process of M/P and F/S for 12 river basins nationwide, which can be considered as the main study of DPWH on flood control at the moment. On Feb.1, 2010, DPWH issued a "Special Order No.50, Series of 2010: Creation of a steering

committee and technical working group for the conduct of master plan and feasibility study of flood control and drainage project on selected river basins nationwide (i.e. the 12 river basins mentioned above)." In the steering committee, Head of FCSEC serves as vice-chairperson (chairperson is Assistant Secretary for Planning). In the technical working group, project manager of FCSEC serves as chairperson and one engineer is a group member.

A rationalization plan of DPWH[1], that is to streamline the organization for effective and efficient administrative functioning within the government, was already in the air as of 2005. This indicates that there was not much scope for FCSEC to address the issue of FCSEC permanency independently from the plan at that time, but was more appropriate to pursue within the scope of the DPWH rationalization plan[2] although the chance of realizing the FCSEC permanency was not high under the streamlining policy. Through JCC meetings, the project/FCSEC as well as the embassy of Japan have repeatedly requested the DPWH management to realize the FCSEC permanency. In 2009, however, it was reported that the rationalization plan was suspended indefinitely so that FCSEC/the project took an action to pursue the permanency of FCSEC through the issuance of Presidential Executive Order. They submitted a formal letter to Secretary on June 30, 2009 on this matter and held a meeting with Undersecretary on August 30, 2009. As of mid-February 2010, however, no arrangement is made on the issue of the FCSEC permanency.

4.3 Project Purpose

Findings regarding the achievement of the project purpose as of the time of the terminal evaluation are as follows:

Project Purpose: The flood management function of DPWH is strengthened through research and development, training, information management, implementation of pilot projects and creation of the internal support mechanism.	
Indicator 1: Policies and Regulations of DPWH which reflect recommendations provided by FCSEC	Result: No policies or regulations have been issued at the national level regarding flood control.
Indicator 2: Utilization of technical standards guidelines and manuals by DPWH Regional and District Engineering Offices.	Result: Several DEOs have already utilized technical standards guidelines and manuals produced by FCSEC.

The interviews to the C/P by the evaluation team revealed that some C/P who have been involved in the pilot project and research teams have substantially enhanced their professional capacity through the project implementation. The former acquired knowledge and skills in formulating M/P and F/S on flood control on which he could not address before the project

[1] DPWH issued Department Order No.205 in October 2004 titled "Creation of a DPWH change management team to prepare the DPWH rationalization plan prescribed under E.O. No.366, 2004."

[2] The evaluation team was informed that there are two ways to make the status of PMO permanent: one is through the issuance of Executive Order and the other is through the congress. FCSEC, which holds the PMO status pursued to obtain the permanent status through the issuance of E.O. before, but this strategy was suspended when the idea of rationalization plan emerged.

started, and the latter can now manage the planning, designing and execution of research experimentation at the hydraulic laboratory even without external technical advice. When the laboratory was constructed in 2002, he could not manage the work at all. Aside from these C/P, the Japanese experts confirmed that most of C/P gradually improved their knowledge and skills related to flood control in various fields such as planning, designing, construction supervision, research and information management.

A survey was conducted to ask DEO if they use TSG/Manual and find them as useful. The result of the survey is as follows (the number of response was 10):

Title of TSG/Manual	Frequent use*
TSG Vol. I – Flood control	50%
TSG Vol. II – Urban drainage	0%
TSG Vol. III – Sabo works	20%
TSG Vol. IV – Natural slope failure countermeasures	20%
Manual on design of flood control planning	30%
Manual on flood control structures	20%
Manual on runoff computation with HEC-HMS	10%
Manual on non-uniform flow computation with HEC-RAS	10%
Specific discharge curve, RIDF curve and isohyets of probable 1-day rainfall	10%
Typical design drawings of flood control structures	40%
Manual on construction supervision of flood control projects**	40%

*Percentage of responses which rated the TSG/Manual as useful and frequently using.
** DPWH issued Department Order No.28, Series of 2005 that stipulated the use of the Manual by all DPWH engineers involved in the implementation of all DPWH flood control projects.

4.4 Overall Goal

Findings regarding the projection for the achievement of the overall goal as of the time of the terminal evaluation are as follows:

Overall Goal: More effective and appropriately designed flood control and sabo structures/facilities are implemented by DPWH in accordance with the technical standards, guidelines and manuals.	
Indicator 1: Number of flood control and sabo structures/facility that are designed and constructed in accordance with the technical standards , guidelines and manuals formulated and produced by FCSEC.	Result: There are at least four cases that flood control and sabo structures were designed and constructed in accordance with the technical standards , guidelines and manuals produced by FCSEC*.
Indicator 2: Disaster Mitigation Plans which reflected recommendation provided by FCSEC	Result: FCSEC proposed National Flood Management Framework Plan to NDCC but the plan has not been launched.

* The assessment is made based on the questionnaire responses from the five DEOs out of more than 180 DEOs so that it does not represent nationwide status.

The following is the list of flood control activities at the level of DEO that are conducted by applying TSG/Manuals produced by FCSEC (the data coming from the questionnaire survey conducted by FCSEC – there are five responses altogether):

DEO	Activities/Studies	TSG/Manual used
Region X Bulua	Construction of flood control at Lugait river	Manual on design control structures
	Construction of Opol flood control	Manual on flood control planning
	Construction of Napaliran revetment	Determination of design discharge
	Hydrologic analysis of proposed bridge	River planning / Runoff analysis
Region X Gingoon	Hubangon river control	Implementation and design
	Agono river control	Implementation and design
	Mahmog line canal	Implementation and design
	Construction of slope stabilization	TSG Vol.IV
	Napanran flood control	TSG Vol.I
	Santa Ines flood control	TSG Vol.I
	Nedina flood control	TSG Vol.I
	Ginedog flood control	TSG Vol.I
Region VIII Southern Leyte	Maasin river control	Manual on construction supervision
	Ilag road slip	Manual on construction supervision
Region I, Ifugao	Lawig river control	Manual on design

The Quezon 1st DEO, that was in charge of the pilot project implementation at the Kinanliman, has extended flood control work at the Kinanliman river with their own initiative beyond the pilot project. DEO engineers, who used to construct flood control structures without planning and due designing, are now applying new knowledge and skills which they have learned through the pilot project and able to construct more effective and appropriately designed flood control structures in accordance with TSG/Manual.

FCSEC presented the outline and concept of National Flood Management Framework Plan at the NDCC cabinet meeting on Feb.28, 2006, which is the highest coordination body for disaster preparedness, disaster operations and rehabilitation from disaster. However, the Plan has not yet been taken into considerations officially.

5. Implementation Process

5.1 Progress of Activities

Due to shortage of C/P and slow disbursement of local budget, the implementation of project activities has been delayed compared with the original plan. In particular, the implementation of pilot project activities was affected. The lack of C/P assignment also caused the existing C/P to address many different jobs in parallel. Despite such difficulties, all the planned activities will be completed by the end of the project. There is one concern, however, that the construction of sabo dam at Santa Fe river, one of the pilot project sites, might not be completed by the end of the project if the release of remaining budget (5 million pesos) is delayed.

5.2 Management and Ownership

Project management and monitoring have functioned appropriately. Communication among Japanese experts and C/P has been smooth and status and progress of project activities are effectively shared through formal monthly meetings as well as informal discussions. All the

Japanese experts and C/P mention that project decision making process has been satisfactory within FCSEC/the project. FCSEC compiled a project progress report every three months and submitted it to NEDA as a formal quarterly monitoring report.

C/P engineers have been seriously and actively involved in the project activities. This perception is supported by all the Japanese experts. Through individual interviews with C/P, the evaluation team identified that attitude of C/P is honest, serious and professional and their commitment to the flood control work is very high.

One critical issue is the decision making by DPWH regarding budget disbursement and C/P assignment. With repeated requests from FCSEC/the project, these issues are to some extent improved at early 2010.

Questionnaire survey and individual interviews to C/P clearly indicate that the method of technology transfer by Japanese experts is very appropriate and all of the C/P, including FCSEC director, appreciate the work and effort of the Japanese experts.

5.3 Addressing Recommendations of Mid-Term Evaluation

The following status has been observed regarding the recommendations that were made at the time of mid-term evaluation:

- DPWH assigned three additional C/P in July 2008 and three more in January and February 2010. However, C/P for the pilot project activities has not been assigned from the DPWH central office and PMO.
- Proposed budget of P50 million is duly disbursed although the timing of disbursement was late.
- No arrangement has been announced for the FCSEC permanency as of mid-February 2010.
- FCSEC accommodates other organizations to conduct research experiments at the Hydraulic Laboratory, such as universities. However, due to the shortage of C/P assignment, the personnel in charge of research experiments is also required to deal with other important project activities (such as TSG/Manual revision) so that it was difficult for him to focus on the work of further promotion of Laboratory utilization.

6. Evaluation Results

The summary of five criteria evaluation of the project is described below. Further details of the evaluation are shown in Annex V (Evaluation Grid).

6.1 Relevance

Relevance of the project is very high based on the following reasons. First, floods, slope failure and debris flow have caused loss of more than 700 lives and 8 billion pesos annually in the Philippines so that flood control activities are critically important to address the issue.

Second, flood control is relevant in the context of national policy in the Philippines. In the Medium-Term Public Investment Program (2005-2010), the government stipulates flood control works as one of ten principal strategies that operationalize the Program. In the Strategic Plan of DPWH (2004-2010), the role of FCSEC is identified as one of main strategies of DPWH.

Third, the identification of project target group is highly appropriate. Principal target group of the project is DPWH staff at the level of RO/DEO as well as FCSEC engineers. Since the project purpose is to strengthen technical and administrative capacity of DPWH, it is appropriate that their staff at field level are the main target group.

Fourth, an approach adopted in the project is highly pertinent for the achievement of project purpose. Unlike the previous aid projects in which Japanese experts carried out most of the principal work of planning, designing and construction supervision of flood control countermeasures, this project has adopted a different approach. Conceptually, the project was designed in such a way that Japanese experts build up the technical capacity of FCSEC engineers with hands-on experiences and FCSEC engineers then enhance knowledge and skills of local DPWH staff at the RO/DEO level. This approach is pertinent in relation to the project purpose as it leads to strengthening the capacity of DPWH staff.

