ミャンマー
灌漑技術センター計画フェーズⅡ
運営指導（中間評価）調査報告書

平成13年12月

国際協力事業団

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序　　文

ミャンマー連邦からの要請を受けて、プロジェクト方式技術協力「灌漑技術センター計画フェーズII」が1999年(平成11年)4月から5年間の計画で実施されています。

本プロジェクトの開始から2年半が経過したので、その進捗状況を把握・評価し、計画内容や実施体制上の問題点を摘出することにより、今後のプロジェクトの活動内容をより適切にするため、2001年(平成13年)11月7日から同22日まで、当事業団農業開発協力部農業技術協力課課長代理　竹内康人を団長とする運営指導(中間評価)調査団を現地に派遣しました。

同調査団は、ミャンマー側評価調査団と合同で中間評価を行い、評価結果を取りまとめて署名を交わしました。

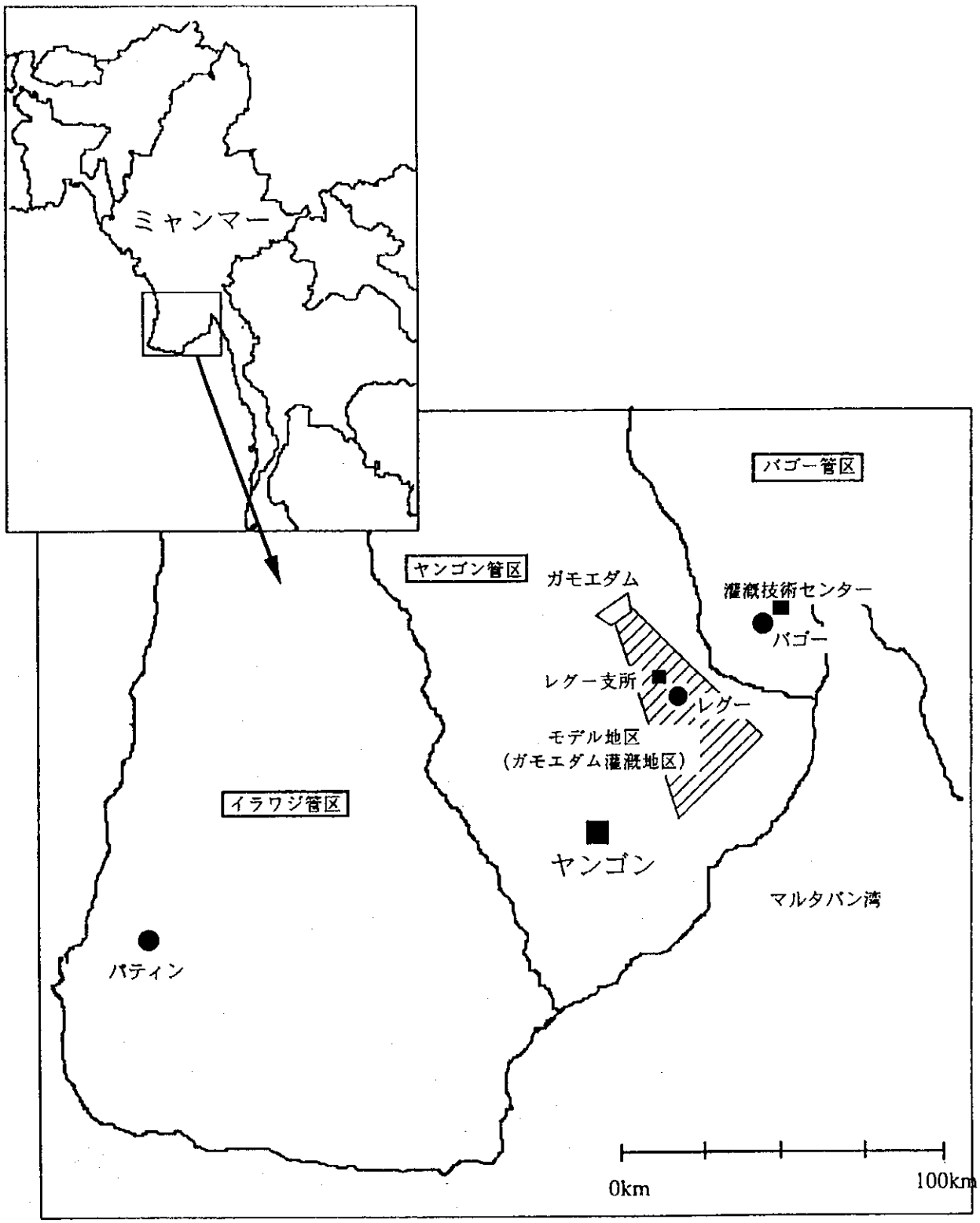
本報告書は、同調査団による調査・評価結果を取りまとめたものであり、今後、本プロジェクトの実施にあたり広く活用されることを願うものです。

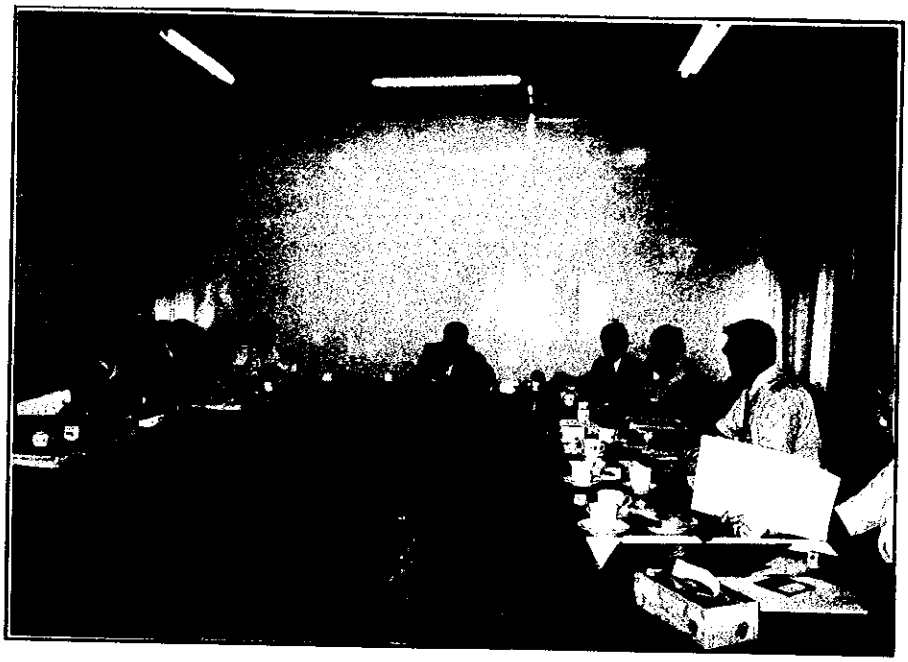
終わりに、この調査にご協力とご支援を頂いた内外の関係各位に対し、心から感謝の意を表します。

平成13年12月

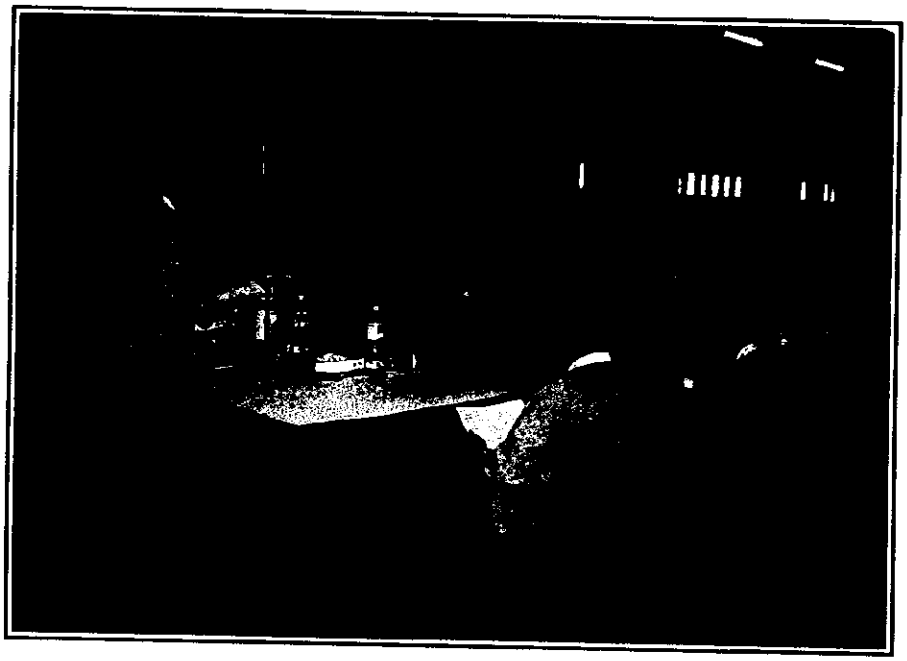
国際協力事業団
農業開発協力部
部長　中川和夫

プロジェクト位置図


ミャンマー
バゴー管区
ヤンゴン管区
ガモエダム
灌漑技術センター
バゴー
レグー支所
レグー
モデル地区
(ガモエダム灌漑地区)
イラワジ管区
ヤンゴン
マルタバン湾
パティン
0km
100km



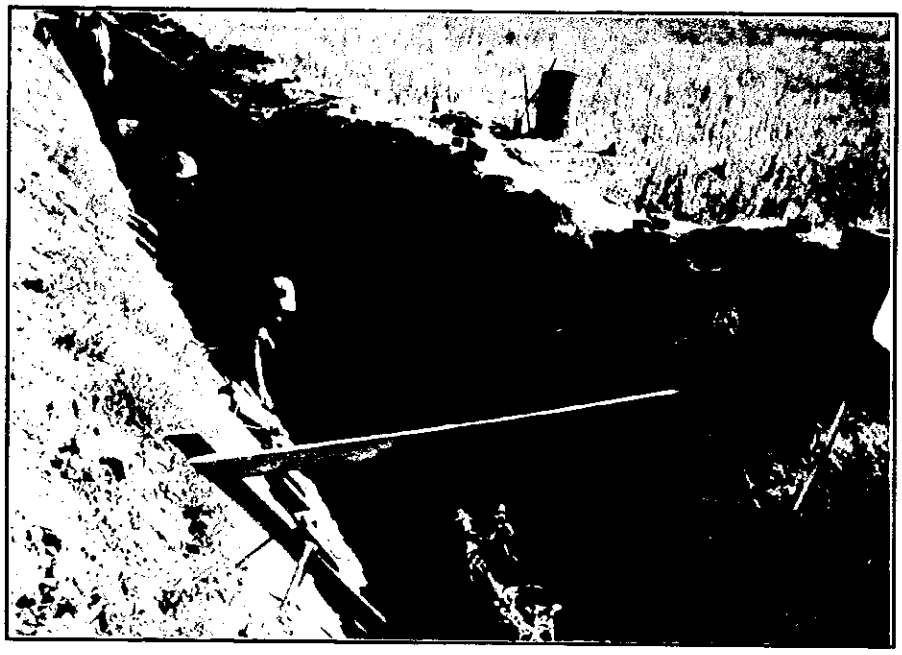
合同評価団内協議



合同調整委員会

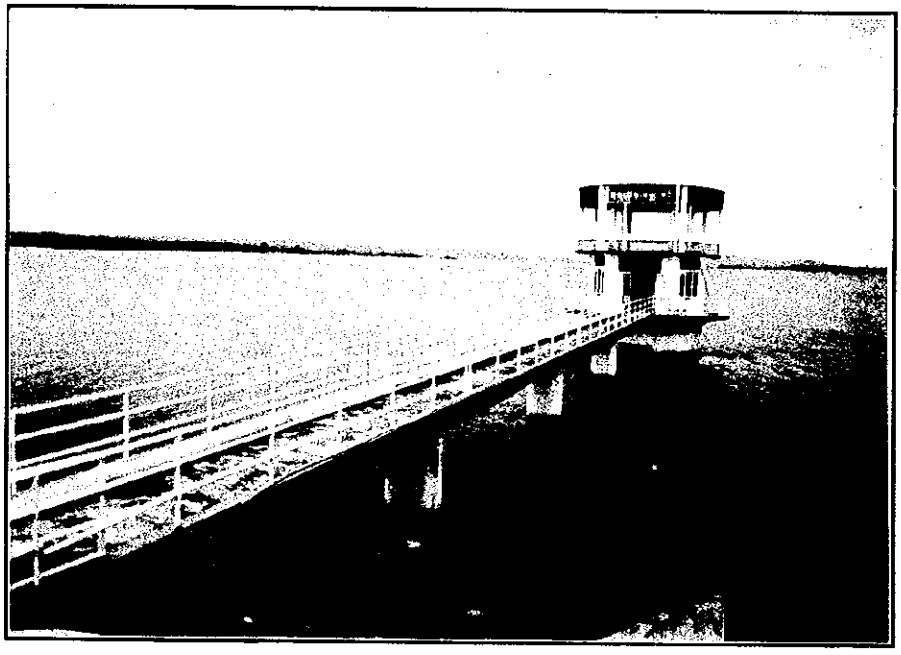
ミニッツ署名・交換

農家からのヒアリング



試験圃場

(Intensive Type)



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1. 運営指導(中間評価)調査団の派遣

1－1　調査団派遣の経緯と目的

ミャンマー連邦(以下、「ミャンマー」と記す)における農業は、農業従事者が全就業人口の7割を占め、国内総生産の60%(1999年現在)を占める基幹産業である。このため、国家経済目標には「農業開発を基礎とした全経済セクターの成長」が掲げられ、"水の効率的な使用のためのダム・貯水池の新規建設と改修修理"や"小規模ダム・貯水池に対する技術等の支援"が重要な課題となっている。

これらの状況を受けて国際協力事業団(JICA)は、1988年にプロジェクト方式技術協力「灌漑技術センター計画」を開始した。この協力は、中途でミャンマー動乱による3年間の中断があったが、フォローアップを含めて1999年まで続けられた。

ミャンマー政府は1992年以降、この技術協力の成果を活用して灌漑開発を推進しており、全農地に占める灌漑面積率は1992年の13%から、数年のうちに19%にまで拡大した。しかし、生産現場における灌漑計画が未熟なこと、施設の操作・維持管理等の水管理技術が確立されていないことから、圃場まで計画どおり水がいきわたらず、更には外資不足による化学肥料等の生産資材輸入の減少が加わって、米の生産量は1995年以降停滞している。

ミャンマー政府は、今後一層の農業生産の安定・向上に資するため、灌漑面積の更なる拡大を図る一方、我が国に対して、ミャンマー灌漑技術センター計画の成果を継続的に発展させる形で水管理関係技術の向上をめざすプロジェクト方式技術協力フェーズIIの実施を要請してきた。

JICAは、1998年10月に事前調査団を派遣し、プロジェクトの国家開発計画等上位計画のなかに占める位置づけ、及びミャンマー側の当該プロジェクトに対する実施体制等を明確にし、想定されるプロジェクト方式技術協力の基本計画案について双方の確認を行い、その結果、本プロジェクトはフェーズIの成果を適用し、適切な水管理の基本手法の開発を図るものとして合意された。