Fifth, the project is highly relevant to aid policy of the Japanese government. The country assistant program for the Philippines that was developed by the government of Japan in 2008 stipulates environmental protection and disaster prevention as one of four priority areas of cooperation. This document particularly describes natural disaster prevention in which the improvement of information dissemination to concerned communities is emphasized. It also stipulates the priority for the "development, maintenance and management of flood control and sabo (erosion control) infrastructure in high priority sites...taking into account of the fiscal situation of the Philippines".

6.2 Effectiveness

Effectiveness of the project is high based on the following reasons. First, the project purpose is achieved at the certain level in a sense that (1) knowledge and skills of FCSEC engineers have been enhanced to a large extent in terms of planning (i.e. MS and F/S), designing and construction supervision of flood control projects (relatively small-scale); research; training; and information management compared with their capacity five years ago; and (2) eight out of ten RO/DEO which responded to a questionnaire already utilize TSG/Manual that were produced by FCSEC/ENCA. It should be emphasized that the achievement of the project purpose at the certain level is made despite the situation that the pre-conditions and important assumptions (i.e. FCSEC permanency, C/P assignment and on-time budget release) have not been satisfied even at the time of the terminal evaluation.

Second, the causal relationship of five outputs and project purpose is strong and they contributed toward the achievement of project purpose. Among others, one of the most important aspects in the project implementation is the direct involvement of FCSEC engineers in the entire process of planning, designing and construction supervision (and maintenance that will be

followed in coming months)[3]. This has successfully enabled to strengthen the capacity of FCSEC.

6.3 Efficiency

Efficiency of the project is high based on the following reasons. First, four outputs are produced at the satisfactory level and one (output 5) at the moderate level at the time of the terminal evaluation, as demonstrated in 4.2 above.

Second, in producing output 1, the strategy of the pilot project implementation is very appropriate. Japanese experts (both long-term and short-term) provided technical and management guidance and suggestions to FCSEC engineers and the engineers then provided the same to DEO engineers and contractors in the field. This strategy has efficiently functioned for FCSEC engineers to digest technical knowledge and enhance their skills.

Third, shortage of C/P as well as slow disbursement of local budget negatively affected the effective implementation of project activities and the achievement of outputs. In addition, the PMO status of FCSEC also negatively affected the project implementation because the employment of FCSEC engineers is on the temporal basis so that they need to worry about a new employment opportunity toward the end of the project. It is likely that the technical capacity of FCSEC engineers could have been further strengthened if these obstacles were removed. Despite these difficulties regarding the provision of inputs (from the Philippines side), however, activities have been conducted and outputs are being produced. This is largely thanks to strenuous efforts by FCSEC engineers and Japanese experts. It should be noted, however, that the shortage of inputs cannot be justified even though activities are conducted and outputs are produced.

6.4 Impact

Impact of the project is high based on the following reasons. First, during the survey by the evaluation team, no negative effects are identified or reported that are brought about by the project, including the effects of the pilot project implementation.

Second, the following positive effects are identified: (a) some RO/DEO are reportedly using TSG/Manuals produced by FCSEC/ENCA for designing and constructing flood control structures within their jurisdiction area; (b) FCSEC plays a crucial role in developing M/P and F/S for 12 river basin throughout the country, which is the major study of DPWH at the moment; and (c) the following positive effects are observed at respective pilot project sites:

[3] In flood control engineering, it is widely acknowledged that effective and efficient flood control cannot be achieved by just following regulations on flood control structures but engineers are required to closely observe river phenomenon and seek for better alternatives on countermeasures all the time because river phenomenon is always evolving and no one can assure the future of river phenomenon (Takahashi 1990). Hence, engineers should be involved in the entire process of planning, designing, construction supervision and maintenance in order to pursue effective and efficient flood control management (Nakamura forthcoming).

At the Kinanliman pilot project site

- Engineers at the DEO have acquired new knowledge and skills regarding flood control through the 1st and 2nd phases of the Kinanliman flood control project (which are the pilot project supported by the JICA project). They have then applied such knowledge and skills at the 3rd phase of the Kinanliman flood control project (which is the DEO's own work beyond the JICA project).
- Residents nearby the site highly appreciate the construction of the flood control structure as has removed the risk of flood at the site. This was already demonstrated on September 26, 2009 when large typhoon hit the area. Residents were no longer required to evacuate but could just stay at home.
- Municipality government clearly acknowledges the advanced work made by the pilot project and FCSEC collaborates with them in monitoring work of the newly constructed flood control structure.

At the Santa Fe project site

- Engineers at the DEO have learned cost-effective and low-emission soil cement techniques and they now plan to use the technique for the construction of flood control structures. An idea of applying the soil cement technique at other DEOs is also emerging.

6.5 Sustainability

Sustainability of the project is ambiguous at the time of the terminal evaluation because the organizational support to FCSEC by the government is not clear as of mid-February 2010. If the rationalization plan is endorsed by the government and FCSEC holds permanent status, human resource and finance are secured even after the termination of the project. Hence, FCSEC could function toward overall goal and sustainability can be considered as high. If the FCSEC permanency is not realized, provision of human resource and finance would continue over the next couple of years thanks to the study on 12 river basin but the shortage of staff and slow disbursement of budget would prevail as the case of now. Furthermore, the role of the FCSEC and its expertise will not be sustained after the termination of the M/P and F/S development unless the permanency is realized. There is a serious risk that the enhanced capacity of FCSEC might fade away if the engineers are moved to other positions inside or outside DPWH upon the termination of M/P and F/S development process. Sustainability is considered as low in such a case.

7. Conclusion

We conclude the project is very positive overall, at the time of the terminal evaluation, and the five evaluation criteria results are favorable, except that sustainability is dependent on the policy choice by the government of the Philippines. Furthermore, we find that the enhanced knowledge and skills of FCSEC engineers, which were materialized through their actual experiences of the project implementation, are truly precious assets in addressing flood control issues in the Philippines as there is no such quality expertise within the country other than in FCSEC. The evaluation team highly appreciates all the efforts made by C/P and Japanese experts as well as other concerned stakeholders involved in the project.

8. Recommendations and Lessons Learned

8.1 Recommendations

- Policy aspect: DPWH and other concerned agencies are strongly requested to make their best efforts to realize the FCSEC permanency in order to address flood control issues in the Philippines through the utilization of quality knowledge and skills of FCSEC, which are the best capacity in the country. Furthermore, DPWH is requested to pay more attention to the importance of addressing flood control and allocate more budget to its activities at the RO/DEO level.

- Technical aspect: FCSEC and DPWH are requested to adopt human resource policy at FCSEC that its engineers acquire a range of knowledge and skills regarding flood control from planning to designing, construction supervision and maintenance. This has to be materialized through their direct involvement in the actual experiences in the project implementation in the field, as the current pilot project is doing. Furthermore, DPWH is strongly advised to effectively utilize knowledge and skills that are stored at FCSEC in addressing flood control issues throughout the country.

- Organizational aspect: In order to ensure capacity building of FCSEC engineers as mentioned above, DPWH and FCSEC are requested to allocate a number of positions at FCSEC and secure the budget for its operation. It is also suggested that skilled, mid-level and young engineers are working together in order to share quality knowledge and skills for future generation in the country.

- M/P and F/S: In the process of M/P and F/S of the 12 river basin, DPWH is requested to assign FCSEC to be in charge of the implementation of M/P and F/S and also to provide fund for modeling and testing proposed countermeasures at the Hydraulic Laboratory.

- Technical advice by a Japanese expert: JICA is requested to support the provision of technical advice by a Japanese expert to FCSEC engineers when it is required since the scale of M/P and F/S of the 12 river basin is rather large compared with that of the three pilot projects. The expert should hold due capacity in terms of both technical expertise and communication skills for the establishment of respectful interpersonal relationships with FCSEC engineers.

8.2 Lessons Learned

- Capacity building of local engineers in flood control can be more effective if local engineers have direct involvement of in the entire process of flood control activities such as planning, designing and construction supervision with technical advices by Japanese experts.

- Transfer of technology to local engineers can be achieved more effectively if Japanese experts and the local engineers have a smooth communication through respectful interpersonal relationships between them.

References

Takahashi, Y. (1990) *River Engineering*. University of Tokyo: Tokyo.

Nakamura, S. forthcoming. Flood control in the Philippines. *Kokkenkyo-jouhou*.

Annex I

Schedule of the Evaluation

Date	Activities		
	Consultant and Philippines members*	Leader, Evaluation Planning	Technical Advisors
2/09 Tue	→ Manila PM Meeting at JICA office		
10 Wed	Interviews at FCSEC		
11 Thu	AM Meeting and interviews at FCSEC PM Data collection at DPWH		
12 Fri	Interviews at FCSEC		
13 Sat	Data analysis and report writing		
14 Sun	AM Report writing PM Report writing and mission meeting	→ Manila PM Mission meeting	
15 Mon	Manila → Real (Quezon) Meeting at DEO, Visit pilot project site		
16 Tue	Meeting at LGU Real → Manila		→ Manila
17 Wed	Manila → Nueva Viscaya Meeting at DEO		
18 Thu	Visit pilot project site, Meeting at LGU Nueva Viscaya → Bongabong (Nueva Ecija), Visit pilot project site		
19 Fri	Meeting at DEO Meeting at LGU, Bongabong → Manila		
20 Sat	Preparation of evaluation report and presentation		
21 Sun	Preparation of evaluation report and presentation		
22 Mon	Meeting at FCSEC Meeting at JICA		
23 Tue	AM Meeting at DPWH PM Meeting at JICA		
24 Wed	AM JCC meeting PM Meeting at JICA		
25 Thu	Manila → Tokyo		

* Philippines members joined the mission from AM activities on Feb.11.