その後、1998年12月に実施協議によってR/D等の署名が行われ、技術協力期間を1999年4月1日から5か年間として本プロジェクトが開始された。また、協力開始から7か月経過した1999年11月に、運営指導調査団を派遣し、今後の協力活動の基本方向についてプロジェクト側と協議し、その協議結果に基づいてプロジェクト・デザイン・マトリックス(PDM)の見直し、改訂を行った。現在、このPDM等に基づきプロジェクト活動を実施している。

今回の調査団は、1999年4月1日のプロジェクト開始から約2年半が経過したところ、プロジェクトの進捗状況を把握・評価し、計画内容や実施体制上の問題点を摘出し、軌道修正の必要性など解決策を検討することで、今後のプロジェクトの活動内容をより適切なものとすることを目的とする。

1－2　調査団の構成

氏　名	担　当	所　　属
竹内　康人	総　　括	国際協力事業団農業開発協力部農業技術協力課課長代理
島崎　和夫	灌漑技術	農林水産省農村振興局整備部設計課課長補佐
戸田　利則	評価分析	建設企画コンサルタント海外部部長
石井　　博	計画管理	国際協力事業団農業開発協力部農業技術協力課職員

1－3　調査日程

2001年（平成13年）11月7日（水）～11月22日（木）の16日間

日順	月日	曜日	行程（総括、灌漑技術、計画管理）	行程（評価分析）	調査内容
1	11月 7日	水		成田 TG641 10:30→バンコク 15:30、バンコク TG305 18:00→ヤンゴン 18:45	移動
2	11月 8日	木			ミャンマー側評価チーム、専門家にPCM手法を説明
3	11月 9日	金			ミャンマー側評価チーム、専門家にPCMによる評価手法を説明
4	11月10日	土			質問票の収集・整理、モニタリングシステムの改善指導
5	11月11日	日	成田 TG641 10:30→バンコク 15:30、バンコク TG305 18:00→ヤンゴン 18:45		質問票の収集・整理 移動
6	11月12日	月			JICA事務所打合せ、日本大使館表敬、海外経済関係局（FERD）、農業計画局（DAP）、農業灌漑省灌漑局（ID）表敬、合同評価調査団結成、専門家との打合せ
7	11月13日	火			C/Pによるプロジェクト進捗状況報告 合同評価・協議
8	11月14日	水			現場調査（バゴー：灌漑技術センター）
9	11月15日	木			現場調査（レグー：ガモエ地区、モデルサイト） 合同評価団改訂PDM案打合せ
10	11月16日	金			①合同評価団改訂PDM案打合せ、②合同調整委員会改訂PDM協議、③第1回合同評価団内協議
11	11月17日	土			協議資料作成（質問書回答取りまとめ、評価報告書案作成等）、専門家からのヒアリング、専門家との評価報告書案確認
12	11月18日	日			専門家からのヒアリング、協議資料作成
13	11月19日	月			第2回合同評価団内協議
14	11月20日	火			午前：評価報告書・ミニッツ、作成・協議 午後：合同調整委員会
15	11月21日	水	ヤンゴン TG306 19:45→バンコク 21:35 バンコク TG642 23:40→		ミニッツ署名、JICA事務所、日本大使館報告、移動
16	11月22日	木	→成田 07:30		

1－4　主要面談者

(1) 農業灌漑省灌漑局 (ID)

Kyaw Zan Win	局長
Khin Zaw	副局長
Ohn Gaing	設計部長
Khin Maung Nyuint	設計部長
Zaw Win	水文部長 (ミャンマー側評価チーム団長)
Maung Maung	調査部長 (ミャンマー側評価チームメンバー)
Lun Maung	計画事業部長
Kyaw Thein	ヤンゴン管区事務所長 (ミャンマー側評価チームメンバー)
Kyaw tun	バゴー管区事務所長
Aye Thein	ITC センター所長
Htay Htay Win	ITC センター副所長
Kyaw Lwin	ITC センター副所長
Aung Bo	チーフカウンターパート (基幹施設水管理)
San Win Naing	チーフカウンターパート (末端施設水管理)
Myo Aung	チーフカウンターパート (システム開発)
Zaw Zaw Latt	チーフカウンターパート (灌漑情報管理)
Htar Htar Win	チーフカウンターパート (研修)
Than Htut	アドミニストレーション部門
Aung Khin	アドミニストレーション部門

(2) 国家計画経済開発省海外経済関係局 (FERD)

Soe Lin	局長
Myo New	部長

(3) 農業灌漑省農業計画局 (DAP)

Tin Htut Oo	局長
Toe Aung	副局長

(4) 在ミャンマー日本大使館

古川　和弘	二等書記官

(5) JICAミャンマー事務所

青木　利通	所長
小塚　英治	所員
島岡　みぐさ	企画調査員

1－5　中間評価の方法

本調査団と、下記のミャンマー側評価チームで合同評価団を構成して、プロジェクトの中間評価を行う。

[ミャンマー側評価チーム]

(1) U Zaw Win	Director, Hydrology Branch
(2) U Kyaw Thein	Director, Yangon Division
(3) U Maung Maung	Director, Investigation Branch
(4) U Hla Baw	Director, Design Branch

合同評価団は、協力中間点にさしかかったプロジェクトの進捗状況を評価5項目(目標達成度、効率性、インパクト、妥当性、自立発展性)の観点から評価するとともに、各活動分野について協力期間5年間で終了できるようPDMの見直しを行う。

2. 要　約

本調査団は2001年11月7日から同22日までミャンマーを訪問し、ミャンマー側と合同評価団を結成し、ミャンマー側U Zaw Win水文部長を議長、日本側竹内団長を副議長に選出した後、「ミャンマー灌漑技術センター計画フェーズII」に係る中間評価を行った。

合同評価団は、活動計画(PO)、改定PDMに基づいて評価5項目による評価を行うとともに、提言を取りまとめ、評価報告書を作成した。この報告書は、11月20日に開催された合同調整委員会に報告・了解され、翌21日、ミニッツに添付のうえ、農業灌漑省灌漑局長と署名が交わされた。

(1) 調査結果

1) プロジェクトは、総じて計画どおりに進捗しており、今後、プロジェクトの残り期間でプロジェクト目標は達成できると考えられる。ただし、基幹施設分野に関しては、活動の一部に遅れが見受けられることから、今後、重点的に対応することが求められる。これについては、他の長期専門家等との連携強化も期待されることから、残りの協力期間内に所期の成果は得られるものと見込まれる。

2) フルタイムカウンターパート(C/P)は各専門家に2～4名配置されており、専門家と常時活動を共にし、技術移転が確実に行われる体制が整えられている(業務調整員が兼務している研修分野については、C/Pは灌漑技術センター、調整員は灌漑局にそれぞれ勤務しており、常時活動を共にする体制にはないが、C/Pは専門家と連絡を密にとりつつ主体的に活動を行っている)。また、フェーズIの成果である設計基準等の基礎技術マニュアルがミャンマー側独自に実施している施設建設に活用されており、技術が定着している。

3) 現地調査の際、試験圃場の農民と対話する機会を得たが、その際、農民からは、プロジェクトで実施した研修が役に立っている旨の発言があった。ただし、プロジェクト対象地区であるガモエ地区では、灌漑稲作の経験がまだ5年程度であり、今後とも農民に対し適正な水管理管理などの研修が必要である。

(2) 提　言

プロジェクトの進捗は、おおむね予定どおりであることから、プロジェクト運営面、プロジェクトの自立発展性を確保する観点から提言した。すなわち、

1) 調査期間中にミャンマー側から本プロジェクトの対象作物として、豆、綿等の畑作物を加えるよう意見が出された。これに対し、プロジェクト・ダイレクターは、本プロジェクトは、ミャンマーの主食である米を対象とし、かつ、水稲が主体であるガモエ地区をプロジェクト対象地区としているため、畑作は対象としないという整理を改めて行った。今後も、このような意見が出てくる可能性があるので、本プロジェクトは、稲作に特化すべき

であるという提言をした。

2) 本プロジェクトの自立発展性を確保するための組織づくりとして、テクニカル・ブック作成作業を総括する部署を灌漑局内に設置するよう提言するとともに、中間目標をプロジェクト終了後3～5年以内に達成するために、プロジェクト期間中に対象地区の調査を実施するよう提言した。

3) 本プロジェクトは、活動場所が、灌漑局本局、灌漑技術センター(バゴー)、灌漑局レグー維持管理事務所の3か所に分かれ活動を行っている。このため、今後テクニカル・ブックの作成を勘案し、意思疎通の更なる強化を期待する趣旨の提言を行った。

4) 上述のとおり、農民に対する研修の継続が重要であるが、その際は、灌漑局のみならず、関係機関の協力が必要であるところ、この旨の提言を行った。

3. PDM改訂と評価実施方法

3－1　PDM改訂

1998年12月のR/D署名時に承認されたPDM-0は、2000年6月に内容が変更され、PDM-1として現在まで使用されている。しかし、プロジェクトの各活動がR/Dで取り決めた5年間で終了できるよう、更なる改訂が必要との意見があった。このため本調査団は、出発に先立って現地プロジェクト関係者との協議に基づいて改訂原案を作成した。合同評価調査団が結成された後、同案を提示し、合同評価案とすることで合意を得た。その後、11月6日の合同調整委員会でPDM-2として承認された。PDM-2の概要、留意事項などは以下のとおりである。

(1) PDM-1の見直し

本中間評価に際し、PDM-1の見直しを表3－1のように行った。

表3－1　PDM-1の見直し

項目	PDM-1	PDM-2
I.　**概外**		
ターゲットグループ	記述なし	灌漑局(ID)エンジニア
プロジェクトエリア	記述なし	ガモエ灌漑地区
プロジェクト期間	記述なし	1999年4月1日～2004年3月31日
作成日	記述なし	2001年11月
II.　**プロジェクト要約**		
1.　**上位目標**	結果が現れる期間、対象地域が不明	プロジェクト終了後5年では発現ができない
指標	灌漑水利用の効率	灌漑地区の総収量
入手手段	評価レポート	農業統計
2.　**中間目標**	なし	プロジェクト終了後、3～5年で実現可能な目標が必要。「3灌漑地区で適切な水管理技術が確立する」
指標		2009年までに3近隣灌漑地区の水管理技術書が作成、2005年から年2回訓練される。2005年3月までに訓練教材と実施計画が準備される。
入手手段		IDの年報
外部条件		灌漑施設が改善される。
3.　**プロジェクト目標**	地域の限定がない	対象地域をガモエ地区とする。
指標	モデル地区の灌漑面積	2004年までに技術書を提出、C/Pが水管理の講義ができる。

入手手段	評価レポート	ID の年報、インタビュー
外部条件		変更なし
4. 成果		
(1) 基幹施設		英語表現を訂正
指標	ガイドラインの内容のみ	2004 年 3 月までにプロポーザルレポート作成、C/P の技術向上
入手手段	ガイドライン	ID 年報、モニタリング、インタビュー
(2) 末端施設		英語表現を訂正
指標	プロポーザルレポートの内容	2004 年 3 月までにプロポーザルレポート作成、C/P の技術向上
入手手段	プロポーザルレポート	ID 年報、モニタリング、インタビュー
(3) システム開発		「技術」サポートに限定
指標	アプリケーション	2004 年 3 月テクニカルサポートシステムを利用、2004年3月までにプロポーザルマニュアル作成、C/P の技術向上
入手手段	使用状況	ID 年報、モニタリング、インタビュー
(4) 灌漑情報		変更なし
指標	プロポーザルレポートの内容	2004 年 3 月までにデータ収集・整理とモニタリング開始、C/P の技術向上
入手手段	プロポーザルレポート	ID 年報、モニタリング、インタビュー
(5) トレーニング		変更なし
指標	マスタープランの内容・トレーニング内容と参加者数	2004年3月までに(ID職員)26回790人・(農民)9回460人、2003年3月までにマスタープランの作成と承認
入手手段	評価レポート	ID 年報、モニタリング、インタビュー
(6) 外部条件		変更なし
5. 活動		変更なし
6. インプット		変更なし
7. 前提条件		変更なし

(2) プロジェクト目標の変更

PDM-1 では、プロジェクト目標、その指標、入手手段が不明確であるために、次のように修正を行った。

プロジェクト目標は、PDM-1 では、地域の設定がないために「モデル地区としてのガモエ地区」を追加した。プロジェクトの指標は、「モデル地区の灌漑面積」であるが、プロジェクトの達成度である「灌漑技術の移転とカウンターパートの技術習熟度」を計るためには不十分である。このため、ローアーミャンマー(ミャンマー南部地域)を対象とした水田稲作に係る水

管理技術を取りまとめた技術書の作成と、達成目標年を明示した。さらに、技術協力の重要な指標であるカウンターパートの技術習熟度を「適正な水管理技術を講義できる水準」として付け加えた。これら指標の入手手段は、灌漑局の年報と、カウンターパートの面談結果によるものとした。

(3) 中間目標の設定

PDM-1では、上位目標はミャンマー全域を対象としているために、プロジェクトの終了後3～5年で到達できるものではない。PDM-1の上位目標は、スーパーゴール(セクター目標)と位置づけられるもので、このために、プロジェクト終了後3～5年で達成が期待される中間目標の設定が必要であった。

水管理技術の中間目標の設定にあたって、「どのような目標を、プロジェクト終了後3～5年の期間で、ミャンマー側が独自でガモエ地区を対象とした水管理技術を発展させ、どのように達成するか」を中心に協議を行った。プロジェクトのターゲットグループが、ID技術者であるために、彼らが、プロジェクトで習得した水管理技術の開発手法を、どのように発展させるかが、課題となった。

合同委員会ではミャンマー側の一部出席者より、「他地域への拡大」と「米作以外の他作物」への適用を望む意見が出された。また、水管理技術の適用が、ローアーミャンマー地域だけではなく、他地域(アッパーミャンマー(ミャンマー北部地域)等)にも、適用できるとする発言があった。これは、地域の限定が不明確であることに起因するものと考えられる。このために、現在プロジェクトで取り組まれている水管理技術は、これまで乾期に灌漑がほとんど実施されてこなかったローアーミャンマーで必要とされるものであり、また主要作物の米を対象としたものであることを、明確にした。

プロジェクトの技術目標とターゲットグループの設定から、中間目標では、ガモエ地区の近隣の灌漑地区に限定し、プロジェクトで達成されるであろう同様な技術書の作成を行うこととした。また、対象地区の選定にあたっては、優先順位と灌漑面積等を検討し、合同委員会で合意を行った。地区数に関しては、現在のプロジェクトの経験から、乾期での現地調査(1年間)、調査解析と雨期中の調査(1年間)、技術書作成(1年間)とすると、1灌漑地区の調査が3年間必要であり、機材や人員等投入の制約を考慮し、3地区とした。

また、プロジェクト対象地域であるガモエ地区では、同時にIDエンジニアや、最終便益者である農民(PCM講義の際に確認している)への研修をこの期間に行い、水管理技術書の適用と定着を図ることとした。

灌漑技術センター(ITC)は、今後中間目標とする技術書の作成を通じて、他の地域や他の作物への適用の拡大ができるような技術を習得し、発展を行う意向である。

合同評価団は、上記の実現を確実なものにするために、プロジェクトの期間中に、現地調査計画書の作成や現地調査等を開始し、必要に応じて専門家のアドバイスを得るよう提言を行っている。

(4) その他

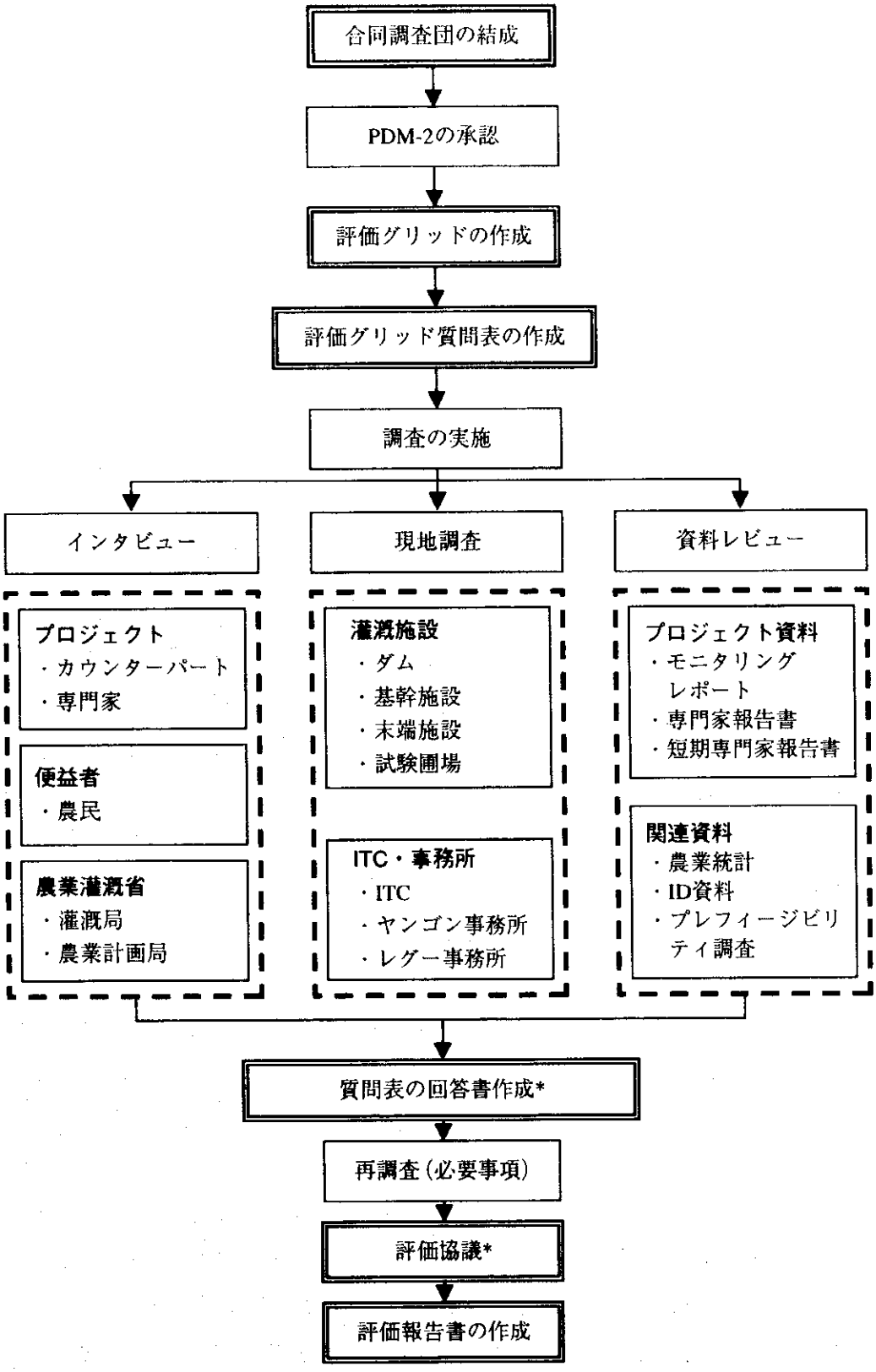
1) 上位目標の指標について、「Cropping Intensity」(作付け可能面積に対する全実作付け面積を示す)を入れるほうがよいとの意見があった。また、水利用効率の改良による「収量増加」への寄与を「入手したデータ」から、どのように判断するかという議論があった。これらは、今後の検討項目となろう。

2) ガモエ地区における灌漑システムの改善目的は、水資源の「効率的」(適切用水量と時期)、圃場への「平等な」配水ととらえられており、これらの目的が指標の検討に有意義である。

3) 中間目標から上位目標への達成のためには、外部条件としては「化学肥料等投入の確保」や「農業機械の導入」等、もっと外部条件を付け加えるべきであるという議論があった。中間目標から上位目標へは、政策、他の投入、人材の育成、農民への普及等様々な外部条件が考えられるが、プロジェクトで「確立された技術を使い、施設を改善・維持管理する」ことのみを、記載した。

3－2 評価調査の実施方法

評価調査の実施方法は、図3－1「調査実施のフローチャート」のとおりである。



注）＊付属資料4．参照

図3－1　調査実施フローチャート

4. 灌漑農業の現状とプロジェクト活動の進捗状況

4－1 現 状

ミャンマーにおける水資源開発は、1988年までの20年以上に及ぶ長期間にわたるビルマ社会主義計画党の独裁支配により、経済発展が停滞したこと及び、ヤンゴン等を含むローアーミャンマーでは、雨期の豊富な降雨量を利用した水田農業が可能であったことなどから、ほとんど水資源開発や灌漑施設の整備は行われてこなかった。

一方、1988年のミャンマー動乱以降、遅れた経済発展と人口増加に対応した食料の確保等の観点から、経済開発において、農業開発を最重要課題として位置づけ、ダムによる水資源開発や灌漑施設の建設による乾期作の導入を積極的に勧めてきている。

4－2 灌漑施設の整備状況

1988年以降、水資源の開発を主体として100か所以上のダム建設や灌漑施設の整備を行ってきている。現在、毎月1か所以上のダムの竣工をめざして取り組んできている。これらのダム(ただし、ハイダムを除く)及びダム以下の幹線・支線水路や分水工は、政府(農業灌漑省灌漑局)により、建設され、末端水路(ウォーターコース)は、政府の計画に基づき農民により建設されている。

これらの施設の建設にあたっては、灌漑技術センター計画フェーズIで技術移転された設計基準や灌漑技術等の多くの技術が活用され、工事が実施されている。これらの施設の建設については、完成後、10年未満とあまり年数を経ていないこともあり、構造上大きな問題は生じておらず、施設の建設技術については、経済性や効率性の観点から多少の改善の余地はあると考えられるものの、ある程度の確立された技術を有している状況にある。

ただし、これらの水資源施設や灌漑施設の建設は、政府の強力な指導の下、急速に進められていることもあり、地区全体の現況調査や管理面も考慮した計画策定がなされておらず、水管理方法や末端施設の維持管理及び農家の灌漑の利用方法への取り組みが重要となってきている。

4－3 水管理の現状

他の地区と同様にガモエ地区も1995年にダム及び灌漑施設が完成し、それ以降灌漑がなされてきており、また、水管理があまり考慮されていない施設計画(支線水路の支配面積に大きな開きがあり、また、その単位面積当たりの設計流量も大きく異なること等)に基づき施設が設置されていることから、現在、前年の経験や実績に基づき試行錯誤しながら、水管理を行っている状況にある。

また、本地区は、当初計画段階で詳細な水計算が行われておらず、また、畑地主体とした灌漑計画を水田主体の灌漑計画に変更するなど、基本的な問題を内在した状況にあるといわざるを得

ない。

以上から、現況の灌漑施設を踏まえ、適切な水管理手法の確立が重要となっている。

(1) 現況水管理の実態

ガモエ地区全体の施設の維持管理は、レグーにあるレグー維持管理事務所が実施しており、幹線・支線水路等は、1～3年に1回定期的な維持管理(草や土砂の除去等)が行われるとともに、水路調査員による月に1回定期点検が行われており、比較的良好な状態で施設の管理がなされている。しかしながら、農民管理の末端の水路については、組織的な対応は行われておらず、個々の農家で必要に応じて水路の維持管理がなされており、末端まで水が配水されていない状況が見受けられる。

一方、水管理について、ダムからの放流量(取水口の開閉)及び期間は、灌漑局長の指示によりなされており、地区全体の配水計画は、毎週土曜日に開催される水配分委員会(農業協同委員会の下部委員会)において、昨年度の実績や農家からの要望を踏まえ、決定されている。

しかし、分水操作上の問題や水管理上の灌漑システムの問題や農家の灌漑に対する認識の低さなどから、支線水路や末端水路または末端圃場からの無効放流が生じ、幹線・支線水路の末端には水が届かないなど、不平等な水配分となっている。

(2) プロジェクトの取り組み概要

現況の灌漑システムを踏まえ、水源地であるガモエダムの水資源を効率的に配水し、個々の圃場に平等にいきわたるようにすることを目的としている。

① 基幹施設水管理

現況水路の状況及び各支線への配水実態を把握し、効率的な水配分計画及び操作手法を確立する。

② 末端施設水管理

幹線からの配水を受け、支線水路がかりの各圃場に効率的に水が配水されるよう末端水路(ウォーターコース)の適正な整備手法や効率的な水利用を行うために必要な最低限の取水ルールや末端水路管理方法を確立する。

③ システム開発

本地区において、計画段階で地形測量や水理的な検討が全く行われておらず、適正な水管理を行ううえで必要なダム貯水池の水収支、水理的な観点からの各支線への配水シミュレーションや受益面積の把握に必要な土地利用台帳等を把握管理するシステムを開発する。

④ 灌漑情報管理

施設の維持管理や効率的な配水計画等の水管理を改善していくために必要な各種情報を管理する手法を確立する。

⑤ 研　修

水管理の改善のため、農民及び灌漑局職員への啓もうが必要であり、これに必要な研修を実施する。また、灌漑局には、系統だった研修計画が存在しないことから、研修マスタープランの策定を行う。

4－4　プロジェクト活動の進捗状況

(1) 基幹施設水管理

灌漑施設の現況把握及び現状の配水計画内容、分水施設等の操作方法の把握を行うとともに、収集したデータや情報を基に、現況配水計画の問題点の分析・検討を行ってきた。これらの検討結果を基に、今年の12月からの乾期灌漑において、具体的な配水計画や分水操作の改善を現地において適用し、観測を行うとともに、改善手法の確立を行うこととしている。あわせて、水理現象シミュレーションを活用し、灌漑施設やシステムの改善の取りまとめを行うこととしている。

配水計画全体の改善計画は取りまとめられてはいないものの、今期の乾期作から支線水路の支配面積を考慮したローテーションの改善や分水施設の操作方法の改善のために具体的に現地で部分的に改善手法を適用していくことから、予定期間内に成果を達成できるものであると思う。

(2) 末端施設水管理

1期の試験圃場の建設はすでに完了し、2期の試験圃場の建設も今期の乾期作実施までにはすべて完了することから、ほぼ予定どおりの進捗状況にある。今後は、これらの試験圃場での観測データ等を活用し、末端水路の適正な整備計画がなされると思う。

また、末端レベルでの水管理においては、協同作業の重要性や灌漑方法等に対する農家の認識を高める必要があることから、これらの農家への指導方法についても取り組んできている状況にある。

(3) システム開発

土地利用台帳システムや水管理のための支援プログラム開発(水理現象シミュレーション、用水到達時間の計測、水収支シミュレーション)はほぼ完了し、今後、これらのシステム、プログラムと観測データを活用して、具体的な水管理改善に向けた検討を行うこととしている。

貯水量モニタリング手法の改善については、ダムの流入量、放出量の観測・確認は実施してきており、今後、ダム貯水量の計測を行い、これを活用して、水収支シミュレーションに活用していくこととしている。

カウンターパートの日本での研修により、多少遅れた部分はあるものの、カウンターパートの体制及び積極的な取り組み姿勢であることから、期間内に十分に成果が達成できるものであると思う。

(4) 灌漑情報管理

当国においては、ほとんど情報やデータが整備されておらず、有益な地図さえ入手ができない状況にあること及び地区の計画において詳細な情報やデータに基づく計画策定がなされていないことから、水管理改善に必要な情報がない部分もあるものの、収集情報や観測データの整備は計画どおり実施されており、期間内に成果は達成できるものであると思う。

(5) 研　修

研修分野の主な活動は、灌漑局職員及び農家への水管理の研修と、研修マスタープランの作成の2つである。1) 水管理研修に関し、ミャンマーに関する研修の現況の調査が行われ、報告書が作成された。他の4つの分野と打合せのうえ、段階的に研修実施計画を作成し、現在までに農家、灌漑局職員に対し Effective Use of Irrigation Water 、Fundamental Water Management 等に関する研修を実施しており、ほぼ予定どおりの進捗状況にある。2) 研修マスタープランについては、作成の前段として、新しく採用された灌漑局職員の技術レベルの調査が行われた。2000年1月に研修マスタープランを作成するための Sub-Special Committee (SSC) が結成され、第1回、第2回 SSC において灌漑局の他の部局から必要なデータが集められ、第3回 SSC において ITC から研修マスタープランのドラフト案が提出された。その後、6回に及ぶ SSC での調整のあと、2001年9月18日にマスタープラン作成のための最初の Special Committee (SC) が開かれ、最終の調整に入った。

今後、数度の SC による調整を経た後、2002年度に灌漑局の研修マスタープランがオーソライズされる予定である。

5. 評価結果

5－1　目標達成度

5－1－1　成　果

成果1：「基幹水利施設での水管理と維持管理技術が改善される」

1)　プロジェクト前半期の成果の達成は「やや満足」であり、今乾期の集中的な努力でプロジェクト完了までに、成果は達成が見込まれる。

2)　成果の達成度は、約50%弱であることから、「やや満足」とした。配水計画を見直し、今乾期中に実施検証することが必要である。プロジェクトはこの実施の準備に取りかかっているために、プロジェクト終了時までに成果が達成される「見込み」があると判断した。

3)　カウンターパートの技術習熟度は、かなり高い。短期専門家の指導後、独力で量水計の設計と施工を行っている。調査団が、現場で施工精度を確認したがかなり高い。プロジェクトの内容説明やインタビューでは、自ら調査団に対して説明ができ、プロジェクト目標と成果の関係、必要な技術課題を理解している。今後の技術課題として、独自の「問題解決」能力の開発が必要である（短期専門家報告書）。このために、技術移転と習熟度は、「かなり満足」できると判断した。