Annex II

List of Personnel Contacted

1. Department of Public Works and Highways

Name	Position
Ms. Maria Catalina E. Cabral, PhD	Assistant Secretary for Planning
Mr. Melvin B. Navarro	Director III, Planning Service
Ms. Rebecca T. Gatsuta	Chief of Development Planning Division, Planning Service

2. Flood Control and Sabo Engineering Center of DPWH

Name	Position
Mr. Resito V. David	Project Director
Ms. Dolores M. Hipolito	Project Manager II
Mr. Gil I. Iturralde	Engineer V
Mr. Galileo Fortaleza	Engineer V
Mr. Alexander B. Borja	Engineer IV
Mr. Michael T. Alpasan	Engineer IV
Mr. Jessie C. Felizardo	Engineer IV
Ms. Lourdes F. Aninipot	Engineer IV
Mr. Grecil Christpher R. Damo	Engineer III
Mr. Harold Uyap	Engineer III
Mr. Adolfo Rey	Information Technology Officer III

3. Project for Strengthening the Flood Management Function of DPWH

Name	Position
Mr. Shinya NAKAMURA, PhD	Chief Advisor
Mr. Shinichi HASEBE	Sabo Engineering
Mr. Junichi FURUKAWA, PhD	Coordinator

4. Quezon 1st District Engineering Office of DPWH

Name	Position
Mr. Alfredo M. Peñamante, Sr	District Engineer
Mr. Freddie M. Combalicer	Project Engineer

5. Municipality of Real, Quezon Province

Name	Position
Mr. Manuel M. Merana	Executive Assistant and Municipal Administrator

6. Nueva Viscaya 2nd District Engineering Office of DPWH

Name	Position
Mr. Rodolfo M. Torralba, Jr.	District Engineer
Mr. Glenn Miguel	Project Engineer

7. Municipality of Santa Fe, Neva Viscaya Province

Name	Position
Florante S. Gerdan	Mayor

8. Nueva Ecija 2nd District Engineering Office of DPWH

Name	Position
Mr. Ulysses C. LLado	District Engineer
Mr. Eduardo Hernandez	Project Engineer

9. Municipality of Bongabong, Neva Ecija Province

Name	Position
Ms. Amelia Gamilla	Mayor

10. JICA Philippines

Name	Position
Mr. Norio MATSUDA	Chief Representative
Mr. Masafumi NAGAISHI	Senior Representative
Ms. Yoko NOMURA	Project Formulation Adviser
Mr. Kessy A. Reyes	Program Officer

Annex III

Project Design Matrix (PDM 1)

Project name : Project for Strengthening the Flood Management Function of DPWH
Implementing Agency : Flood Control and Sabo Engineering Center of DPWH (FCSEC) — Date : February 6, 2008
Target group : Internal organizations and Personnel of DPWH relevant to Flood Control and Sabo Engineering activities — Duration : July 01, 2005 – June 30, 2010

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
(Super Goal) Water-induced disasters are mitigated through improved effectiveness of flood control and sabo structures and other measures implemented by DPWH for sustainable development.	Significant decrease in damage to life and properties.	1. Damage Assessment Report 2. Calamity Report	
(Overall Goal) More effective and appropriately designed flood control and sabo structures/facilities are implemented by DPWH in accordance with the technical standards, guidelines and manuals.	1. Number of flood control and sabo structures/facility that are designed and constructed in accordance with the technical standards , guidelines and manuals formulated and produced by FCSEC. 2. Disaster Mitigation Plans which reflected recommendation provided by FCSEC	1.Physical status of project implementation report issued by Bureau of construction 2.Dully accomplished feedback questionnaires from the Regional and District Engineer Offices 3. FCSEC Quarter Report 4.Disaster Mitigation Plans at all levels (Nation, Province Municipality Barangay)	1. Flood management policy of DPWH and related offices/agencies are reviewed and made appropriate for the prevailing conditions in the country. 2. No abrupt change in environment and natural conditions takes place.
(Project Purpose) The flood management function of DPWH is strengthened through research and development, training, information management, implementation of pilot projects and creation of the internal support mechanism.	1. Policies and Regulations of DPWH which reflect recommendations provided by FCSEC 2. Utilization of technical standards guidelines and manuals by DPWH Regional and District Engineering Offices.	1. Policies and Regulations of DPWH 2. Duly accomplished feedback questionnaires from the Regional and District Engineer Offices	1. Support from relevant offices in DPWH and other agencies/organizations is sustained. 2. The national budget for flood control projects is sustained
(Outputs) 1. Pilot projects are implemented using the technical standards, guidelines and manuals. 2. Research is conducted for developing/updating technical standards, guidelines and manuals; and assessing efficient countermeasures for flood control and sabo. 3. Improve knowledge and skills of DPWH engineers on flood control and sabo through training programs.	1-1 At least 3 pilot projects (revetment, spur dike and sabo dam) are planned, designed, constructed and maintained. 2-1 Recommendation is made for the revision/ modifications/updating of the technical standards, guidelines and manuals. 2-2 Appropriate countermeasures based on actual field requirements are recommended. 2-3 Alternative low cost flood control and sabo structures are developed. 2-4 Reports on the usage/applicability of the technical standards, guidelines and manuals are prepared. 3-1 Increased level of proficiency of engineers of more than 100 offices through the training on planning and design of flood control structures 3-2 Increased level of proficiency of engineers of 40 offices through the training on planning and design of sabo works engineering 3-3 Increased level of proficiency of engineers of more than 100 offices through the training on conclusion supervision of flood control and sabo projects. 3-4 Increased level of proficiency of engineers of more than 100 offices through the training on maintenance of flood control and sabo structures.	1-1 Progress reports, Accomplishment Reports 2-1 Supplementary technical standards, guidelines and manuals 2-2 Technical report, Minutes of Meeting / Records of Discussion, Letter Request 2-3 Technical report, Approved design plans 2-4 Reports 3-1Record of training/Evaluation report 3-2 Record of training/Evaluation report 3-3 Record of training/Evaluation report 3-4 Record of Training/Evaluation report	1. Trained staff continue working for DPWH and develop expertise in flood control and sabo engineering. 2. FCSEC is supported by policies of the government. 3. Appropriate provincial budget is continuously allocated

4. Information Management System is established for a more effective flood management function of DPWH.	4-1Networks with other related agencies/organizations are established for improved data sharing and coordination. 4-2 Coordination meetings /seminars on flood and sabo management are held with other related agencies/organizations at least once a year. 4-3 Adequate data and information are collected, analyzed and compiled in the database. 4-4 Annual Report is submitted at the end of the year. FCSEC Bulletin is published twice a year.	4-1 Letter request for information sharing 4-2 Records/materials of seminars 4-3 Updated database 4-4 Publications of FCSEC Annual Reports and Newsletters	
5. The internal support mechanism is created to sustain the development of technology and organization in the field of flood control and sabo engineering.	5-1 Resolutions in support of the project objectives/goals are approved by the JCC. 5-2 Plan/document on the sustainability of the project gains is submitted to and approved by DPWH management.	5-1 Recommendations to JCC and TWG 5-2 Approved plan/document	
(Activities) 1-1 Collect available data/information regarding the selected pilot sites through survey and investigation, and interviews with local residents. 1-2 Formulate Master Plan(s) for pilot rivers. 1-3 Conduct Feasibility Studies on the pilot projects identified in the Master Plan(s). 1-4 Conduct hydraulic experiments for the pilot projects. 1-5 Conduct detailed design of the pilot projects. 1-6 Supervise the construction of the pilot projects. 1-7 Conduct post evaluation of the completed pilot projects. 1-8 Prepare/submit reports. 2-1 Conduct field survey and investigation including disaster survey, and provide technical assistance. 2-2 Conduct hydraulic experiments for other offices/organizations' technical requirements and to further improve the technical standards, guidelines and manuals. 2-3 Monitor usage/applicability of the technical standards, guidelines, manuals and other outputs of the project. 2-4 Make reports and recommendations. 3-1 Continue training on structure planning & design, construction supervision and maintenance. 3-2 Commence training on planning and design of sabo works. 3-3 Evaluate the training. 4-1 Conduct coordination meetings/seminars with related agencies/organizations regarding flood and sabo management. 4-2 Issue bulletins and annual reports. 4-3 Accumulate and compile data and information. 4-4 Continuosu upgrade of Library 5-1 Hold consultative meetings regularly to strengthen the internal mechanism. 5-2 Prepare a plan/document on the sustainability of the project gains.		(Input) [Philippine side] ▪ Assignment of a sufficient number of counterpart personnel ▪ Assignment of administrative support staff ▪ Buildings/facilities ▪ Expenses necessary for the implementation of the project and for operation and maintenance of building and equipment [Japanese side] ▪ Long-term experts; Chief Advisor Coordinator Sabo Engineering River Engineering ▪ Short-term experts; Sediment discharge analysis Run-off analysis Hydraulic experiments Feasibility studies of the pilot projects Other fields as required ▪ Training of counterpart personnel in Japan and/or third countries; ▪ Provision of equipment Equipment for surveying and updating manuals Equipment for hydraulic experiments and research Equipment for establishing an information filing and dissemination system	1. A sufficient number of counterpart and technical/administrative support staff are secured. 2. Maintenance and other operating expenses are released on time. (Pre-conditions) 1. DPWH Executive Committee and top management commit full support to the project. 2. DPWH commits to make FCSEC a permanent organization.

Annex IV

Performance of Inputs

1. Inputs from the Japanese Side

(1) Experts

a) Long term experts

No.	Name	Area of Expertise	Period of assignment	MM
1	Mr. Yoshio TOKUNAGA	Chief Advisor	2005/07/01 - 2008/06/30	36.0
2	Mr. Shinya NAKAMURA, PhD	Chief Advisor	2008/06/10 – 2010/06/09	24.0
3	Mr. Takeo MITSUNAGA	Sabo Engineering	2006/03/21 - 2008/03/20	24.0
4	Mr. Shinichi HASEBE	Sabo Engineering	2008/05/19 – 2010/05/18	24.0
5	Mr. Takafumi MIKI	Coordinator	2005/07/01- 2007/09/28	26.9
6	Mr. Junichi FURUKAWA, PhD	Coordinator	2007/09/26 – 2010/06/30	33.2
			Total	168.1

b) Short term experts (as of February 2010)

No.	Name	Area of Expertise	Period of assignment	MM
1	Mr. Wataru SAKURAI	Sabo Engineering	2005/07/01 - 2006/03/24	8.8
2	Mr. Yosuke USUI	Program Formulation for Pilot Projects	2005/10/11 - 12/25	2.5
			2006/01/03 - 03/30	2.9
3	Mr. Susumu HEISHI	Basic Plan for Development of Low-cost Structures	2006/01/22 - 03/24	2.1
4	Mr. Kohei YAMAMOTO	Information Management System Formulation	2006/02/04 - 03/12	1.3
5	Mr. Hideo MATSUSHIMA	Hydraulic Experiment	2006/12/03 - 12/23	0.7
			2007/01/05 - 02/27	1.7
6	Mr. Masaki ISHII	Defence of Riverbank Erosion, Guidance of PP Detail Design	2006/12/17 - 12/27	0.3
			2007/01/07 - 03/18	2.4
7	Mr. Tadashi YAMADA, PhD	Hydraulic Experiment Planning	2007/03/17 - 03/23	0.2
8	Mr. Noboru JITSUHIRO	SABO Planning	2007/06/21 - 08/11	1.7
		SABO Structure Survey	2007/09/30 - 11/18	1.6
9	Mr. Taketoshi MATSUNAGA	River Information Technology	2007/07/12 - 08/27	1.5
			2007/10/23 - 12/11	1.6
			2008/01/15 - 03/04	1.6
		River Planning Information Technology	2008/06/09 - 08/02	1.8
			2008/09/10 - 12/10	3.0
			2009/01/15 - 03/10	1.8

No.	Name	Area of Expertise	Period of assignment	MM
10	Mr. Rokuro KOBAYASHI, PhD	Hydraulic Experiment	2008/09/28 - 12/20	2.7
11	Mr. Hideki SAWA	River and Sabo Engineering	2008/09/28 - 12/20	2.7
			2009/01/15 - 03/15	2.0
			2009/05/07 - 08/01	2.8
			2009/08/23 - 12/19	3.9
			2010/01/05 - 03/20	2.5
12	Ms. Natsuko TOTSUKA	Flood Discharge Runoff Analysis	2009/06/22 - 08/22	2.0
			2009/09/01 - 12/12	3.4
			Total	59.5

(3) Training courses in Japan (as of February 2010)

Name	Title and Institution	Course Title	Period
Mr. Harold N. Uyap	Engineer III, DPWH-FCSEC	Hydraulic Model Experiment	2006/09/11 - 12/08
Mr. Freddie M. Combalicer	Quezon 1st District Engineering Office, Region IV-A	Flood Control Administration	2007/02/04 - 02/23
Mr. Resito V. David	Director of FCSEC, Project Director	Research and Survey Management (Hydraulic Model Experiment/Flood Control Plan)	2007/11/26 - 12/08
Mr. Michael T. Alpasan	Engineer IV, DPWH-FCSEC	Disaster Risk Management Technology on Volcanic Eruption, Debris Flow and Landslide Mitigation	2008/03/12 - 06/14
Mr. Gil I. Iturralde	Engineer V, DPWH-FCSEC	Disaster Risk Management	2008/10/15 - 10/25
Mr. Alexander B. Borja	Engineer IV, DPWH-FCSEC		
Ms. Lourdes F. Aninipot	Engineer IV, DPWH-FCSEC	River Information Management	2009/07/06 - 07/11
Mr. Adolfo M. Rey	Information Technology Officer III, DPWH-FCSEC		

(4) Equipment Provided (as of February 2010)

Date of Purchase	Name of Equipment/Goods	Type / Specification	Number	Cost (Peso)
2005/10/21	Cabinet	Model JPC-22: 1180(W)×400(D)×1760(H)	1	13,800
10/21	Conference Table	RCD-64: 1800(W)×900(D)×750(H)	2	29,000
11/15	Whiteboard	Doubled faced 4'×6'	1	10,200
11/15	Hard Disk	SEAGATE External USB Hard Disk Drive 250GB	1	10,500
12/15	GPS	GPS 60	1	21,600
2006/02/02	Vehicle Van	Mitsubishi, L-300 Versa Van, Series of 2006	1	743,000
02/13	Processor	Intel Pentium 4	6	240,000
02/13	Computer Software	MicroSoft Office XP Pro	10	177,000
02/13	Laptop Computer	Compaq Presario V2317, S/N:SCNF6031RVQ	4	402,000
02/13	Printer / Plotter	HP Designjet 800	1	311,000
02/13	Scanner	HP Scanjet 8200	1	28,000
02/13	Projector	Epson EMP-S3	1	53,900

Date of Purchase	Name of Equipment/Goods	Type / Specification	Number	Cost (Peso)
02/13	Tripod (Projection Screen)	60×60	1	3,750
02/13	Fax Machine	Canon L220	1	20,500
02/13	Color Printer	HP Laserjet 3600N	1	44,500
02/16	Digital Camera	Canon IXUS 55, No. 1248614220	1	26,000
02/16	Digital Camera	Canon IXUS 55, No. 1248614212	1	26,000
03/02	PC Software	Manifold System	1	17,500
03/02	Digital Theodolite w/tripod	Topcon DT-209	1	125,500
03/02	Automatic Level w/tripod	Topcon AT-G7N	1	26,500
03/02	Laser Distance Meter	Nikon Laser600	2	76,000
03/02	Wheel Measure	Myzox MG-20S	1	9,500
03/02	Extendable Ladder	Werner / 20 ft 225 lb. load	2	36,000
03/02	Jig Saw Cutter	Bosch GST60PB	1	11,500
03/02	Wireless PA System	SENRUN EP2001D	2	106,000
03/02	Stand Fan	Iwata- 26 inches diameter	2	9,740
03/02	Stand Fan	NCS16	4	4,870
03/25	Copier	TOSHIBA E-STUDIO 350 w/ARDF	1	212,000
09/27	Cabinet	Storage Steel Cabinet	2	25,900
2007/01/16	Tester	Hioki Insulation Tester 3118-11	1	20,000
01/16	Tester	Yokogawa Clamp Tester CL-155	1	14,300
01/23	GPS	GPS 60	2	42,000
01/23	Wireless LAN	Linksys Broadband, Router Wireless G(1), Linsys USB, Network Adapter	1	31,920
02/14	Satellite Map	Satellite Map (Kinanliman River)	1	37,716
03/12	Satellite Map	Satellite Map (Agos River)	1	60,340
06/01	Magazine Stand	Double-faced	1	11,500
10/24	Digital Planimeter	Digital Planimeter with Multiadapter Model-Planix10S Maker: Tamaya Measurement System Co.,Ltd (¥891,000)	12 sets	342,700
2008/02/29	Cabinet (Double-Deck)	Model JPC-22 1180(W)×400(D)×1760(H)	1	14,000
04/09	Safety Box	Sentry, Model MS3817	1	23,900
07/04	Magazine Rack	10 rows/3 columns Back to Back	1	13,500
07/15	Digital Camera	OLYMPUS MGU850	1	20,690
07/29	Desktop PC	Custom-Build, SIM Computer Sales, Inc.	1	60,500
08/01	Shredder	HSM 102.2 Strip Cut Paper Shredder	1	19,600
08/12	Total Station	NIKON DTM-332	1	305,000
08/19	GPS (Global Positioning System)	Garmin eTrex Vista	10	180,000
08/22	CD-ROM (for Training)	Movement pictures of the earth and sand in Japan (¥105,000)	50	42,780
2009/05/28	Bicycle	MTB#26, BMX#20	2	9,480
05/29	Software	MathCAD 14.0 Single User	1	94,972
07/06	Software	GeoStudio 2007 Basic	1	75,996
08/06	AC Automatic Voltage Regulator	OMNI, 1000W	4	11,999
08/14	Laptop Personal Computer	Ideapad Y650, Lenovo (China)	1	72,900
08/14	Video Camera	Sony DCR SR87	1	36,650
08/14	Printer	HP Photosmart C309A	1	14,500

Date of Purchase	Name of Equipment/Goods	Type / Specification	Number	Cost (Peso)
08/14	Desktop Personal Computer	Custom-Build, Gemora Electronic Marketing and Services	4	235,600
08/18	Gravimeter	1.Hydrometers, Liquids with SG>Water 2.Specific Gravity Hydrometer	1	18,900
08/18	Mechanical Stirrer	Model K-2RN (AS ONE Corp. Japan)	1	39,800
09/08	Flow Visualization Software	2D-PIV Analysis Software Set, La Vision Inc., USA	1	650,000
10/01	Stand for Mechanical Stirrer	Model BH (AS ONE Corp., Japan)	1	19,500
			Total	5,342,503

(5) Local Operational Cost for Project Implementation at the Japanese Side*

Year	Amount (Peso)
2005	989,911.78
2006	1,448,817.65
2007	1,367,546.56
2008	1,540,978.54
2009**	1,528,090.35
Total	6,875,344.88

*Following the Japanese fiscal year: April - March
** Estimation until March 2010

2. Inputs from the Philippines Side

(1) Assignment of Counterparts

	Name	Title and Institution	Period
1	Mr. Resito V. David	Project Director	2005/07 – Present
2	Ms. Dolores M. Hipolito	Project Manager II	2005/07 – Present
3	Mr. Gil I. Iturralde	Engineer V	2005/07 – Present
4	Mr. Galileo Fortaleza	Engineer V	2005/07 – Present
5	Mr. Alexander B. Borja	Engineer IV	2005/07 – Present
6	Mr. Michael T. Alpasan	Engineer IV	2005/07 – Present
7	Mr. Jessie C. Felizardo	Engineer IV	2005/07 – Present
8	Ms. Lourdes F. Aninipot	Engineer IV (seconded from BOM)	2008/07 – Present
9	Mr. Grecil Christpher R. Damo	Engineer III	2005/07 – Present
10	Mr. Harold Uyap	Engineer III	2005/07 – Present
11	Mr. Bibiano B. Calanog	Engineer III	2010/01 – Present
12	Mr. Adolfo Rey	Information Technology Officer III	2005/07 – Present
13	Mr. Arnulfo M. Abrillo	Draftsman III	2010/02 – Present