4)　予想外の外部要因の影響は、今のところ確認されないために、「不確か」と判断した。

成果2：「末端灌漑システムの水管理の検討方法が改善される」

1)　プロジェクト前半期の成果の達成は「やや満足」であり、今乾期の集中的な努力でプロジェクト完了までに、成果は達成が見込まれる。

2)　成果の達成度は、約50%である。2000年の乾期中に第1試験圃場を完成させ、今乾期中第2試験圃場の末端水路にれんがによるライニング工事を実施し完成する予定である。第1試験圃場は、施工を実施したID施工部の建設機械が古く、高い施工精度を要求される田面の「均平」作業に適していなかったために、施工後の均平度に一部の田面で不陸が出ており、農民からの苦情が表明された。施工の遅れと施工精度から「やや満足」と判断した。しかし、プロジェクトでは、農民の苦情を聞き、現在修正工事を実施することを計画している。このように、プロジェクト実施者と農民の間で、工事や研修を通じて日常的な「対話」ができる関係がつくり上げられており、プロジェクトの終了時までには、成果の達成が「見込める」と判断した。また、試験圃場工事で、施工者の実施能力が確認されたことは、今後の計画、設計、施工管理の検討において大きな成果と考えてよい。

3)　カウンターパートの技術習熟度は高い。調査団は、現在施工中の水路ライニング工事

を見学したが、「帳張り」を設置し、「水糸」により丁寧な施工が実施されており、施工及び監督能力は高いと判断した。また、プロジェクトの内容説明やインタビューでは、自ら調査団に対して説明ができ、プロジェクト目標と成果の関係、必要な技術課題を理解している。このために、技術移転と習熟度は、「かなり満足」できると判断した。

4) 予想外の外部要因の影響は、今のところ確認されないために、「不確か」と判断した。

成果3:「水管理のための技術支援システムが改善される」

1) プロジェクト前半期の成果の達成は「満足」であり、プロジェクト完了までに、成果は達成が見込まれる。

2) 現在の成果の達成率は、50%であり、スケジュールどおりである。このために「満足」と判断した。また、成果の達成も、「見込まれる」と判断した。

3) カウンターパートの技術習熟度は高く、既にデーターベースシステム、リモートセンシング、GPS測量、水理現象解析(ミャンマー単位に変更)を、利用している。また、プロジェクトの内容説明やインタビューでは、調査団に対してカウンターパート自ら説明ができ、プロジェクト目標と成果の関係、必要な技術課題を理解している。このために、技術移転と習熟度は、「かなり満足」できると判断した。

カウンターパートからの要望として、現在使用しているコンピューター土木設計のプログラムは、汎用性が低いために、世界標準となっている「Auto Cad」社の土木設計プログラムの導入と、GISプログラムの導入があった。カウンターパートとしては、技術習得の目標を、プロジェクト後も使用ができる汎用性の高いプログラムで行う必要があると考えたものと思われる。GISプログラムに関しては、森林保護で使用しているGISソフトとの整合性が必要であり、ミャンマーでの基準に従うのがよいと思われる。

4) 予想外の外部要因の影響は、今のところ確認されないために、「不確か」と判断した。

成果4:「灌漑事業を管理するための灌漑事業管理情報システムが改善される」

1) プロジェクト前半期の成果の達成は「満足」であり、プロジェクト完了までに、成果は達成が「見込まれる」と判断した。

2) 灌漑情報のデータ収集と水管理モニタリングは、50%達成しており、スケジュールどおりであり、「満足」と判断した。また、現在の進捗状況から、成果の達成は、「見込まれる」と判断した。

3) カウンターパートの技術習熟度は高い。灌漑情報の管理システム改善を実施している。また、プロジェクトの内容説明やインタビューでは、評価団に対しカウンターパート自ら説明ができ、プロジェクト目標と成果の関係、必要な技術課題を理解している。この

ために、技術移転と習熟度は、「かなり満足」できると判断した。現在、情報をデジタル化し、CD-ROMに記録し、必要に応じて現場事務所にCD-ROMで情報を提供するシステムを構築する作業を行っているが、機材(プロジェクト3事務所に1台のみ)が不足しており、今後作業の進捗に追加の検討が考慮される。カウンターパートからは、カラーコピー機の要請が強かったが、維持管理と運転費用が高価なことから、まだ必要性が少ないものと判断した。

4) 予想外の外部要因の影響は、今のところ確認されないために、「不確か」と判断した。

成果5:「水管理技術が、研修を通して灌漑局技術職員及び試験圃場の農民に普及する」

1) プロジェクト前半期の成果の達成は「満足」であり、プロジェクト完了までに、成果は達成が「見込ま」れる。

2) 既に、トレーニングマスタープランを作成しており、現在灌漑局の承認待ちである。

3) カウンターパートの技術習熟度は高く、訓練用教材、準備等を、独力で行っている。今後、農民や女性参加を課題とした「訓練ニーズ分析」等、新しい訓練が課題となる。また、プロジェクトの内容説明やインタビューでは、カウンターパート自らが評価団に対し説明ができ、プロジェクト目標と成果の関係、必要な技術課題を理解している。このために、技術移転と習熟度は、「かなり満足」できると判断した。

4) 予想外の外部要因の影響は、今のところ確認されないために、「不確か」と判断した。

5－1－2 プロジェクト目標

(1) 上記の成果の達成から、プロジェクト目標である「フェーズIで達成された基礎的灌漑技術を適用し、ガモエ灌漑事業(モデル)地区での水管理技術を確立する」に関しては以下のように判断した。

1) フェーズIで供与されたITC施設と試験室は、プロジェクトのために効果的に利用されている。

2) プロジェクト地域の適切な水管理のための技術書は、ローアーミャンマーに適した水田稲作栽培のための水管理技術を目的にするものである。

3) カウンターパートの訓練は実施中であり、技術習熟の結果は、「かなり満足」されるものである。適切な水管理技術のための講師としての能力は、成果の到達により向上している。

4) 重要な外部条件である「プロジェクトを通じて獲得された知識と経験が継続的に普及する」は、実現しつつあることを確認した。

(2) 予定外の外部要因と条件は以下のとおりである。

1) カウンターパートは、ほとんどが「土木」技術者であり、「水管理」を十分学んでいない。灌漑局は、海外での研修を通じた数名のエキスパートがいるのみである。多くのカウンターパートは、JICAを通じた日本での訓練を受けており、3名のカウンターパートはプロジェクトにより日本の大学で水管理の修士課程で学んでいる。

2) プロジェクト地域での水管理の責任者は分散している。水管理計画はプロジェクトが作成し、ダム、幹線水路、2次水路、末端水路への取り入れ口は、灌漑局のメインテナンス事務所、末端水路は農民と水管理組合が管理責任をもっている。農業調整委員会(Agriculture Coordinating Committee)が、灌漑局、ミャンマー農業サービス(Myanmar Agriculture Services)、定住土地局(Settlement and Land Record Department)、農業機械局(Agricultural Mechanization Department)の代表によって設立され、ガモエ地区ではよく機能している。

5－2 効率性

5－2－1 投入の量と質

〔日本側投入〕

(1) 日本人専門家の派遣

1) 日本人専門家はPDMのすべての活動を進めることに貢献し、それは「満足」と評価できる。

2) 彼らは、現在の段階では、プロジェクトを予定どおりに進めることに貢献している。

3) 日本人専門家の貢献は、ミャンマー側から高く評価されている。

(2) カウンターパート研修

1) 研修を通じて、日本を知ることはプロジェクトで日本人専門家との共同作業に役に立っている。

2) 日本での研修は、カウンタパートの知識の向上と経験の拡大の貢献している。

(3) 機材供与

1) JICAが供与した機材は適切である。

2) これらのほとんどの機材は、維持管理とサービスのためにミャンマーで調達された。

3) 機材の供与は予定どおり行われた。

(4) JICAによるその他の援助

JICAによるプロジェクト費用への援助は、プロジェクト援助を円滑に進めている。

〔ミャンマー側投入〕

(1) カウンターパートの配置

1) カウンターパートはPDMのすべての活動を進めることに貢献し、それは「満足」と評価できる。

2) 彼らは、現在の段階では、プロジェクトを予定どおりに進めることに貢献している。

3) カウンターパートの能力と意欲は、非常に高い。これは、PDMの成果の達成に大いに貢献している。

4) カウンターパートの貢献により、日本人専門家がミャンマーの社会や文化の状況を知ることは、プロジェクトの円滑な進捗に大いに役に立っている。

(2) 予算処置

ミャンマー政府によるミャンマー側の予算処置は最大限の努力を払っている。

5－2－2 投入の時期

〔日本側投入〕

(1) 日本人専門家派遣

専門家の適時の派遣は、プロジェクトを円滑に進捗している。

(2) 機材供与

機材の投入は、適切な時期に実施され、プロジェクト活動を効果的に支えた。

(3) カウンターパート研修

日本での研修の時期は、十分に効率的で効果的であった。

〔ミャンマー側投入〕

(1) カウンターパート

適時のカウンターパートの任命はプロジェクトの効果を向上させた。

(2) 予算処置

経済的に困難であったにもかかわらず、プロジェクトへの予算処置は適切に準備された。

5－2－3 サポートシステム

合同委員会は年1回の定期委員会と必要に応じ開催されている。合同委員会のメンバーは、灌漑局長、副局長、設計部長、計画・工事部長、水文部長、ヤンゴン地区部長、ボゴ地区部長、農業計画局代表、JICA、日本大使館(オブザーバー)である。ここで、現在の活動と課題報告を行っている。会議での結論は、新たな人事や予算処置としてプロジェクトを支えており、関係者間

の協議により、プロジェクトが強力な指示体制を獲得している。

5－3　インパクト

(1) 予想される正のインパクト

1)　農民はプロジェクトの実施に満足しており、日本の援助とミャンマー政府の支援に感謝をしている。

2)　農業計画局と灌漑局は、プロジェクトの達成をもとに、水管理技術を他の作物（米以外の2次作物）や他の地域（中央とアッパーミャンマー）へ発展させることを望んでいる。

3)　プロジェクトの効果による農業政策の変化は、「不確か」である。

(2) 予想される負のインパクト

現在の段階では負のインパクトはない。将来、生じることかどうか確実には判断できない。

(3) 予想されない正のインパクト

1)　農民の所得向上が図られる。

2)　試験圃場の水管理組合は、営農用の小規模農業機械の購入を望んでいる。試験圃場の農家は、これら機械の使用後、他の地域へ貸し出すことで、余分の収入が得られるであろう。これらの余分の収入は、試験圃場の維持管理費用を賄うことができる。

(4) 予想されない負のインパクト

現在のところ、負のインパクトはない。

5－4　妥当性

5－4－1　国家政策との一致

(1) 新国家5か年計画（2001年2月～2005年6月）は、現在検討中である。農業計画局より、本計画は現行の計画と同様な農業セクター開発のための政策であるとの発言があった。また、灌漑の水管理の人材育成は、セクター開発コンポーネントの重要な鍵である。

(2) 新国家計画のなかで、目標作目は、米、豆類、綿花、サトウキビ、コーヒー、黒胡椒、トウモロコシである。米の増収は、最重要課題の1つであり、ローアーミャンマーでの夏期の水田稲作のための灌漑の発展と水管理の改善は、この目標達成に重要である。

5－4－2　社会的課題との一致

農業セクターは、国内総生産の60%を占め、総労働人口の70%の雇用吸収を行っている。人口の57%が農村部に生活している（1998年現在値、出所FAO Production 1998）。灌漑の水管理は、作付け面積密度を高めさせ、総収量の増加させ、農民の収入を増加させる。

5－4－3　日本の援助政策との一致

ミャンマーに対する日本の援助方針は、重点分野を農業、医療･保健、教育、ライフライン、環境保全、麻薬撲滅等である。プロジェクト目標は、これに一致している。

5－5　自立発展性

5－5－1　政策の持続性

(1) 政策サポートの継続性が期待できる。

(2) ミャンマー政府は、多数のダムと灌漑用施設を建設しており、このために、灌漑地区での水管理はより重要な課題となっている。農業灌漑省と灌漑局は、この施策を継続する意向である。

(3) 効率的な水管理は、農民のオーナーシップ、ルールと規約、灌漑施設の改善等が要求される。農業灌漑省及び灌漑局は、これらを理解している。

5－5－2　技術の持続性

プロジェクトは、地元で入手できる資源(地場でみつかる材料や労働力)を、水路の改良や補修のために、技術的に可能な限り利用することを意図している。プロジェクトでは、灌漑技術センター(ITC)の試験室と研修を通じて、水路に適用する土質改良の研究を考えている。

5－5－3　環　境

(1) 負の環境インパクトは、効果的な水管理では生じない。排水改良により、滞水が生じることがないと考えられる。

(2) 灌漑局は、環境影響評価(EIA)の重要性を理解している。灌漑局エンジニアはEIAの知識が必要である。このために、プロジェクトでは環境研修を考えている。

5－5－4　社会・文化

(1) 農民は、収入の増加があるために、プロジェクトに満足をしている。農民の支持が期待できる。

(2) 女性の参加がより増えることが期待できる。農村部の女性に対する研修に特別な配慮が必要である。

(3) 夏期の水田稲作栽培は、「乾田直播き」と収穫のために多くの労働力が必要である。これにより、農村部の雇用の増大が起こり得る。

(4) プロジェクト地域では、灌漑は1996年のダム建設の竣功時から開始されている。農民と水管理組合は、水田灌漑の十分な経験がないために、水管理の改善を必要としている。

5－5－5　制度･管理

(1) ITCは、全国規模で効率的な水管理を開発するための、人材開発の重要な組織である。ITCへの現在の政策支援のもとでは、ITCはその役割を十分に果たし得る。

(2) プロジェクトのモニタリングシステムは、プロジェクト内部に、よく組み込まれている。効率的水管理の普及のためには、各プロジェクトにおいて、同様なモニタリングシステムが作られると予想される。

(3) ITCは、灌漑局のスタッフにマスタープランによる、訓練の実施を行う予定である。

5－5－6　経済・財務

(1) ITCは、収入を得る事業をもっていないために、その活動を全面的に政府の予算に頼っている。農業セクターがその重要性を減じない限り、必要な予算のサポートは継続すると考えられる。

(2) 水管理の持続性のためには、今後使用する灌漑用水の利用者への「コストリカバリー」(受益者負担)の政策を考慮するべきである。

5－6　総合評価

本プロジェクトの中間評価時における重点項目(妥当性・目標達成度・効率性)の総合評価を要約すると次のとおりである。

(1) (妥当性)農業セクターは、ミャンマーにとって最優先課題の1つである。また、日本の国別援助政策と一致している。

(2) (妥当性)水管理分野での人材育成は、農業セクターの灌漑事業を進めるうえで重要な課題となっている。

(3) (目標達成度)各成果の達成は、本プロジェクトの目標である「ローアーミャンマーのガモエ地区をモデルとする水田稲作の水管理技術を開発する」の達成に重要な要素となっている。また、訓練計画の実施によりカウンターパートがID全体に技術を普及することができる。プロジェクトでのこれらの成果と目標の達成は、現在のところ「見込み」がある。

(4) (効率性)現在のところ、各投入がそれぞれの成果を達成するために効率よく利用されている。

中間評価の総合結果を表5－2にまとめる。本事業の評価は総合的には「満足」であり、プロジェクトの目標の達成は、期限までに「見込みがある」と判断される。

表５－２　中間評価の総合的検討

評価５項目	具体的評価項目	判断	評価点
妥当性	公共事業・ODAとしての適格性	あり	満足
	国別事業実施計画との整合性	整合	非常に満足
	相手国のニーズへの一致	一致	非常に満足
	参加型の計画作成	PCMを採用	満足
	日本の技術の優位性	あり	満足
目標達成度	計画の論理性	PDM	やや満足
	目標設定のレベル	妥当	満足
	外部条件の可能性	高い	不明
効率性	費用対成果（中間評価時点）	高い	満足
インパクト	上位計画の達成の見込み	高い	見込みあり
	実施によるインパクト	正のみ	見込みあり
	環境面その他の配慮	必要	見込みあり
自立発展性	組織能力	非常に高い	見込みあり
	財務状態	高い	見込みあり
	プロジェクト受容性	非常に高い	見込みあり
	総合的評価	満足・見込みあり	

6. 提　言

プロジェクトの進捗は、おおむね予定どおりであることから、今回の評価では、プロジェクト運営面、プロジェクトの自立発展性を確保する観点から提言した。これらの提言は、2001年11月20日に開催された合同調整委員会で承認された。

(1) 改定PDM案を承認するための合同調整委員会が11月16日に開催された。その際、ミャンマー側出席者からは、主食の米のみならず、豆、綿等の畑作についても視野に入れた灌漑技術の移転を行ってほしい旨、発言があった。プロジェクト・マネージャー等プロジェクト関係者からは、本プロジェクトは、そもそも、ミャンマーの主食である米を対象とし、かつ、水稲が主体であるガモエ地区をプロジェクト対象地区としているため、畑作については対象としていない旨説明があり、合同委員会議長もプロジェクト・マネージャーの説明を支持し、畑作は対象としないという整理をした。しかしながら、今後もこのような意見が出る可能性があるため、本プロジェクトは、稲作に特化すべきであるという提言をした。

(2) 本プロジェクトの成果となるテクニカル・ブック(配水計画、施設操作計画、施設整備・修復計画等を示した水管理に関する技術書)は現在のところ、プロジェクトにおいて作成作業中であり、テクニカル・ブック作成作業を総括する部署は灌漑局内に存在しない。今回の中間評価において、本プロジェクトの中間目標を「3つの灌漑地区での水管理技術を確立する。」とした。この中間目標の指標の1つに、「2009年9月までに3つの灌漑地区のためのテクニカル・ブックを策定する」があるが、これらのテクニカル・ブックはミャンマー側独自で策定するものである。このため、プロジェクト終了までに、当該部署の設置を提言した。

(3) 中間目標をプロジェクト終了後3～5年以内に達成するために、プロジェクト期間中に対象地区の調査を実施するよう提言した。これは、灌漑局は本プロジェクトの対象地区であるガモエ地区を含むローアーミャンマーにおける灌漑技術については、テクニカル・ブックは地区ごとに固有の対処法も含まれること、灌漑局は経験が豊富ではないことから、専門家からの助言が得られるプロジェクト協力期間中に灌漑局により調査を開始することを提言したものである。また、灌漑局は、この調査のために必要な機材については灌漑局独自で調達することを併せ提言した。

(4) 本プロジェクトは、活動場所が、灌漑局本局、灌漑技術センター(バゴー)、灌漑局レグー維持管理事務所の3か所に分かれており、専門家もこの3か所に分散して活動を行っている。このため、プロジェクトでは、週のはじめに定例会議を行い、従来、意思の疎通を図ってきているところであるが、今後テクニカル・ブックの作成を勘案し、意思疎通のさらなる強化が期待され、これを提言した。

(5) 上述のとおり、農民に対する研修の継続が重要であるが、その際は、灌漑局のみならず、関

係機関の協力が必要であるところ、この旨の提言を行った。

7. 団長所感

フルタイムカウンターパートが2～4名配置され、主体的に取り組んでいる。今回の合同評価団に対しての説明は、カウンターパート(C/P)が準備し、自身により評価団に対し説明している。専門家は補足説明にとどめる程度であった。研修分野については、C/Pは灌漑技術センター(バゴー：ヤンゴンから車で1時間30分程度)、日本側担当専門家である業務調整員は灌漑局(ヤンゴン)にそれぞれ勤務しており、常時活動をともにする体制にはないが、C/Pは専門家と連絡を密にとりつつ、主体的に活動を行っている。このように、技術移転の環境は整っており、今後もさらなる技術の向上が期待される。

合同委員会において、本プロジェクトに畑作物についても対象とするよう意見が出された。これについては、本プロジェクトがミャンマーの主要作物である稲作を対象として開始されたという経緯等を踏まえ、対応しないことを確認したが、本プロジェクトのこれまでの取り組み、現在までの成果が、ミャンマー側に一定の評価を得ている表れともいえよう。他方、本プロジェクト終了後の協力については、ミャンマー政府の方針として畑作の強化もあげられていることから、この方針の実行に資すると考えられる今回のミャンマー側の要望についても考慮することも必要と思われる。

プロジェクト・モデル地区内の農民に対して研修が行われている。農民はこの研修に満足しており、農民へのインタビューの際に、農民代表から今後は特段研修を必要としない旨の発言があった。当該地区は、灌漑稲作の経験が5年程度であり、その歴史が浅く、地区全体で適正に水管理を行うためにはさらなる研修が望まれる。また、これまで、水資源施設や灌漑施設は、政府の強力な指導の下、急速に建設が進められていることもあり、地区全体の計画を定めた上で建設されている状況にはない。このため、水管理方法や末端施設の維持管理方法、農家の灌漑の利用方法への取り組みが重要になってきている。このように、ソフト面での強化が重要であり、この点で、本プロジェクトの果たす役割は大きい。

本プロジェクトは、テクニカル・ブックの作成をプロジェクト目標、及び中間目標達成の指標の1つにしている。このテクニカル・ブックは、共通の技術面もあるが、各地区固有の技術面も含まれている。例えば、配水計画をテクニカル・ブックに反映させるためには基幹施設、末端施設の担当部署の連携が重要である。このため、連携を推進するための仕組みづくりが重要となる。この仕組みがプロジェクト終了前にでき上がっていることが、自立発展性確保のために重要であろう。

中間目標達成のために、他の3地区での調査をプロジェクト期間中にミャンマー側独自で行うことを提言した。ローアーミャンマーでの灌漑稲作については、経験が浅く、また、水計算に基づいた計画づくりについても今後の課題である現状にかんがみ、協力期間中に日本人専門家の助

言を行いつつ活動を行うことが妥当と判断したものである。ここでのポイントは、主体は、ミャンマー側であるという点であり、日本人専門家が主体となって活動することは、ミャンマー側の自立発展を阻害することにもなりかねないので、この点を十分留意すべきである。

灌漑技術センター(ITC)は灌漑局がミャンマー国内で実施している水源施設、灌漑施設工事に際し、施工管理等を担当している。現在、乾期であり、この時期は工事時期と重なるため、コンクリート強度試験、土質試験等がなされていた。試験工程も管理されており、基礎技術についての技術移転は、なされていることがうかがわれた。

付　属　資　料

1. ミニッツ
2. 評価グリッド（日本語・英語）
3. 質問表（日本語・英語）
4. 質問表回答（英語）
5. 評価結果（英語）

1. ミニッツ

MINUTES OF MEETING OF THE JOINT EVALUATION ON JAPANESE TECHNICAL COOPERATION FOR THE IRRIGATION TECHNOLOGY CENTER PROJECT PHASE II IN THE UNION OF MYANMAR

The Government of Japan dispatched the Japanese Mid-term Evaluation Team (hereinafter referred to as "the Japanese Team"), headed by Mr. Yasuto TAKEUCHI, to the Union of Myanmar (hereinafter referred to as "Myanmar"). The Japanese Team was dispatched through the Japan International Cooperation Agency (hereinafter referred to as "JICA") from November 7 to November 22, 2001, for the purpose of conducting mid-term evaluation of the Project Type Technical Cooperation for the Irrigation Technology Center Project Phase II in Myanmar (hereinafter referred to as "the Project") as well as discussing the major issues related to the implementation of the Project.

During the Japanese Team's stay in Myanmar, the Japanese Team and the Myanmar authorities formulated the Joint Evaluation Team (hereinafter referred to as "the Evaluation Team") to conduct mid-term evaluation of the Project by carrying out a field visit, exchanging views and holding a series of discussions in respect of desirable measures to be taken by both Governments for the successful implementation of the Project.

As the result of the evaluation, the Japanese Team and the Myanmar authorities concerned agreed to recommend to their respective Governments the matters referred to in the Joint Evaluation Report attached hereto.

Yangon, November 21, 2001

Mr. Yasuto TAKEUCHI
Leader,
Japanese Mid-term Evaluation Team,
Japan International Cooperation Agency
Japan

21 | 11 | 2001

U Kyaw San Win
Director General,
Irrigation Department,
Ministry of Agriculture and Irrigation
The Union of Myanmar

Attached Document

The Joint Coordinating Committee has authorized the PDM-2 that was submitted by the Evaluation Team.

THE JOINT EVALUATION REPORT
FOR THE IRRIGATION TECHNOLOGY CENTER PROJECT PHASE II
IN THE UNION OF MYANMAR

Yangon, November 21, 2001

Mr. Yasuto TAKEUCHI
Leader,
Japanese Evaluation Team

U Zaw Win
Leader,
Myanmar Evaluation Team

1. INTRODUCTION

1-1 Background

Based upon the Record of Discussions signed on December 23, 1987, the Government of Japan and the Government of the Union of Myanmar (hereinafter referred to as "Myanmar") implemented the Technical Cooperation Program for the Irrigation Technology Center Project (herein after referred to as "the Phase I Project") since April 1, 1988.

The aim of the Phase I Project was to upgrade irrigation technology through such activities as the collection and analysis of technical data, the preparation of design criteria for irrigation facilities, the test and analysis on soil and construction materials, and the training of irrigation engineers, etc., thus to contribute to agricultural development in Myanmar.

After the Phase I Project, the Government of Myanmar requested a project type technical cooperation to upgrade irrigation technology especially on water management, applying the basic irrigation technology which was gained through the Phase I Project.

In response to this request, the Government of Japan dispatched a Preliminary Study Team in October 1998 for the purpose of collecting more detailed information to formulate the framework of the project. An Implementation Study Team was dispatched in December 1998, for the purpose of working out the details of the Irrigation Technology Center Project Phase II in the Union of Myanmar (hereinafter referred to as "the Project") and the Record of Discussion was signed on December 19, 1998. The Project started on April 1, 1999. The Advisory Team was dispatched from November 28 to December 4, 1999 and the detailed Tentative Schedule of Implementation and the Plan of Operation (hereinafter referred to as "PO") was formulated. Nearly two and a half years have passed since the commencement of the Project.

1-2 Purpose of the Study

The evaluation activities were performed with the purpose of:

(1) Evaluating degree of achievement based on the Record of Discussions, Project Design Matrix (hereinafter referred to as "the PDM") and the PO during the first half of the Project,

(2) Reviewing and revise the PDM and the PO for the remaining cooperation term if necessary, and

(3) Identifying problems on any aspects of the Project implementation and propose necessary solutions.

1-3 Inputs for the Project

(1) Japanese Inputs

1) Dispatch Experts

A total of 9 long-term experts and a total of 11 short-term experts have been dispatched. The list

of the dispatched experts is attached in ANNEX 1.

2) Training of Myanmar Counterparts in Japan

A total of 10 counterparts have visited Japan to participate in technical training. The list of trained counterparts is attached in ANNEX 2.

3) Provision of Equipment

Major equipment was provided to carry out the Project activities effectively. The amount of provided equipment is attached in ANNEX 3.

4) Supplementary funds to cover local costs

The Japanese side paid a part of local cost to implement the Project effectively and on schedule. The supplementary funds provided by the Japanese side is attached in ANNEX 4.

(2) Myanmar Inputs

1) Assignment of Counterparts

Myanmar counterparts have been assigned to the Project. The list of assigned counterparts is attached in ANNEX 5.

2) Provision of Facilities and Equipment

Myanmar side provided facilities and equipment required for the Project. The list of facilities and equipment is attached in ANNEX 6.

3) Allocation of Budget

Allocation of Budget by Myanmar side is attached in ANNEX 7.

2. METHOD OF THE EVALUATION

2-1 Composition of the Joint Evaluation Team

(1) Japanese members

1) Mr. Yasuto Takeuchi : Team Leader

Deputy Director, Agricultural Technical Cooperation Division, Agricultural Development Cooperation Department, Japan International Cooperation Agency (JICA)

2) Mr. Kazuo Shimazaki: Irrigation Technology

Deputy Director, Overseas Land Improvement Cooperation Office, Design Division, Rural

Infrastructure Department, Rural Development Bureau, Ministry of Agriculture, Forestry and Fisheries

3) Mr. Hiroshi Ishii: Evaluation Plan

Staff, Agricultural Technical Cooperation Division, Agricultural Development Cooperation Department, JICA

4) Mr. Toshinori Toda: Analysis for Evaluation

General Manager, Overseas Division, Construction Project Consultants

(2) Myanmar members

1) U Zaw Win: Team Leader

Director of Hydrology Branch, Irrigation Department, Ministry of Agriculture and Irrigation

2) U Kyaw Thein: Member

Director of Yangon Division, Irrigation Department, Ministry of Agriculture and Irrigation

3) U Maung Maung: Member

Director of Inspection Branch, Irrigation Department, Ministry of Agriculture and Irrigation

4) U Hla Baw: Member

Dy. Director of Design Branch, Irrigation Department, Ministry of Agriculture and Irrigation

2-2 Five Evaluation Criteria

(1) Efficiency

Productivity of the implementation process: how efficiently the various inputs are converted into outputs.

(2) Effectiveness

Effectiveness concerns the extent to which the project purpose has been achieved, or is expected to be achieved, in relation to the outputs produced by the project.

(3) Impact

Impact is intended and unintended, direct and indirect, positive and negative changes as a result of the project.

(4) Relevance

Relevance is to question whether the outputs, project purpose and overall goal are still in keeping with the priority needs and concerns at the time of evaluation.

(5) Sustainability

Sustainability of the development project is to question whether the project benefits are likely to continue after the external aid has terminated.

3. MONITORING OF ACTIVITIES

The Evaluation Team surveyed the present project management led by the Project for examining the level of achievement of the Project activities and finding out the problems to be solved in the course of Project implementation. The result of progress of activities is indicated in ANNEX 8 and ANNEX 9.

4. REVISION OF PDM

The Evaluation Team proposed the revised PDM to the Joint Coordinating Committee Meeting held on November 16, 2001. As a result of discussion among the member of the Joint Coordinating Committee, the proposed PDM was authorized as PDM-2 and is attached in Annex 10. The detail explanations concerning revision of PDM are as follows.

4-1 Description of PDM

At the occasion of signing on R/D, PDM-0 was authorized between the Implementation Study Team dispatched by JICA and the Myanmar authorities concerned. And based on the suggestions by the Advisory Team dispatched by JICA, PDM-1 as attached in Annex12 was agreed and signed in June 2000.

The description of Project Purpose, Outputs of the Project, Verifiable Indicator and Means of Verification was not so clear in PDM-1. In order to define PDM description, some parts were revised.