	Name	Title and Institution	Period
14	Mr. Ireneo M. Cabig	Engineering Assistant	2010/01 – Present
15	Ms. Esther A. Balbas	Budget Officer III	2005/07 – Present
16	Ms. Charo Pena	Artist Illustrator II	2005/07 – Present
17	Mr. Moses C. Legaspi	Driver III	2005/07 – Present
18	Mr. Jose P. Herrero Jr.	Driver II	2005/07 – Present
19	Mr. Potenciano Eugenio	Driver I	2005/07 – Present
20	Mr. Reynante Dare	Driver I	2005/07 – Present
21	Mr. Reginald Recto	Laborer II	2005/07 – Present
22	Mr. Tirson R. Perlada Jr.	Engineer IV	2008/06 - 2009/12
23	Mr. Jerry A. Fano	Engineer III	2005/07 - 2009/09
24	Mr. Simplicio G. Rafaele Jr.	Engineer III	2008/07 - 2009/06
25	Ms. Melanie Linbo	Laboratory Technician III	2005/07 - 2006/06
26	Mr. Dominga Menor	Clerk II	2005/07 – 2008/01
27	Mr. Renato Ladra	Laborer II	2005/07 – 2009/12

(2) Local Operational Cost for Project Implementation at the Philippines Side*

Year	Amount (Pesos)	
	Operational Cost	Cost for Pilot Project
2005	9,991,678	-
2006	9,995,711	-
2007	9,971,403	10 million
2008	8,597,757	15 million
2009	10,744,283	28 million
Total	49,300,832	53 Million

* Following the Philippines' fiscal year: January – December

Annex V

Evaluation Grid: Project for Strengthening the Flood Management Function of DPWH

<table>
<tr><th colspan="2">Evaluation Criteria / Items of Investigation</th><th>Evaluation Questions</th><th>Evaluation Results</th></tr>
<tr><td rowspan="3">Achievement</td><td rowspan="2">Inputs</td><td>Have Inputs from the Japanese side been provided as planned?</td><td>➢ Both Japanese experts and C/P recognize that inputs from the Japanese side have been duly provided without any problems.</td></tr>
<tr><td>Have Inputs from the Philippines side been provided as planned?</td><td>➢ Initially, the Philippines side was expected to provide 14 technical staff and 7 administrative staff in addition to project director and project manager. As of December 2009, the number of staff was 10 for technical staff and 2 for administrative staff (the number is 12 and 2 respectively as of February 2010).
➢ The Philippines side committed P50 million for pilot projects and P10 million for annual operating expenses. This has been satisfied as indicated in Annex IV. However, the disbursement was not timely. In the case of the pilot projects, the first disbursement for one of three pilot projects was made on Sep.20, 2007 although the proposal of "Implementation Program for Pilot Projects" was developed in July 2006. For the fiscal year of 2008 and 2009, the disbursement was made at the end of October, which was nearly at the end of the fiscal year.
➢ In terms of the provision of daily operational costs, the disbursement of the budget is on the reimbursement basis. For example, purchase of printer inks and payment for the repairing of air condition were made by individual staff and reimbursed by the office later on. This seems to be the general scheme for Project Management Office so that the situation will be different if FCSEC obtains permanent status.
➢ Both Japanese experts and C/P perceive that inputs from the Philippines side were not sufficient for the project.</td></tr>
<tr><td>Achievement of outputs</td><td>Output 1:
Are pilot projects implemented using the technical standards, guidelines and manuals?</td><td>➢ Three pilot projects have been implemented by using the existing technical standards, guidelines and manuals. Kinanliman case was the very first experience for DPWH to directly work on MP and F/S for flood control by its technical staff in FCSEC. According to the staff directly involved in the pilot project process, the following TSG/Manuals are the ones most frequently referred to during the process of MP, F/S and construction:
◆ TSG for planning and design, Vol.1: Flood control
◆ TSG for planning and design, Vol.3: Sabo Works
◆ Manual on flood control planning
◆ Manual on non-uniform flow computation with HEC-RAS
◆ Manual on runoff computation with HEC-HMS
◆ Typical design drawings of flood control structures
◆ Manual on construction supervision of flood control projects
➢ The progress and status of three pilot projects are as follows:
<table>
<tr><th>Pilot Project</th><th>Purpose and Progress</th></tr>
<tr><td>1. Kinanliman river flood control pilot project</td><td>Purpose : Construction of dike and revetment
Done : Data/information gathering, MP and F/S, Hydraulic experiments, Detailed design and Construction supervision (for both 1st and 2nd stages)
In operation : Regular maintenance</td></tr>
<tr><td>2. Digmala river flood control pilot project</td><td>Purpose : Construction of revetment and spur dike
Done : Data/information gathering, MP and F/S, Hydraulic experiments, Detailed design and Construction supervision
In operation : Regular maintenance</td></tr>
<tr><td>3. Santa Fe river sabo dam pilot project</td><td>Purpose : Construction of sabo dam
Done : Data/information gathering, MP and F/S, Hydraulic experiments and Detailed design
In operation : Construction supervision</td></tr>
</table></td></tr>
</table>

			The following cost-effective/appropriate technologies were adopted in the implementation of the pilot projects: • Adoption of "Netsugi" method in revetment that contributed to the reduction of cost and solid waste (case 1). • Use of locally available large gravels in spur dike construction that is applicable in other areas (case 2). • Invention of "soil cement" in sabo dam construction that largely reduced the cost compared with the use of cement (case 3). ➢ In the case of Kinanliman pilot project, the construction already demonstrated its effectiveness as no flood damage occurred when large typhoon hit the area on September 26, 2009.
		Output 2: Is research conducted for developing/updating technical standards, guidelines and manuals; and assessing efficient countermeasures for flood control and sabo?	➢ A range of research and experimentation activities were conducted at the Hydraulic Laboratory as follows: • Experiment on Agos River, Spur dike countermeasures, 2005* • Vane Experiment Using Badoc River, 2006** • Preparation Works for Kinanliman River Model, 2006* • Preparation Works for Agos River Model, 2007* • Preparation Works for Mayon Mudflow Experiment, 2007 • Open Experiment of Kinanliman River, Agos River and Mayon Mudflow Experiment, 2007 • Runoff Coefficient with Pavement Cover, 2007** • Soil Erosion Countermeasure using Cocofiber , 2008** • Effectiveness of Vegetation Works Against Surface Erosion, 2008** • Velocity Profile Masurement, 2008 • Digmala River Modeling, 2008* • Vegetative River Banks Protection Works, 2008 • Demonstration of Digmala River Model and Vegetative River Bank Protection Works, 2008* • Demonstration of Hydraulic Laboratory during the Sabo soil cement seminar, 2009 • Determination Coefficient of Discharge Using Various Weir Shapes, 2009 • Sta. Fe River Modeling, 2009* < * Assess appropriateness of countermeasures ** Experiment low-cost structures > ➢ In responding to local needs, FCSEC has provided technical assistance to RO/DEO/LGUs, some of which are as follows:

When	To whom	What
2005	PS, DPWH RO	Study of flooding problems in San Fernando city, Pampanga
2006	Southern Leyte	Landslide in Guinsaugon, St. Bernard
2006	PS	Study on risk management for sediment related disasters on selected national highways
2006	FCSEC	Study on nationwide flood risk assessment and flood mitigation plan for selected areas
2006	FCSEC	Disaster survey in Mayon Volcano area
2006	PS	Comprehensive fold mitigation for Cavite lowland area
2007	RO V	Field investigation for planning and implementation of urgent sabo and flood projects around Mayon volcano
2008	Municipality of Buguey Province of Cagayan	Massive erosion of the coastal areas along Buguey, Cagayan
2009	DPWH 3rd Pangasinan DEO	Flooding problem at urdaneta city, Pangasinan
2009	DPWH Aklan DEO	Flood damage in Aklan river
2009	Occidental Mindoro	Study on sabo and flood control project on Amnay-Patrick river
2009	Olongapo	F/S on the desilting/dredging of Kalaklan river Olongapo
2009	PS, RO III	Study on Dinalupihan-Hermosa-Lubao flood control project
2009	FCSEC	Preparatory study on sector loan for disaster risk management

➢ The following is the list of technical standards, guidelines and manuals that are or will be produced by FCSEC/the project. Some of them (**) are revised versions that were originally produced by the previous ENCA project.

Title	Date of Issue
Technical Report Vol.1: Experiment on the Effective Arrangement of Spur dikes as Countermeasure against bank erosion using simplified river model	Feb. 2006
Technical Report Vol.2: Experiment on the Effective Arrangement of Spur dikes as countermeasure against bank erosion in Agos River and Saint Bernard landslide, Southern Leyte, Field Report	Jul. 2006
Technical Report Vol.3: The Mayon 2006 Debris Flows – The Destructive Path of Typhoon Reming	Nov. 2007
Technical Report Vol.4: Field Survey and Technical Assistance	Jun. 2009
Profile of Sabo Structures in the Philippines	Apr. 2008
Manual on Non-uniform Flow Computation with HEC-RAS**	Nov. 2009
Manual on Runoff Computation with HEC-HMS**	Nov. 2009
Manual on Planning of Flood Control Structures**	2010
Manual on Design of Flood Control Structures**	2010
Manual on Planning & Design of Urban Drainage**	2010
Manual on Planning & Design of Sabo Works**	2010

➢ Since March 2009, weekly technical meetings have been organized in order to revise TSG/Manuals. The meetings are attended by staff from FCSEC, PS, BOC, BOD, PMO Cluster 1&2, BORS and BOM. In the meetings, participants look at sentence by sentence in each of TSG/Manuals and revise them in order to make them user friendly. Once the revision is completed, four sets of manuals (as described above) will be published by the end of the project.

Output 3:
Are knowledge and skills of DPWH engineers on flood control and sabo improved through training programs?

➢ The number of DPWH engineers who participated in training programs as of the time of the terminal evaluation is as follows:

Training program	Schedule	Location of ROs/ DEOs	No. of offices	Number of participants
Planning and Design of Flood Control Structures (Lecture)	November 7-11, 2005	V	12	30
	August 14-18, 2006	VI	16	28
	July 9-13, 2007**	IV-B &X	23	24
	November 5-9, 2007**	VIII & XI	23	26
	September 15-19, 2008	IX & XIII	17	23
	August 17-21, 2009	VII & XII	20	21
		Total	111	152
Planning and Design of Flood Control Structures (OJT)	August 21-22, 2008	V	12	25
	July 6-10, 2009	VI	13	23
	March 2010	IV-B		
	May 2010	X		
		Total	25	48
Construction Supervision of Flood Control Structures	November 21-23, 2005	V	12	42
	September 4-6, 2006	VI	16	30
	July 18-20, 2007**	IV-B & X	17	19
	November 14-16, 2007**	VIII & XI	22	23
	September 22-24, 2008	IX & XIII	19	22
	October 14-16, 2009	VII & XII	21	24
		Total	107	160
Maintenance of Flood Control Structures	November 23-25, 2005	V	12	27
	September 06-08, 2006	VI	15	31
	July 20-22, 2007**	IV-B & X	20	23

	November 26-28, 2007**	VIII & XI	22	25
	Sep.29-Oct.1, 2008	IX & XIII	19	21
	Feb. 3-5 2010	VII & XII	21	23
		Total	109	150
Planning and Design of Sabo Works	June 1-5, 2009	Nationwide	22	23
	November 16-20, 2009	Nationwide	23	25
		Total	45	48

** Ex-post evaluation was conducted for these courses at after one year of their implementation. The evaluation result is described below.