To make the project purpose clearer, that is, the Project aims at upgrading irrigation technology especially in water management for paddy rice in Ngamoeyeik Project area as a model, the words "in Ngamoeyeik Project area as a model" was added to the Project Purpose. Previous Verifiable Indicator for the Project Purpose "Irrigated area in model area" is not so easy to evaluate the achievement of the Project Purpose from the view point of human resource development. Thus, "Technical Book as the compilation of irrigation technology for paddy rice in lower Myanmar" is applied to the Verifiable Indicator for the Project Purpose. And also, to verify human resource development, "Counterparts can lecture the appropriate water management." is put to the cell of

verifiable indicator for the project purpose. Means for verification are "Annual Report of Irrigation Department" and "Interview" respectively.

To verify Overall Goal, indicator "efficiency of irrigation water use" has been replaced with "total yields in irrigated fields", considering the fact that base line data concerning efficiency of irrigation water in the project area is limited due to short history of paddy irrigation in Ngamoeyeik area.

Verifiable indicators for outputs of the project are necessary to be revised because those at PDM-1 are in general used for means of verification. To improve this situation, such description as "Proposal reports on improvement of main facilities are prepared by March 2004." is adopted for verifiable indicators for outputs. Details are shown in PDM-2.

4-2 Intermediate Goal

When the Project was agreed by the R/D, there was no definition about when the Overall Goal would be attained. The Overall Goal of the project was set up, to be attained more than 10 to 20 years after the end of the project. Recently, the time span of the Overall Goal was defined by JICA that the Overall Goal should be attained within 3 to 5 years after the end of the project. Thus, the time span of the Overall Goal was consequently shortened in comparison with that at R/D.

The original Overall Goal of this project should be understood as the Super Goal and new Overall Goal should be set up. However, we must respect the description of R/D. To overcome this problem, the Evaluation Team remained the original Overall Goal that is actually equivalent to the Super Goal, and set up the Intermediate Goal that is actually equivalent to the Overall Goal by new definition as follows:

Intermediate Goal that should be attained within 3 to 5 years after the end of the project

To establish appropriate water management technology in the three irrigation areas

Verifiable Indicators for Intermediate Goal

- Three Technical books for appropriate water management in the irrigation areas* are submitted by March 2009. **
- The water management training is implemented twice a year from 2005.
- Materials of water management training and its implementation plan are set up by March 2005.

Note) *Tabuhla, Zalethtaw, Mazin irrigation areas

** At least one technical book for each project areas such as Tabuhla, Zalethtaw, Mazin irrigation areas is to be submitted

Means of Verification for Intermediate Goal

Annual Report of ID

5. Results of the Evaluation

5-1 Effectiveness

Output 1 "Irrigation technology of water management and maintenance in main facilities is improved"	1. Effectiveness of the output during the first-half project period was marginally satisfactory and the output is likely to achieve by end of the project with intensive efforts for this dry season. 2. The present achievement is reportedly about 50% completion to the schedule. A water distribution plan will be prepared through applying optional components of a method of water distribution trial from this dry season. 3. Counterparts learning achievement was judged quite high by the field observation of setting water measurement facilities. The counterparts apply the design and techniques that experts provide through transfer of technology. The experts suggested that the counterparts develop "problem –solving" attitudes by themselves through a new training. 4. Unexpected externality influence is uncertain.
Output 2 "Study method for water management of terminal irrigation system is improved"	1. Effectiveness of the output during the first-half project period was marginally satisfactory and the output is likely to achieve by the end of the project with intensive efforts for this dry season. 2. The present achievement is reportedly about 50% completion against the schedule. 3. The section carried out investigation on the present water management and its strategy, construction of the first test farm on schedule. 4. Counterpart learning achievement are found quite well by the experts and observation by the Joint Evaluation Team (JET). 5. Unexpected externality influence is uncertain.
Output 3 " Technical supporting system for water management is improved"	1. Effectiveness of the output during the first-half project period was satisfactory and the output is likely to achieve by the end of the project. 2. The present achievement is 50% against whole schedule that is on schedule. 3. Counterparts' technical achievement is to learn operation of a data base system, remote sensing technology, use of GPS for topographic survey, hydraulic phenomena program revised for Myanmar. 4. Unexpected externality influence is uncertain.
Output 4 " Irrigation information management technology is improved to monitor irrigation projects"	1. Effectiveness of the output during the first-half project period was satisfactory and the output is likely to achieve by the end of the project. 2. The section achieved 50% of improvement of data collection and processing of irrigation projects monitoring, and 50% of monitoring on water management. 3. Counterparts improved irrigation information management technology to monitor irrigation project. 4. Unexpected externality influence is uncertain.
Output 5 "Water management technology is disseminated to technical staff of Irrigation Department and farmers in test farm through training	1. Effectiveness of the output during the first-half project period was satisfactory and the output is likely to achieve by the end of the project. 2. The section achieved to prepare a draft training master plan for ID high authority's approval. 3. Counterparts are able to prepare training materials and arrangement by themselves. They need more advanced training such as training needs analysis (TNA) in particular for women participation through a new training. 4. Unexpected externality influence is uncertain.

Project Purpose **" To upgrade the irrigation technology especially in water management in Ngamoeik Project Area as model, applying the basic irrigation technology which was achieved through the Phase I Project"**	1. ITC facilities and a laboratory that were provided by ITC (Phase I) are used for the project effectively. 2. A technical book for appropriate water management for the project area aims to develop WM for rice paddy cultivation to be suitable for the Lower Myanmar region. Progress of the preparing of the book is satisfactory and is likely to achieve by the end of the Project. 3. Counterparts training is underway as planed and results of counterparts' learning are highly satisfactory. Their capability of lecturers of appropriate water management is likely to improve through the outputs' achievements. 4. An important assumption that "the knowledge and experience acquired through the project are continuously extended" is found as this being materialized. Other unexpected externalities and conditions for attaining the project purpose are: 5. Counterparts are mostly civil engineers and did not sufficiently learn water management. ID has only a few experts for this field from training abroad. Numbers of counterparts have received JICA training in Japan and three counterparts having a master course of water management in the Japanese universities through the project. 6. Responsibilities of water management in the project site are diversified; Water management plan by the project and operation and maintenance by Maintenance offices from dam and main canals, the secondary canals to intakes to Water Courses (tertiary canal) and Water courses by farmers. Agriculture Coordinating Committee is established by the departmental persons from ID, MAS, SLRD, AMD functioning well in Ngamoeyiek Area. MAS; Myanmar Agriculture Services, SLRD; Settlement and Land Record Department AMD; Agricultural Mechanization Department

5-2 Efficiency

Quality and quantity of inputs	**Japanese side** 1. Dispatch of Japanese experts 1) Japanese experts satisfactorily contributed to progress of all activities in the PDM. 2) Their contribution led the Project to the present stage as scheduled. 3) Contribution by Japanese experts is highly appreciated by Myanmar side. 2. Counterpart Training in Japan 1) Knowing Japan through the training was very useful for collaborative work with Japanese experts in the Project. 2) The training in Japan contributed to the improvement of knowledge and expansion of experience of counterparts. 3. Provision of equipment 1) Most of the equipment provided by JICA was appropriate. 2) Most of the equipment was procured in Myanmar for easy maintenance and service of equipment. 3) Equipment was provided as scheduled. 4. Other support by JICA 1) Project cost assisted by JICA smoothened the project activities. **Myanmar side** 1. Allocation of Counterpart personnel 1) Counterparts contributed to satisfactory progress of all activities in the PDM. 2) Their contribution led the Project to the present stage as scheduled.

	3) The capabilities and motivation of counterparts are very high. This has highly contributed to the achievement of the outputs as mentioned in the PDM. 4) Their contribution to acquaint Japanese experts with Myanmar conditions of socio-cultural aspects was very useful for smooth implementation of the Project. 2. Budget allocation by the Government of Myanmar 1) Budget allocation by the Government of Myanmar was sufficient.
Timing of inputs	**Japanese side** 1. Dispatch of Japanese experts Timely dispatch of Japanese experts enabled the smooth implementation of the Project. 2. Provision of machinery and equipment Input of equipment was mostly adequate in timing, which effectively support Project Activities. 3. Counterpart training in Japan Timing of the training in Japan was adequate for effective and efficient activities. **Myanmar side** 1. Assignment of counterpart personnel Timely assignment of counterpart personnel improved the efficiency of the Project. 2. Budget allocation Although economy had faced hardship, allocation to the Project was mostly adequate in timing.
Supporting System	1. Joint Coordinating Committee Joint Coordinating Committee meeting was held once a year. The members of the committee are DG, DyDG, and Directors of Design Branch, Director of Planning and Works Branch, Director of Hydrology Branch, Director of Yangon Division, Director of Bogo Division of ID, representatives of Department of Agricultural Planning (DAP) and JICA, respectively, and Japanese Embassy (as observer). Reports of the current activities and recognition of issues were major topics in the meeting. The outcome of the meeting strengthened the Project with more personnel and budgetary support. Through good representation and close consultation among the stakeholders, the Project is obtaining strong support.

5-3 Impact

Positive impact which is expected	1. Farmers expressed satisfaction with the project implementation and appreciated Japanese aids and Myanmar government assistance. Farmers' satisfaction with the final project benefits is likely to arise. 2. DAP and ID hope to develop water management technology to be based on the project achievement, to the other crops (the second crops except rice) and other areas (Central and Upper Myanmar). 3. Favorable change in agricultural policy from an impact of the project is uncertain.
Negative impact which is expected	At this stage, no negative impact has been observed and is uncertain to occur.
Positive impact which is unexpected	1. Incomes of farmers can be increased. 2. WUA of intensive farming area would like to procure small farm machinery. The farmers from intensive farming area can get some extra income to go and help the nearby area with the use of these small farm machinery after finishing of their works. These extra income can also support the O&M cost of their intensive farms.
Negative impact which is unexpected	At this stage, no negative impact has been observed.

5-4 Relevance

Relevance with National Policies	1. A new five-year development plan (2001/2-2005/6) is under review. The plan will reportedly follow the same national policy for agriculture sector development as the present plan directs. Human resource development of irrigation water management is a key component of agriculture sector development. 2.Under the new plan, the target crops are rice, legume, cotton, sugar, coffee, black pepper, and maize. The surplus of rice production is one of the most important objectives. Irrigation development and water management improvement for paddy in summer in the Lower Myanmar should contribute to the achievement of the objectives.
Relevance with society	Agriculture sector contributed 59% of GDP, and absorbs 63% of total labor force. (1999). Most of people live in rural areas. (Estimated at 65%). Irrigation water management will increase crop intensity and total yields of the rural areas, thus increase of incomes of farmers.
Relevance with Japanese Policies	Japanese aid country policy to Myanmar is to assist in development of agriculture, health, education, lifelines, and environment protection and drug eradication. The project purpose clearly meets it.

5-5 Sustainability

Policy aspects	1. Continuity of policy support is likely to expect. 2. The Myanmar government has constructed many dams and other irrigation facilities so that its water management of irrigation areas become more important issues. MOAI and ID intend to continue the same policy. 3. Efficient water management will require farmer's ownership, its rules and regulations, and proper maintenance of irrigation facilities. MOAI and ID understand it.
Technological aspects	1. The project intends to use local resources such as local labor and materials for canal improvement and maintenance as it is technically feasible. The project considers studying local soil improvement of canals through ITC laboratory and the training.
Environmental aspects	1. No negative impact is likely to occur with efficient water management. Water logging areas is unlikely to find with drainage improvement. 2. ID recognizes importance of Environment Impact Assessment. However, ID engineers need EIA knowledge. The project considers the training for environment.
Socio-cultural aspects	1. The farmers are satisfied with the project because their incomes increased. The farmers' supports are likely to expect. 2. More women will be expected to participate in the training. Special arrangement is required for rural women training. 3. For paddy cultivation in summer, farmers apply direct seeding culture of paddy rice and harvest it by labor. This is likely to increase employment opportunity in the rural. 4. In this project area, irrigation started in 1996. Farmers and Water Users Association have not long experiences in paddy irrigation, and they need to improve their water management.
Institutional and management aspects	1. ITC is a key institute of human resource development in order to develop efficient water management in the country-wise. Under the present policy support to ITC, ITC is likely to play this role. 2.The project monitoring system is well established within the project. For extending efficient water management, the monitoring system also will be created in each project. 3. ITC will provide the training of ID staffs by a training master plan.
Economic and Financial aspects	1. ITC has no income generation measures and their operations fully depend on the government budget. A budgetary support is likely to continue unless agriculture sector ceases its important role. 2. For sustainability of water management, cost recovery policy should be considered to water users.

6. RECOMMENDATIONS

1. The Government of Myanmar puts a priority not only on paddy but also on second crops in agriculture sector. However, the Project should focus on irrigation technology for paddy field, considering that rice is the main crop in Myanmar, Ngamoeyeik Project Area was selected as the project site, and project period and planned input to the Project are limited.

2. The technical book, which is submitted by March 2004, is focusing on irrigation technology especially on paddy irrigation water management for Ngamoeyeik Project Area. That means that this technical book contains specific technology applicable only to Ngamoeyeik Project Area and that different technical book is necessary to each project area. At present, the Project plans to compile this technical book, but no permanent unit for making such kind of technical book exists in ID. Therefore, to continue making technical books for the three project areas after the termination of the Project, it is necessary to establish a management unit to facilitate activities of the related divisions before the termination of the Project.

3. To attain the Intermediate Goal in three to five years after the termination of the Project, it is recommended that ID should start survey of target irrigation area so as to have technical advice from the Japanese expert when necessity arises. In addition, ID is also recommended to prepare by itself for the procurement of instruments and other facilities to attain intermediate goal.

4. Project offices are dispersed into three sites due to its activities. To attain the Project purpose, it is much more important in the second half of the project period to keep close relation among sections of the Project than in the first half of the project period.

5. Farmers in test farm in Ngamoeyeik Project Area are satisfied with training conducted by the Project. However, for appropriate water management, it is necessary to continue farmers training with collaboration of local authorities and Myanmar Agriculture Service.

Annex 10 Project Design Matrix (PDM-2)
Date: 16 November 2001
Project Area: Ngamoeyeik Irrigation Project Duration: April 1, 1999 ~ March 31, 2004 Target Group: Irrigation Department (ID) Engineers

Summary of the Project	Verifiable Indicators	Means of Verification	Important Assumptions
1. Overall Goal To raise agriculture productivity through improvement of irrigation technology.	Total yields in irrigated fields are increased through efficient irrigation water use.	Agricultural statistics	
1' Intermediate Goal To establish appropriate water management technology in the three irrigation areas.	1'-1) Three technical books for appropriate water management in the irrigation areas* are submitted by March 2009. 1'-2) The water management training is implemented twice a year from 2005. 1'-3) Materials of water management training and its implementation plan are set up by March 2005. Note) * : Tabuhla, Zalethtaw, Mazin irrigation areas	Annual report of ID	- Irrigation facilities will be improved by using the project proposal
2. Project Purpose To upgrade the irrigation technology especially in water management in Ngamoyeik Project Area as a model applying the basic irrigation technology which was achieved through the Phase I Project.	1) A technical book for appropriate water management for the project area is submitted by March 2004. 2) Counterparts can lecture the appropriate water management.	1) Annual report of ID 2) Interview	-Dissemination of water management technology developed by the project - Agricultural development policy will continue

3. Outputs			
1) Irrigation technology of water management and maintenance in main facilities is improved.	1-1) Proposal reports on improvement of main facilities and its operation and maintenance techniques are prepared by March 2004. 1-2) Counterparts' technical capacity will be improved.	1-1) Annual report of ID 1-1) Project monitoring report 1-2) Experts' interviews 1-2) Counterparts' interviews	- The knowledge and experience acquired through the Project is continuously extended.
2) Study method for water management of terminal irrigation system is improved.	2-1) Proposal reports on study methods for improvement of terminal facilities will be prepared by March 2004. 2-2) Counterparts' technical capacity will be improved.	2-1) Annual report of ID 2-1) Project monitoring report 2-2) Experts' interviews 2-2) Counterparts' interviews	
3) Technical supporting system for water management is improved.	3-1) Technical supporting system for water management is used by March 2004. 3-2) Proposal Manuals for reservoir capacity survey are prepared by March 2004. 3-3) Counterparts' technical capacity will be improved.	3-1) Annual report of ID 3-1) Project monitoring report 3-2) Annual report of ID 3-2) Project monitoring report 3-3) Experts' interviews 3-3) Counterparts' interviews	
4) Irrigation information management technology is improved to monitor irrigation projects.	4-1) Data collection and processing of irrigation projects will be started by March 2004. 4-2) Monitoring on water management will be started by March 2004. 4-3) Counterparts' technical capacity will be improved.	4-1) Annual report of ID 4-1) Project monitoring report 4-2) Annual report of ID 4-2) Project monitoring report 4-3) Experts' interviews 4-3) Counterparts' interviews	
5) Water management technology is disseminated to technical staff of Irrigation Department and farmers in test farm through training.	5-1) 26 times of training for 790 ID staffs will be conducted by March 2004. 5-2) 9 times of training for 460 farmers will be conducted by March 2004. 5-3) Training master plan will be prepared and approved by ID by March 2003.	5-1) Annual report of ID 5-1) Project monitoring report 5-1) ID staff focus group 5-2) Annual report of ID 5-2) Project monitoring report 5-2) Framer focus group 5-3) Annual report of ID 5-3) Project monitoring report	

4. Activities 1) Water Management for Main Facilities 1-1) Survey and evaluation on present water management in model area 1-2) Study on techniques to improve irrigation facilities 1-3) Improvement of operation and maintenance techniques of irrigation facilities 1-4) Preparation of materials for training 2) Water Management for Terminal Facilities 2-1) Survey and evaluation in present water management in study area 2-2) Study on techniques to improve terminal facilities and water management in test farm 2-3) Preparation of materials for training 3) System Development 3-1) Development of data base system of irrigation area 3-2) Development of supporting programs for water management 3-3) Improvement of monitoring method of water storage of reservoir 3-4) Preparation of materials for training 4) Irrigation Information Management 4-1) Study on monitoring method of water management in existing irrigation projects 4-2) Improvement of storage system of irrigation information 4-3) Preparation of materials for training 5) Training 5-1) Implementation of training for the above four fields 5-2) Formulation of training master plan	Input (Japanese Side) 1. Dispatch of Experts (1) Long-term experts - Chief Advisor/ Irrigation Information Management - Coordinator/ Training - Water Management for Main facilities - Water Management for Terminal Facilities - System Development (2) Short-term Experts will be dispatched when necessity arises 2. Provision of machinery and equipment 3. Training of counterpart personnel in Japan 4. Local cost (Myanmar Side) 1. Counterparts (1) Project Director (2) Deputy Project Director (3) Project Manager (4) Two Assistant Directors (5) Counterparts for each experts (6) Management staff (7) Technical staff (8) Other staff as needed 2. Land, building and facilities (1) Land and facilities for the Project (2) Office and other facilities for Japanese Experts (3) Facilities to keep provided machinery (4) Other facilities 3. Local cost	- Same counterparts should be assigned more than two years - Institutional collaboration between Branches and Divisions in Irrigation Department - Institutional collaboration among Myanmar Agricultural Services, Settlement & Land Records Department, Department of Agriculture Planning, and Irrigation Department Pre-conditions - Land for test farm is prepared

ANNEX 1

Assignment of Japanese Experts

Term	FY*	Expertise	Name	Duration
Long	-	Chief Advisor/ Information Management	Mr. TATSUTA Jirzemon	April 1, 1999 ~ May 31, 1999
	-	Coordinator/Training	Mr. SUGIYAMA Yoshinobu	April 1, 1999 ~ June 18, 2000
	-	Water Management for Terminal Facility	Mr. SAKAUE Tsutomu	April 1, 1999 ~ March 31, 2002
	-	System Development	Mr. IKAWA Norihiko	April 11, 1999 ~ April 10, 2001
	-	Chief Advisor/ Information Management	Mr. SUGATANI Susumu	May 24, 1999 ~ March 31, 2002
	-	Water Management for Main Facility	Ms. INAKI Michiyo	May 24, 1999 ~ May 23, 2001
	-	Coordinator/Training	Mr. OTAKA Akio	June 1, 2000 ~ May 31, 2002
	-	Water Management for Main Facility	Mr. KURAMAE Toyoshi	May 8, 2001 ~ May 7, 2003
	-	System Development	Mr. MARUMO Nobuki	May 27, 2001 ~ May 26, 2003
Short	1999	System Development	Mr. KAMIMURA Kenichiro	Dec 19, 1999 ~ Jan 8, 2000
	1999	Water Management for Main Facility	Dr. HASEGAWA Takashi	Jan 16, 2000 ~ Jan 26, 2000
	1999	Training	Dr. YAGI Kazuhiko	Feb 22, 2000 ~ March 17, 2000
	1999	Water Management for Terminal Facility	Dr. SATO Masayoshi	March 19, 2000 ~ March 30, 2000
	1999	Water Management for Main Facility	Mr. NAKA Tatsuo	Nov 20, 2000 ~ Dec 2, 2000
	2000	System Development	Mr. NARITA Ryoichi	Dec 2, 2000 ~ Dec 16, 2000
	2000	Information Management	Mr. OCHII Yasuhiro	Dec 2, 2000 ~ Dec 23, 2000
	2000	Water Management for Terminal Facility	Mr. FUKUMOTO Masato	Jan 7, 2001 ~ Feb 4, 2001
	2001	Training	Dr. KANAYA Hisatomo	Sep 1, 2001 ~ Sep 23, 2001
	2001	System Development	Mr. MIURA Yoshikatsu	Sep 9, 2001 ~ Sep 29, 2001
	2001	Water Management for Main Facility	Mr. TAKAKI Kyoji	Sep 23, 2001 ~ Oct 13, 2001

* = Japanese Fiscal Year starts on April 1

ANNEX 2

Acceptance of Myanmar Counterpart for Training in Japan

FY*	Title of Training	Name	Institution	Duration
1999	Irrigation and Drainage	U Thaung Htike	ITC	Feb 7, 2000 ~ Nov 17, 2000
1999	Water Management	U Aung Thu Kywe	ITC	Mar 30, 2000 ~ Nov 17, 2000
1999	Computer Network	Daw Than Win	ITC	Mar 30, 2000 ~ June 6, 2000
2000	Study Tour (Water Management)	U Ohn Gaing	ID (Project Manager)	May 22, 2000 ~ June 13, 2000
2000	Study Tour (Irrigation and Drainage)	U Aye Thein	ITC	Aug 19, 2000 ~ Sep 12, 2000
2000	Remote Sensing	U Myo Aung	ITC	May 9, 2000 ~ Aug 8, 2000
2000	Irrigation and Drainage	Daw Myint Myint Than	ITC	Feb 5, 2001 ~ Nov 16, 2001
2000	Study Tour (Irrigation Projects for Paddy Field)	U Khin Zaw	ID (Project Driector)	May 5, 2001 ~ June 3, 2001
2001	Operation and Management of Irrigation Canal System	U Soe Tun Aung	ITC	June 25, 2001 ~ Nov 16, 2001
2001	Upland Irrigation, Water User's Association and Agricultural Cooperative	Daw Aye Aye Hlaing	ITC	July 9, 2001 ~ Aug 4, 2001

* = Japanese Fiscal Year starts on April 1

ANNEX 3

List of Equipment Provided by the Government of Japan

YF	Number	Name of Equipment	UNIT PRICE (¥)	UNIT PRICE (US$)	Quantity	Location	Timing	REMARK
1998	PE-001	Generator, Super Silent 40KVA, SDMO		15,125	1	Hlegu Sub-Office	15-Mar-99	
1998	PE-002	Risograph, Riso GR 3750		15,000	1	Risograph Room, Bago ITC	15-Mar-99	
1998	PE-003	Consumables for Risograph, Riso N/A		2,100	1	Risograph Room, Bago ITC	15-Mar-99	
1998	PE-004	Copier, Canon NP-4050		9,725	1	Yangon Coordinator Room	15-Mar-99	
1998	PE-005	Facsimile, Canon L-300		1,925	1	Yangon Coordinator Room	15-Mar-99	
1998	PE-006	Consumables for Copier, Canon NP-4050		970	1	Yangon Coordinator Room	15-Mar-99	
1998	PE-007	Personal Computer Set, Geocomp Pentium II 333MHz		2,770	2	WM I Section, Hlegu Office	15-Mar-99	
1998	PE-008	Personal Computer Set, Geocomp Pentium II 333MHz		2,770	2	WM II Section, Hlegu Office	15-Mar-99	
1998	PE-009	Personal Computer Set, Geocomp Pentium II 333MHz		2,770	1	SD Section, Bago ITC	15-Mar-99	
1998	PE-010	Personal Computer Set, Geocomp Pentium II 333MHz		2,770	1	OCE Room, Bago ITC	15-Mar-99	
1998	PE-011	Laser Printer, HP LaserJet 6L		450	2	WM I Section, Hlegu Office	15-Mar-99	
1998	PE-012	Laser Printer, HP LaserJet 6L		450	2	WM II Section, Hlegu Office	15-Mar-99	
1998	PE-013	Laser Printer, HP LaserJet 6L		450	1	SD Section, Bago ITC	15-Mar-99	
1998	PE-014	Laser Printer, HP LaserJet 6L		450	1	OCE Room, Bago ITC	15-Mar-99	
1998	PE-015	UPS, Sunpac 500VA		140	2	WM I Section, Hlegu Office	15-Mar-99	
1998	PE-016	UPS, Sunpac 500VA		140	2	WM II Section, Hlegu Office	15-Mar-99	
1998	PE-017	UPS, Sunpac 500VA		140	1	SD Section, Bago ITC	15-Mar-99	
1998	PE-018	UPS, Sunpac 500VA		140	1	OCE Room, Bago ITC	15-Mar-99	
1998	PE-019	UPS, Sunpac 500VA		140	2	Yangon Coordinator Room	15-Mar-99	
1998	PE-020	Auto Voltage Regulator		110	4	WM I Section, Hlegu Office	15-Mar-99	
1998	PE-021	Auto Voltage Regulator		110	4	WM II Section, Hlegu Office	15-Mar-99	
1998	PE-022	Auto Voltage Regulator		110	2	SD Section, Bago ITC	15-Mar-99	
1998	PE-023	Auto Voltage Regulator		110	2	OCE Room, Bago ITC	15-Mar-99	
1998	PE-024	Map Data Storing System, OCE 9400		38,500	1	OCE Room, Bago ITC	15-Mar-99	
1998	PE-025	Auto Voltage Regulator		110	1	OCE Room, Bago ITC	15-Mar-99	
1998	PE-026	UPS		280	1	OCE Room, Bago ITC	15-Mar-99	
1998	PE-027	Color Printer, Epson Stylus Color 1520		1,000	1	OCE Room, Bago ITC	15-Mar-99	
1998	PE-028	GPS, Topcon GP-DX1		49,044	1	SD Section, Bago ITC	15-Mar-99	
1998	PE-029	Personal Computer Set, N/A Pentium II 333MHz		2,321	1	SD Section, Bago ITC	15-Mar-99	
1998	PE-030	Color Printer, Canon BJC-4650		682	1	SD Section, Bago ITC	15-Mar-99	
1998	PE-031	Air Conditioner, Sharp AH-A184E/AU-184E		950	3	Hlegu Sub-Office	15-Mar-99	
1998	PE-032	Air Conditioner, Sharp AH-A184E/AU-126E		800	5	Hlegu Sub-Office	15-Mar-99	
1998	PE-033	Defumidifier, White Westing House WD395P		611	2	WM I Room, Hlegu Office	15-Mar-99	

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YF	Number	Name of Equipment	UNIT PRICE (¥)	UNIT PRICE (US$)	Quantity	Location	Timing	REMARK
1998	PE-034	Defumidifier, White Westing House WD395P		611	2	WM II Room, Hlegu Office	15-Mar-99	
1998	PE-035	Defumidifier, White Westing House WD395P		611	1	SD Room, Bago ITC	15-Mar-99	
1998	PE-036	Defumidifier, White Westing House WD395P		611	1	OCE Room, Bago ITC	15-Mar-99	
1998	PE-037	Chair for Computer Table, LSC-421 DG-F401		88	2	WM I Room, Hlegu Office	15-Mar-99	
1998	PE-038	Chair for Computer Table, LSC-421 DG-F401		88	2	WM II Room, Hlegu Office	15-Mar-99	
1998	PE-039	Chair for Computer Table, LSC-421 DG-F401		88	1	SD Room, Bago ITC	15-Mar-99	
1998	PE-040	Chair for Computer Table, LSC-421 DG-F401		88	1	OCE Room, Bago ITC	15-Mar-99	
1998	PE-041	Table for Computer, Sinma AT1500/H3/1060		265	2	WM I Room, Hlegu Office	15-Mar-99	
1998	PE-042	Table for Computer, Sinma AT1500/H3/1060		265	2	WM II Room, Hlegu Office	15-Mar-99	
1998	PE-043	Table for Computer, Sinma AT1500/H3/1060		265	1	SD Room, Bago ITC	15-Mar-99	
1998	PE-044	Table for Computer, Sinma AT1500/H3/1060		265	1	OCE Room, Bago ITC	15-Mar-99	
1998	PE-045	Vehicle, 4 Wheel Drive, Toyota Land Cruiser FZJ105L-GCMRK (Gasoline 4,477cc)		28,837	1	HM Section, Yangon	15-Mar-99	
1998	PE-046	Vehicle, 4 Wheel Drive, Toyota Land Cruiser FZJ105L-GCMRK (Gasoline 4,477cc)		28,837	1	WM I Section, Yangon	15-Mar-99	
1998	PE-047	Vehicle, Micro-Bus, Toyota Coaster HZB50L-ZGMSS (Diesel 4,164cc)		44,878	1	Administaration, Bago ITC	15-Mar-99	
1998	PE-048	Motorcycle, Honda CT110P/DK	280,000		6	Hlegu Sub-Office	28-May-00	
1998	PE-049	Spare Parts for Motorcycle, Honda	28,000		6	Hlegu Sub-Office	28-May-00	
1999	PE-001	Partial Flume, Concordia N/A		500	5	WMII Section, Hlegu Office	23-Mar-00	
1999	PE-002	Water Intake Gate Plate and accessories, Asco Order Made		261	50	WMI Section / Ngamoyeik Irrigation System	23-Mar-00	
1999	PE-003	Personal Computer Set, Notebook type, Dell 5000R 500 LLT		3,850	1	SD Room, Bago ITC	23-Mar-00	
1999	PE-004	Scaner, Color Micro Tek, 9600 XL		2,100	1	SD Room, Bago ITC	23-Mar-00	
1999	PE-005	Super Drive, Mitsubishi LS-120		120	2	SD Room, Bago ITC	23-Mar-00	
1999	PE-006	Personal Computer Set, N/A		1,930	1	Risograph Room, Bago ITC	21-Mar-00	
1999	PE-007	Laser Printer, Canon LBP-800		330	1	Risograph Room, Bago ITC	16-Mar-00	
1999	PE-008	UPS, Sunpac 500VA		97	1	Risograph Room, Bago ITC	23-Mar-00	
1999	PE-009	Computer Desk and Chair, N/A		270	1	Risograph Room, Bago ITC	24-Mar-00	
1999	PE-010	Air Conditioner, Mitsui MS-13		520	1	Risograph Room, Bago ITC	23-Mar-00	
1999	PE-011	Copier, Canon NP-4050		9,725	1	Hlegu Sub-Office	16-Mar-00	
1999	PE-012	Copier, Canon NP-4050		7,000	1	Dx HD ITC Room, Bago ITC	16-Mar-00	
1999	PE-013	Battery for GPS, Topcon		216	8	SD Room, Bago ITC	23-Mar-00	
1999	PE-014	Battery for Total Station, Topcon BT-32Q		125	5	WM II Room Hlegu Sub-Office	23-Mar-00	
1999	PE-015	Battery fot Total Station, Leica GEB77		95	5	WM II Room Hlegu Sub-Office	21-Mar-00	