- The following is the result of the ex-post evaluation on the above mentioned six training courses (three programs). The total number of training participants is 140 for the courses and interviewees of the ex-post evaluation were 103 (74% of the total participants).
  - 80% says they are currently involved in flood control activities.
  - 36% says they apply knowledge in their current work much/very much which they learned during the course
  - 59% says they apply skills in their current work much/very much which they learned during the course
  - 85% of participant' supervisors says the training has improved overall performance of the trainees by a large extent

Output 4:
Is Information Management System established for a more effective flood management function of DPWH?

- For gathering data on flood control inventory in the country, the project distributed a jurisdiction map to 138 DEOs nationwide in 2006 and requested them to provide with location and concerned data of existing structures within their coverage area. The response rate was 100% by the end of the year.
- The second round of data collection (i.e. data updating) was conducted in 2009. The following figure is the status of response per Region:

Region	Number of DEO	Number of DEO responded	
CAR	9	7	
I	11	7	
II	11	11	
III	16	11	
IV A	16	10	
IV B	9	7	
V	15	15	
VI	14	0	
VII	11	1	
ARMM	4	0	
VIII	12	1	
IX	9	6	
X	13	11	
XI	10	8	
XII	11	8	
XIII	10	9	
Total	181	112	62%

- FCSEC newsletter was published as follows:

Number	Data of Issue
Newsletter Vol. 1	March 2007
Newsletter Vol. 2	December 2007
Newsletter Vol. 3	December 2008
Newsletter Vol. 4	January 2010

- The project organized (will organize) the following Seminars in order to widely share knowledge on flood control:

Date	Title	Participants	
		Pax	Organization
Feb.16, 2007	Open Experiment of Kinanliman River, Agos River and Mayon Mudflow Experiment	28	DPWH, NEDA, NWRB, PHIVOLCS, LGU, Universities, NGO
Dec.9 2008	Demonstration for Digmala River Model and Vegetative River Bank Protection Works	39	DPWH, PAGASA, LGU, Universities
Mar.5 2009	Sabo Soil Cement Seminar		
Mar.25-27 2009	Seminar on Debris Flow Breaker with ICHARM		

- FCSEC staff attended the following coordinating meetings and workshops in order to share relevant information and data regarding flood control among concerned agencies and organizations:

Date	Topic	Lead Agency
30-Jan-06	Regional Water Financing Dialogue Meeting	PWP
18-May-06	REINA Project Symposium	PHIVOLCS
24-Aug-06	National Multihazard Mapping Seminar-Workshop	EMB/UNDP
12-Mar-07	JICA Mission Team for Flood Forecasting and Warning System for Pampanga and Agno River Basins	PAGASA
19-Mar-07	Upgrading of the Flood Forecasting and Warning System (FFWS) for Pampanga and Agno River Basins	PAGASA
27-Apr-07	Memorandum of Agreement among the Agency members of JOMC	PAGASA
21-Aug-07	Technical Cooperation Project for FFWSDO	PAGASA
8-Oct-07	Technical Cooperation Project for FFWSDO	PAGASA
24-Oct-07	Climate Outlook Forum	PAGASA
11-Feb-09	Climate Outlook Forum	PAGASA
2-Apr-09	Technical Cooperation Project for FFWSDO	PAGASA
7-Sep-07	Privatization of the Binga/Ambuklao Dams	NDCC
23-Sep-09	Climate Outlook Forum	
9-Nov-09	Climate Outlook Forum	PAGASA
16-Nov-09	Joint Coordination Committee meeting for the Strengthening of Flood Forecasting and Warning System for Dam Opertaion	PAGASA
16-Nov-09	IWRM Study for Poverty Alleviation and Economic Development in the Pampanga River Basin	NWRB
11-Jan-10	Caliraya, Botocan Dam Manuals	PAGASA
19-Jan-10	Caliraya, Botocan Dam Manuals	PAGASA
25-Jan-10	IWRM Study for Poverty Alleviation and Economic Development in the Pampanga River Basin	NWRB
3-Feb-10	IWRM Study for Poverty Alleviation and Economic Development in the Pampanga River Basin	NWRB
8-Feb-10	Ondoy, Pepeng Post Disaster Sumposium	UP
15-Feb-10	Flood Forecasting And Warning System	PAGASA

- FCSEC presented the outline and concept of National Flood Management Framework Plan at the NDCC cabinet meeting on Feb. 28, 2006.
- Quarterly reports have been produced and submitted to NEDA. The reports contain the progress of project activities and issues that arose in relation to the PDM framework.

		Output 5: Is the internal support mechanism created to sustain the development of technology and organization in the field of flood control and sabo engineering?.	➢ Consultative meetings to strengthen the internal support mechanism such as JCC and TWG were organized as follows: (table below) ➢ TSG/Manuals that were produced by the project have not yet been endorsed by the government. Their status is all "draft" at the moment. It is likely that the revised TSG/Manual will go through the formalization process. ➢ In 2008, DPWH launched the preparation process of MP and F/S for 12 river basins nationwide. On Feb.1, 2010, DPWH issued a "Special Order No.50, Series of 2010: Creation of a steering committee and technical working group for the conduct of master plan and feasibility study of flood control and drainage project on selected river basins nationwide." In the steering committee, Head of FCSEC serves as vice-chairperson (chairperson is Assistant Secretary for Planning). In the technical working group, Project Manager of FCSEC serves as chairperson and one engineer is a group member. ➢ The issue of the DPWH rationalization was already recognized as of December 2005. This indicates that there was not much scope for FCSEC to address the permanency issue independently at that time but was more appropriate to pursue within the scope of the DPWH rationalization plan. Through JCC meetings, FCSEC/the project as well as representative from the embassy of Japan has repeatedly requested DPWH to realize the FCSEC permanency. In 2009, however, the rationalization plan was suspended indefinitely so that FCSEC/the project took an action to pursue the permanency of FCSEC through the issuance of Presidential Executive Order. They submitted a formal letter to Secretary on June 30, 2009 on this matter and held a meeting with Undersecretary on August 30, 2009. As of February 2010, rumor is prevailing that the rationalization plan has been signed by DBM and FCSEC has secured the permanency within the DPWH structure.
	Achievement of project purpose	Is the flood management function of DPWH strengthened through research and development, training, information management, implementation of pilot projects and creation of the internal support mechanism?	➢ A survey was conducted to ask DEO if they use TSG/Manual and find them as useful. The result of the survey is as follows (the number of response was 10): (table below) ➢ The interviews to the C/P revealed that two C/P who head pilot project team and research team have substantially

Meeting	Date	Main Topics
1st JCC	Oct.12, 2005	Presentation of the Project
2nd JCC	Dec.20, 2005	Accomplishments of the Project
3rd JCC	Feb.6, 2006	Review of Project activities (mid-term evaluation)
4th JCC	Jun.26, 2007	
5th JCC	Jun.23, 2008	
6th JCC	Feb.24, 2010	
1st TWG	Jan 01, 2006	Criteria of Pilot Projects
2nd TWG	Feb 02, 2006	Financial Arrangement for Pilot Projects
3rd TWG	May 24 2006	Request for Budget for Pilot Projects
4th TWG	Oct 26, 2006	Selection of Pilot Projects
5th TWG	Mar 09, 2007	Ongoing activates of the Project
6th TWG	Jan 17, 2008	Mid-term Evaluation of the Project
7th TWG	May 29, 2008	
8th TWG	Mar 03, 2009	

Title of TSG/Manual	Frequent use*
TSG Vol. I – Flood control	50%
TSG Vol. II – Urban drainage	0%
TSG Vol. III – Sabo works	20%
TSG Vol. IV – Natural slope failure countermeasures	20%
Manual on design of flood control planning	30%
Manual on flood control planning	20%
Manual on runoff computation with HEC-HMS	10%
Manual on non-uniform flow computation with HEC-RAS	10%
Specific discharge curve, RIDF curve and isohyets of probable 1-day rainfall	10%
Typical design drawings of flood control structures	40%
Manual on construction supervision of flood control projects	40%

*Percentage of responses which rated the TSG/Manual as useful and frequently using.

<table>
<tr><td></td><td></td><td></td><td>enhanced their professional capacity through the project implementation. The former acquired knowledge and skills in formulating MP and F/S on flood control on which he could not address before the project started, and the latter can now manage the planning, designing and execution of research experimentation at the hydraulic laboratory even without external technical advice. When the laboratory was constructed in 2002, he could not manage the work at all. Aside from these C/P, the Japanese experts confirmed that most of C/P (though not all) gradually improved their knowledge and skills related to flood control in various fields such as planning, designing, construction supervision, research and information management.
➢ The survey shows that they basically find the TSG/Manual are useful but they do not really have a chance to use because budget for flood control is scarce and they have no chance to use the TSG/Manual.
➢ DPWH plans to revise the Red Book, which is the TSG that involves all the technical standard relevant to the scope of work of DPWH. It is envisaged that revised TSG/Manual produced by FCSEC will be referred to in the drafting process of the Red Book.</td></tr>
<tr><td></td><td>Projection on achievement of overall goal</td><td>Will more effective and appropriately designed flood control and sabo structures/facilities be implemented by DPWH in accordance with the technical standards, guidelines and manuals?</td><td>➢ The following is the list of flood control activities at the level of DEO that are conducted based on TSG/Manuals produced by FCSEC (the data coming from questionnaire survey conducted by FCSEC – there are only seven responses altogether):
<table>
<tr><th>DEO</th><th>Activities/Studies</th><th>TSG/Manual used</th></tr>
<tr><td rowspan="4">Region X
Bulua</td><td>Construction of flood control at Lugait river</td><td>Manual on design control structures</td></tr>
<tr><td>Construction of Opol flood control</td><td>Manual on flood control planning</td></tr>
<tr><td>Construction of Napaliran revetment</td><td>Determination of design discharge</td></tr>
<tr><td>Hydrologic analysis of proposed bridge</td><td>River planning / Runoff analysis</td></tr>
<tr><td rowspan="7">Region X
Gingoon</td><td>Hubangon river control</td><td>Implementation and design</td></tr>
<tr><td>Agono river control</td><td>Implementation and design</td></tr>
<tr><td>Mahmog line canal</td><td>Implementation and design</td></tr>
<tr><td>Construction of slope stabilization</td><td>TSG Vol.IV</td></tr>
<tr><td>Napanran flood control</td><td>TSG Vol.I</td></tr>
<tr><td>Santa Ines flood control</td><td>TSG Vol.I</td></tr>
<tr><td>Nedina flood control</td><td>TSG Vol.I</td></tr>
<tr><td>Ginedog flood control</td><td>TSG Vol.I</td></tr>
<tr><td rowspan="2">Region VIII
Southern Leyte</td><td>Maasin river control</td><td>Manual on construction supervision</td></tr>
<tr><td>Ilag road slip</td><td>Manual on construction supervision</td></tr>
<tr><td>Region I, Ifugao</td><td>Lawig river control</td><td>Manual on design</td></tr>
</table></td></tr>
<tr><td rowspan="4">Implementation process</td><td>Progress of activities</td><td>Was there any delay in the implementation of planned activities?</td><td>➢ Due to shortage of C/P and slow disbursement of local budget, the implementation of project activities has been affected compared with the original plan. However, except Sabo construction that is currently been addressed at Santa Fe river, planned activities will be implemented by the end of the project.
➢ As for Sabo dam construction at Santa Fe river, it will be completed by the end of the project unless heavy rain hits the site during the raining season or budget disbursement is delayed. However, there is still a risk that the construction might be delayed due to heavy rain and slow budget disbursement.</td></tr>
<tr><td>Monitoring</td><td>What was the activity monitoring plan and how was it implemented?</td><td>➢ FCSEC and the project drafted a formal quarterly monitoring report every three months that was submitted to NEDA.
➢ Since communication among concerned staff is smooth, status and progress of project activities have been shared effectively on the informal basis.</td></tr>
<tr><td rowspan="2">Communication</td><td>Was communication among project personnel (Japanese experts, C/Ps, RO) satisfactory?</td><td>➢ Yes. Very much.</td></tr>
<tr><td>Was communication between project personnel and actors at concerned organizations satisfactory?</td><td>➢ As indicated in Output 4 and 5, FCSEC staff have been communicating with member of concerned agencies such as other structure of DPWH (PS, BOD), PAGASA, etc.</td></tr>
</table>

	Decision-making	Was the decision making process of project planning and implementation satisfactory?	➢ All the Japanese experts and C/P mention that project decision making process has been satisfactory within FCSEC/the project. ➢ One issue is on the decision making by DPWH regarding budget disbursement and C/P assignment. Despite repeated request from the project, these issues have not really been improved.
	Ownership	Was the level of interest and involvement by C/P organizations satisfactory?	➢ Most of C/P have been seriously and actively involved in the project activities. This perception is supported by all the Japanese experts. ➢ Through interviews with C/P on the individual basis, the terminal evaluation team identified that attitude of all the C/P is truly honest, serious and professional. Although their skill level is still under development, their commitment to the flood control work is very high. ➢ The critical issue is, as already indicated above, the support by senior official of DPWH and government. Issues on C/P and budget disbursement are not addressed.
	Technology transfer	Was the method of technology transfer appropriate?	➢ Questionnaire survey to C/P clearly indicates that the method of technology transfer by Japanese experts is very appropriate and all of the C/P, including FCSEC director, appreciate the work and effort of the Japanese experts.
	Management	Were there any issues or problems in the management and process of the project implementation?	➢ Critical issue on project management has not emerged except the issue described above.
		Was the assignment of C/Ps appropriate to carry out project activities?	➢ Due to shortage of C/P assignment as described at the "Input" section, each C/P, senior engineers in particular, has been required to deal with many different jobs in parallel.
	Recommendation at Mid-Term Evaluation	Were C/P allocated to vacant as well as pilot project positions?	➢ Three additional C/P assignment was made in January and February 2010.
		Was budget for pilot project increased?	➢ Proposed budget of P50 million is disbursed. However, the timing of disbursement has been late every year.
		Is the plan that FCSEC becomes a permanent organization likely to be realized?	➢ According to FCSEC staff, there is rumor during the last two weeks that the rationalization plan was signed at DBM. But a letter is not circulated yet.
		Was utilization of the DPWH Hydraulic Laboratory facilities improved?	➢ Following the recommendations made in the mid-term evaluation, FCSEC accepts other organizations to conduct research experiments at the Hydraulic Laboratory. ➢ Due to shortage of C/P assignment, the personnel in charge of research experiments is also required to deal with other important project activities. Hence, focusing on the work of further promotion of Laboratory utilization is very difficult.
Relevance	Consistency	Is the project consistent with national policies of the Philippines?	➢ In the Medium-Term Public Investment Program (2005-2010), the government stipulates flood control works as one of ten principal strategies that operationalize the Program.
		Is the project consistent with Japan's ODA policies?	➢ The country assistant program for the Philippines that was developed by the government of Japan in 2008 stipulates environmental protection and disaster prevention as one of four priority areas of cooperation. ➢ The above document particularly describes natural disaster prevention in which the improvement of information dissemination to concerned communities is emphasized. ➢ It also stipulates that "development, maintenance and management of flood control and sabo (erosion control) infrastructure in high priority sites, as well as strengthening disaster preparedness including evacuation plans etc., taking into account of the fiscal situation of the Philippines".
		Is the project in line with the needs of target groups?	➢ Major target group of the project is DPWH staff at the level of RO/DEO as well as FCSEC staff. The project is designed and has been implemented in order to provide and enhance their knowledge and skills regarding flood control so that it can be concluded that the project is in line with the needs of target groups.
	Strategy and approach	Was the selection of target groups appropriate?	➢ Since the project purpose is to strengthen technical and administrative capacity of DPWH, it is appropriate that their staff at field level are the main target group.

		Was the identification of C/P organization appropriate?	➢ Yes, DPWH is the organization in charge of flood control.
		Was project approach or strategy appropriate to realize Overall Goal and Project Purpose?	➢ Unlike the previous aid projects in which Japanese experts carried out most of the principal work of planning, designing and construction supervision, this project has adopted a different approach. Conceptually, the project was designed in such a way that Japanese experts build up the technical capacity of FCSEC staff with hands-on experiences and FCSEC staff then enhance knowledge and skills of local DPWH staff at the RO/DEO level. ➢ Obviously, the above approach is pertinent in relation to the project purpose as it can strengthen the capacity of DPWH staff.
		Were the capacity and experiences of JICA sufficient for achieving the Overall Goal and Project Purpose?	➢ As demonstrated by the questionnaire survey, all the C/P recognize and appreciate the high quality and capacity of Japanese experts. There is no question on this.
Effectiveness	Projection on the achievement of Project Purpose	Has Project Purpose already been achieved or will be achieved by the end of the Project?	➢ On the one hand, the capacity of FCSEC in terms of planning (i.e. MS and F/S), designing and construction supervision of flood control projects (relatively small-scale); research; training; and information management has been largely improved compared with their capacity five years ago. On the other hand, however, the level of their capacity is not to the extent that they can manage these activities by themselves. FCSEC still needs professional technical assistance from qualified experts to accomplish the work, without which the quality of their work is unlikely to be guaranteed, particularly for flood control project in the field.
		Are there any factors that may facilitate or inhibit the achievement of the Project Purpose?	➢ The PMO status of FCSEC has negatively affected the pursuance of project purpose because the employment of FCSEC staff is on the temporal basis so that they need to worry about a new employment opportunity toward the end of the project. More seriously, the enhanced capacity of FCSEC will be eliminated if staff are moved upon the termination of the project. ➢ Shortage of C/P as well as slow disbursement of local budget negatively affected the effective implementation of project activities. It is likely that the technical capacity of FCSEC staff could have been strengthened further if these obstacles were removed. ➢ One critical issue is that the position of the JCC chairperson is held by Assistant Secretary for Planning. Since the Assistant Secretary for Planning only holds the authority for planning, matters related to human resource as well as budget allocation could not really be addressed through his authority.
	Causal relationships	Are the five (5) outputs sufficient to achieve Project Purpose?	➢ All the five outputs have contributed to the achievement of project purpose. ➢ In this project, pre-conditions and some of important assumptions have not been satisfied even at the time of the terminal evaluation.
		Are the important assumptions that exist between Outputs and Project Purpose correct at the present point of time?	➢ There was no big change on the C/P assignment during the project period so that enhanced capacities of FCSEC staff have been maintained within the organization.
	Use of external resources	Do the project effectively use external resources?	➢ In gathering data regarding flood control structures throughout the country, the project/FCSEC obtained full support from RO/DEO. ➢ The project/FCSEC frequently communicate with PS, BOD, BOC, BOM and BORS of DPWH, PAGASA and NWRB for sharing data and information related to flood control.
Efficiency	Achievement of Outputs	Is the achievement of each Output adequate?	➢ Four outputs are more or less achieved at the satisfactory level, as demonstrated in the "Achievement" section above. One (output 5) is at the moderate level.
		Are there any factors that facilitated or inhibited the achievement of Outputs?	➢ As described repeatedly, shortage of C/P assignment and budget disbursement negatively affected during the process of achieving outputs.
	Causal relationships	Are the important assumptions that exist between Activities and Outputs correct at the present point of time?	➢ No. The number of C/P is short and budget disbursement has been late.

		Were Inputs and Activities sufficient to produce Outputs (in terms of timing, quantity, cost and quality)?	➢ Despite some difficulties on the provision of inputs from the Philippines side, activities have conducted and outputs are produced. This is largely thanks to strenuous efforts by some of C/P and Japanese experts. It should be noted, however, that shortage of inputs cannot be justified even though activities are conducted and outputs are produced.
Impact	Projection on the achievement of Overall Goal	Is there prospect that Overall Goal is achieved?	➢ As indicated in the "Achievement" section, some RO/DEO are reportedly using TSG/Manuals produced by FCSEC/ENCA for designing and constructing flood control structures within their jurisdiction area. However, effectiveness and appropriateness of these flood control structures could not be examined by the evaluation team. ➢ As described above, FCSEC made contribution to NDCC, the highest coordination body for disaster preparedness, disaster operations and rehabilitation from disaster. ➢ At the Kinanliman pilot project site, engineers at the DEO has acquired new knowledge and skills regarding flood control through the 1st and 2nd phases of the Kinanliman flood control project (which are the pilot project supported by the JICA project) and they have applied such knowledge and skills at the 3rd phase of the Kinanliman flood control project (which is the DEO's own project beyond the JICA project).
		Are there any factors that facilitate or inhibit achievement of Overall Goal?	➢ Inhibiting factors are basically the same as those of project purpose.
	Spreading effects	Are there any project impacts on policy, economy, society or environment?	➢ As indicated in the "Achievement" section, FCSEC plays a crucial role in developing MP and F/S for 12 river basin throughout the country, which is the major policy of DPWH at the moment. ➢ At the Kinanliman pilot project site, residents nearby the site highly appreciate the construction of the flood control structure as has removed the risk of flood at the site. This was already demonstrated on September 26, 2009 when large typhoon hit the area. The residents used to run away when typhoon approached, but this time, they could stay at home.
		Are there any negative impacts that are brought about by the project?	➢ No negative impacts have been observed or reported.
	Causal relationships	Are the important assumptions that exist between Project Purpose and Overall Goal correct?	➢ Important assumptions are valid at this level.
Sustainability	Policy aspect	Will the current policy framework be maintained after the termination of the project?	➢ As indicated in the "Achievement" section, DPWH issued a special order that places FCSEC to take a central role in the implementation of the MP and F/S development. This is unlikely to change upon the termination of the project, or not affected by the status of the rationalization plan of DPWH. In this sense, it can be said that policy support to FCSEC at the level of DPWH is to some extent ensured.
		Will the support to FCSEC from the Philippines government continue after the termination of the project?	➢ In the last two weeks, there is rumor that the rationalization plan for DPWH is already signed. If this is the case, the support of the government to FCSEC continues upon the termination of the project.
	Organizational aspect	Will concerned organizations continue to provide organizational supports (including human resource and finance) to achieve Overall Goal?	➢ At the time of the terminal evaluation, the situation is ambiguous. If the rationalization plan is endorsed by the government, human resource and finance are secured upon the termination of the project. Hence, FCSEC could function toward overall goal. If this is not the case, provision of human resource and finance is to be continued, as DPWH issued a special order, but shortage of staff and disbursement issue would prevail as the case of now.
	Technology aspect	Will the facilities and equipment provided by the project be maintained appropriately?	➢ Yes, if budget is secured.
		Has the C/P organization acquired technologies on flood control and sabo structures/facilities that were examined through the Project?	➢ As described at the "Achievement of Project Purpose" section.
	Other factors	Are there any factors that may inhibit sustainability of the project?	➢ As repeatedly indicated, securing staff positions and providing timely budget disbursement are the key to the sustainability of FCSEC. At the moment, the prospect is ambiguous.

Remark: "Project Doc." includes PDM, PO, appraisal/evaluation reports, progress report and any other concerned documents.

Annex VI

List of Activities Conducted in the Hydraulic Laboratory

Date	Activities	Attendees	Purpose	Content and Result
Oct 21, 2005 - Dec 10, 2005	Experiment on Agos River, Spur dike countermeasures	FCSEC	To determine the effective spur dike arrangment as immediate countermeasures for damaged section in Agos River	Results documented in the report.
Feb 1, 2006	Meeting and Demonstration with Secretary Ebdane	FCSEC, DPWH Secretary	To show the Research and Development activities of the DPWH, PMO-FCSEC	List of the visitors were filed
Feb 18, 2006	Laboratory Visit (Educational Tour)	Mapua Institute of Technology Students	To show the Research and Development activities of the DPWH, PMO-FCSEC	List of students were filed
Mar 22, 2006	Laboratory Visit and Demonstration of Agos River Model	Local Government Officials, Infanta, Quezon Province	To demonstrate the Agos River Model and show the Hydraulic laboratory facilities	List of visitors were filed
Sep 7, 2006	Laboratory Visit	Kyushu University, Japan	To show and explained the Research and Development activities of the DPWH, PMO-FCSEC	List of the visitors were filed
Sep 29, 2006	Laboratory Visit	ADB Participants from ICHARM, IFNET, CTI, others	To show and explained the Research and Development activities of the DPWH, PMO-FCSEC	List of the visitors were filed
Oct 20, 2006	Laboratory Visit	Rotary Club of Paranaque	To show the Research and Development activities of the DPWH, PMO-FCSEC	List of the visitors were filed
Nov 15, 2006 - Dec 15, 2006	Vane Experiment Using Badoc River	FCSEC	To introduce vane structures through hydraulic experiment	Draft report written.
Dec 16, 2006 - Jan 19, 2007	Preparation Works for Kinanliman River Model	FCSEC	To improved the FCSEC C/Ps knowledge and skills in river model planning and preparation. To verify the countermeasures at Kinanliman river in the conjunction with the plans in the Pilot Project	The model preparation works was completely done
Jan 8, 2007 - Feb 9, 2007	Preparation Works for Agos River Model	FCSEC	To improved the FCSEC C/Ps knowledge and skills in river model planning and preparation	The model preparation works was completely done
Jan 29, 2007 - Feb 15, 2007	Preparation Works for Mayon Mudflow Experiment	FCSEC	To demostrate the threshold of mudflow occurrence in Mt. Mayon	The model preparation works was completely done
Feb 16, 2007	Open Experiment of Kinanliman River, Agos River and Mayon Mudflow Experiment	FCSEC and other Offices in the DPWH	To demonstrate/showcase to the attendees the several research and development activities of FCSEC C/Ps	The Attedees had a better understanding about the flood situation and the mudflow at first glance
Jun 04, 2007 - Jul 27, 2007	"Runoff Coefficient with Pavement Cover"	Mapua Institute of Technology Students	To determine the run-off coefficient of concrete block pavement applied on parks, open space, etc.	The result was documented in the report by the MIT Students.
Nov 12, 2007	Laboratory Visit	JICA Press Tour Team		List of visitors were filed
Dec 17, 2007 - Feb 29, 2008	Soil Erosion Countermeasure using Cocofiber	University of the Philippines Students	To determine the effective applicability of the variety of cocofiber nets against soil erosion at different incliniations.	The result was documented in the report by the UP students.

Date	Activities	Attendees	Purpose	Content and Result
Jan 07, 2008 - Mar 28, 2008	Effectiveness of Vegetation Works Against Surface Erosion	Mapua Institute of Technology Students	To determine the effectiveness of the Three (3) kinds of Grasses (calapo, nursery, Centrosema) against surface erosion using the Artificial Rainfall Apparatus	The result was documented in the report by the MIT Students.
Apr 02, 2008	Velocity Profile Masurement	De LaSalle University Students	Measurement exercises using the 1-dimensional velocity current meter	Measurement results were collected and analyse by the DLSU students
Oct 06, 2008 - Dec 19, 2008	Digmala River Modeling	FCSEC	To observe the present river condition of Digmala river during the flood events	At different set of discharge flows and experiment conditions the water level and flow velocities were measured.
Oct 06, 2008 - Dec 19, 2008	Vegetative River Banks Protection Works	FCSEC	To determine the applicabilty of Vegatation/sodding works against the riverflow velocities	The limitations of vegetation/sodding works against riverflow are verified and concluded
Dec 09, 2008	Demonstration of Digmala River Model and Vegetative River Bank Protection Works	FCSEC and other Offices in the DPWH	To show the present river condition of digmala river during the event of flood. And to give an idea on the limitations of vegetation/sodding works against the riverflow	List of attendees were filed
Dec 16, 2008	Laboratory Visit (Educational Tour)	Eastern Samar State University Students	To show the Research and Development activities of the DPWH, PMO-FCSEC	List of students were filed
Feb 19, 2009	Laboratory Visit (Educational Tour)	Central Luzon State Unversity Students	To show the Research and Development activities of the DPWH, PMO-FCSEC	List of students were filed
Mar 05, 2009	Demonstration of Hydraulic Laboratory during the Sabo soil cement seminar	FCSEC and other Offices in the DPWH, R.O, DEO	To demonstrate and show the Research and Development activities of the DPWH, PMO-FCSEC	List of participants were filed
Apr 16-17, 2009	Determination Coefficient of Discharge Using Various Weir Shapes	De LaSalle University Students	To investigate the various characteristics of flow using the the different classification of weirs	Measurement results were collected and analyse by the DLSU students
Sep 16-Oct 30, 2009	Sta. Fe River Modeling	FCSEC	To observe the Sta. Fe River after construction of Sabo Dam	Effect of Sabo Dam at Different flood frequency was observed and verified

ANNEX Ⅱ

ATTENDANT LIST

<Philippine Side>

1. Ms. Maria Catalina E. Cabral, PhD.	Assistant Secretary, Chair-person (Absent)
2. Mr. Resito V. David, CEO VI	Project Director, PMO-FCSEC
3. Mr. Melvin B. Navarro, MNSA	OIC-Director, Planning Service
4. Ms.Rebecca Garsuta	Engineer V, Planning Service
5. Mr. Reynaldo Faustino	Engineer V, Bureau of Research & Standards
6. Mr. Gilberto S. Reyes	OIC-Director, Bureau of Design
7. Mr. Perfecto Zaplan	Engineer V, Bureau of Design
8. Mr. Aristarco Doroy	EngineerV, Bureau of Construction
9. Ms. Lilia Banaag	EngineerV, Bureau of Maintenance
10. Mr. Ramon Ariola	Engineer II PMO-MFCDP I
11. Ms. Maximina M. Razon	EngineerIV, PMO-MFCDP II
12. Ms. Dolores M. Hipolito	Project Manager II, PMO-FCSEC
13. Mr. Gil I. Iturralde	Engineer V, PMO-FCSEC
14. Mr. Michael T. Alpasan	Engineer IV, PMO-FCSEC
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