ANNEX 3

YF	Number	Name of Equipment	UNIT PRICE (¥)	UNIT PRICE (US$)	Quantity	Location	Timing	REMARK
1999	PE-016	SCSI Board for Computer, Adaptec 3229UW		260	1	SD Room, Bago ITC	21-Mar-00	
1999	PE-017	SCSI Cable for Computer, EMS Tech. CA2010 HPDB50M/M		30	2	SD Room, Bago ITC	23-Mar-00	
1999	PE-018	Paper for OCE (36"), OCE		72	5	OCE Room, Bago ITC	21-Mar-00	
1999	PE-019	Paper for OCE (24"), OCE		57	5	OCE Room, Bago ITC	21-Mar-00	
1999	PE-020	Toner for OCE Printer, OCE B4		150	2	OCE Room, Bago ITC	21-Mar-00	
1999	PE-021	Developer for OCE Printer, OCE 9144952		392	2	OCE Room, Bago ITC	21-Mar-00	
1999	PE-022	Color Ink for OCE Color Printer, Epson		14	10	OCE Room, Bago ITC	23-Mar-00	
1999	PE-023	Black Ink for OCE Color Printer, Epson		12	10	OCE Room, Bago ITC	23-Mar-00	
1999	PE-024	Consumables for Copier, Ricoh 5010		21	12	TR Section, Bago ITC	23-Mar-00	
1999	PE-025	Consumables for Copier, Ricoh 4501		55	12	TR Section, Bago ITC	23-Mar-00	
1999	PE-026	Consumables for Risograph, RISO		45	10	Risograph Room, Bago ITC	23-Mar-00	
1999	PE-027	Toner for Printer, HP		51	10	SD/TR Section, Bago ITC	23-Mar-00	
1999	PE-028	Toner for Printer, HP		95	10	SD Room, Bago ITC	23-Mar-00	
1999	PE-029	Toner for Printer, HP		95	10	HM Section, Bago ITC	23-Mar-00	
1999	PE-030	Color Ink for Color Printer, Epson		31	10	TR Section, Bago ITC	23-Mar-00	
1999	PE-031	Black Ink for Color Printer, Epson		18	10	TR Section, Bago ITC	23-Mar-00	
1999	PE-032	Drawing Pen Set, Rotring		25	7	SD/HM Section, Bago ITC	24-Mar-00	
1999	PE-033	Drawing Ruler Set, Ushida		8	7	SD/HM Section, Bago ITC	23-Mar-00	
1999	PE-034	Steel Cabinet, Leeco CB02		80	2	HM Section, Bago ITC	24-Mar-00	
1999	PE-035	Section Paper		11	2	HM Section, Bago ITC	24-Mar-00	
1999	PE-036	Tracing Paper		24	2	HM Section, Bago ITC	24-Mar-00	
1999	PE-037	Air Conditioner, Mitsui MS-16		805	1	OCE Room, Bago ITC	23-Mar-00	
1999	PE-038	Direct Projecter, Plus DP-30		1,615	1	TR Section, Bago ITC	23-Mar-00	
1999	PE-039	LCD Projecter, CTX EzPro550		3,803	1	TR Section, Bago ITC	23-Mar-00	
1999	PE-040	Video Player, Panasonic SR-98		224	1	TR Section, Bago ITC	23-Mar-00	
1999	PE-041	Cassette Recorder, Sony TCM 465V		72	1	TR Section, Bago ITC	24-Mar-00	
1999	PE-042	Water Level Meter, Ikeda LR-110WPS	434,000		15	Hlegu Sub-Office	28-May-00	
1999	PE-043	Recording Chart	1,900		180	Hlegu Sub-Office	28-May-00	
1999	PE-044	Cartridge Pen	900		120	Hlegu Sub-Office	28-May-00	
1999	PE-045	Current Meter, Tokyo Keisoku SAT-200-10	140,000		5	Hlegu Sub-Office	28-May-00	
1999	PE-046	Counter, Tokyo Keisoku SA-1111	200,000		5	Hlegu Sub-Office	28-May-00	
1999	PE-047	Joining Cable, 10m	8,000		5	Hlegu Sub-Office	28-May-00	
1999	PE-048	Instrument Shelter, Tamaya H2-SF	253,800		1	Hlegu Sub-Office	28-May-00	
1999	PE-049	Recording Rain Gauage, Ota, 34-T	120,000		1	Hlegu Sub-Office	28-May-00	
1999	PE-050	Recording Chart	1,700		2	Hlegu Sub-Office	28-May-00	
1999	PE-051	Cartridge Pen	1,200		4	Hlegu Sub-Office	28-May-00	

ANNEX 3

YF	Number	Name of Equipment	UNIT PRICE (¥)	UNIT PRICE (US$)	Quantity	Location	Timing	REMARK
1999	PE-052	Evaporation Pan, D-101	400,000		1	Hlegu Sub-Office	28-May-00	
1999	PE-053	Wind Vane and Anemo Meter, Ota 111-T	830,000		1	Hlegu Sub-Office	28-May-00	
1999	PE-054	Recording Chart	1,700		24	Hlegu Sub-Office	28-May-00	
1999	PE-055	Ink, 150cc	1,600		2	Hlegu Sub-Office	28-May-00	
1999	PE-056	Thermo Hygrometer, Sato Auroa 90 III	150,000		1	Hlegu Sub-Office	28-May-00	
1999	PE-057	Recording Chart	2,000		24	Hlegu Sub-Office	28-May-00	
1999	PE-058	Cartridge Pen	14,000		1	Hlegu Sub-Office	28-May-00	
1999	PE-059	Leakage Capacity Tester, DIK-4350	95,000		5	Hlegu Sub-Office	28-May-00	
1999	PE-060	Partial Flume, Ikeda PF-6	450,000		3	Hlegu Sub-Office	28-May-00	
1999	PE-061	Map Case, 1-874-7000	90,000		2	IIM Section, Bago ITC	28-May-00	
1999	PE-062	Base	13,000		1	IIM Section, Bago ITC	28-May-00	
1999	PE-063	Map Case, 1-874-7000	68,000		2	IIM Section, Bago ITC	28-May-00	
1999	PE-064	Base	10,000		1	IIM Section, Bago ITC	28-May-00	
1999	PE-065	Vehicle, 4 Wheel Drive, SUZUKI Jimny SN413V-JLX	1,727,300		2	Hlegu Sub-Office	2-Oct-00	
1999	PE-066	Spare Parts for Jimny , SUZUKI	345,400		1	Hlegu Sub-Office	2-Oct-00	
2000	PE-001	Copier, Canon NP-6241		7,700	1	Hlegu Sub-Office	23-Apr-01	
2000	PE-002	Water Level Gauge, Yokogawa, W-431-01	385,000		1	Hlegu Sub-Office	23-Apr-01	
2000	PE-003	Joint Box to Lighting Conducotr, Yokogawa, M-458	47,000		1	Hlegu Sub-Office	23-Apr-01	
2000	PE-004	Cable 100m, Yokogawa, C-381-00110	80,000		1	Hlegu Sub-Office	23-Apr-01	
2000	PE-005	Battery, Yokogawa, M-317-01	60,000		2	Hlegu Sub-Office	23-Apr-01	
2000	PE-006	Battery Charger, Dengen, HR-MAX40	65,000		1	Hlegu Sub-Office	23-Apr-01	
2000	PE-007	Water Level Recorder, Yokogawa, W-021-01-60	449,000		4	Hlegu Sub-Office	23-Apr-01	
2000	PE-008	Recording Paper, Yokogawa, S-119	1,800		96	Hlegu Sub-Office	23-Apr-01	
2000	PE-009	Cartridge Pen, (Red, Green), Yokogawa, N-015-11	1,800		24	Hlegu Sub-Office	23-Apr-01	
2000	PE-010	Recording Rain Gauage, Yokogawa, B-432-10	394,000		2	SD Room, Bago ITC	23-Apr-01	
2000	PE-011	Recording Paper, Yokogawa, S-001	900		16	SD Room, Bago ITC	23-Apr-01	
2000	PE-012	Cartridge Pen (Red), Yokogawa, N-015-12	900		16	SD Room, Bago ITC	23-Apr-01	
2000	PE-013	Digital Camera, Olympus, C-3030	88,000		1	Hlegu Sub-Office	23-Apr-01	
2000	PE-014	Smart Media, Olympus, M-32PI	8,700		1	Hlegu Sub-Office	23-Apr-01	
2000	PE-015	PC card adapter (English), Olympus, MA-2	12,000		1	Hlegu Sub-Office	23-Apr-01	
2000	PE-016	PC connector Kit (English), Olympus, C-9KP	7,600		1	Hlegu Sub-Office	23-Apr-01	
2000	PE-017	Software (CAMEDIA MASTER 2.5), Olympus, C90PE2	11,900		1	Hlegu Sub-Office	23-Apr-01	
2000	PE-018	Manual (English), Olympus	2,600		2	Hlegu Sub-Office	23-Apr-01	
2000	PE-019	Wireless Amp with Transformer, Victor, PF-W91	105,000		1	TR Section, Bago ITC	23-Apr-01	
2000	PE-020	Wireless Tuner Unit, Victor, WT-UD84	34,500		1	TR Section, Bago ITC	23-Apr-01	
2000	PE-021	Wireless Microphone, Vector, WM-P860	49,000		2	TR Section, Bago ITC	23-Apr-01	

ANNEX 3

YF	Number	Name of Equipment	UNIT PRICE (¥)	UNIT PRICE (US$)	Quantity	Location	Timing	REMARK
2000	PE-022	Battery Charger for WM-P860 with Transformer, Vector, WT-C62	31,800		1	TR Section, Bago ITC	23-Apr-01	
2000	PE-023	Speaker, Vector, PS-S202B	12,500		1	TR Section, Bago ITC	23-Apr-01	
2000	PE-024	Speaker Cable 5M	10,000		1	TR Section, Bago ITC	23-Apr-01	
2000	PE-025	Screen, UCHIDA, BM-18	25,000		1	IIM Section, Bago ITC	23-Apr-01	
2000	PE-026	Screen, UCHIDA, KS-18B	59,000		1	IIM Section, Bago ITC	23-Apr-01	
2000	PE-027	Roller Cutter, DAHLE 558	56,000		1	IIM Section, Bago ITC	23-Apr-01	
2000	PE-028	Edge for DAHLE 558	5,800		2	IIM Section, Bago ITC	23-Apr-01	
2000	PE-029	Software (AUTO CAD 2000), Autodesk	449,800		1	SD Room, Bago ITC	23-Apr-01	
2000	PE-030	Software (MS-WINDOWS 2000 Professional), Microsoft	64,800		1	SD Room, Bago ITC	23-Apr-01	
2000	PE-031	Software (Office 2000 Professional), Microsoft	79,000		1	SD Room, Bago ITC	23-Apr-01	
2000	PE-032	Software (Norton System Works 2001), Symatec	16,500		1	SD Room, Bago ITC	23-Apr-01	
2000	PE-033	Software (ADOBE PHOTOSHOP 6.0), Adobe	119,000		1	SD Room, Bago ITC	23-Apr-01	
2000	PE-034	Software (VIRUS SCAN), Network Associates, VSF-DRCT-JP-450	9,900		1	SD Room, Bago ITC	23-Apr-01	
2000	PE-035	Camera, Konica, Genbakan Toku Zoom	41,000		1	Hlegu Sub-Office	23-Apr-01	
2000	PE-036	Battery, 2CR5	1,200		2	Hlegu Sub-Office	23-Apr-01	
2000	PE-037	Case	1,700		1	Hlegu Sub-Office	23-Apr-01	
2000	PE-038	Manual (English)	1,700		2	Hlegu Sub-Office	23-Apr-01	
2000	PE-039	R Scale Set, UCHIDA, 1-816-0050	13,000		2	IIM Section, Bago ITC	23-Apr-01	
2000	PE-040	Curve Template Set, UCHIDA, 1-811-0004	2,900		2	IIM Section, Bago ITC	23-Apr-01	
2000	PE-041	Template Set, Kokuyo, TZ-3190N	1,660		5	IIM Section, Bago ITC	23-Apr-01	
2000	PE-042	Slide Projector with Transformer, Cabin, CF-110	110,000		1	TR Section, Bago ITC	23-Apr-01	
2000	PE-043	Halogen Lamp	1,700		5	TR Section, Bago ITC	23-Apr-01	
2000	PE-044	Carrying Case	5,300		1	TR Section, Bago ITC	23-Apr-01	
2000	PE-045	Video Capture Board, Pinnacle, DC-30PLO	99,000		1	TR Section, Bago ITC	23-Apr-01	
2000	PE-046	Land Cruiser, Toyota, HZJ105L-GCMRS	2,540,000		2	ID,SD Section, Yangon	17-Jun-01	
2000	PE-047	Spare Parts, Toyota	254,000		2	ID,SD Section, Yangon	4-Sep-01	
2000	PE-048	Hi-Lux Double Cab, Pick Up, Toyota, PRMDS	1,790,000		1	TR Section, Yangon	17-Jun-01	
2000	PE-049	Spare Parts, Toyota	179,000		1	TR Section, Yangon	4-Sep-01	
2000	PE-050	Honda Bike Spare Parts, Honda	227,000		1	Hlegu Sub-Office	17-Jun-01	

ANNEX4

Allocation Budget by the Government of Japan for Local Cost Expenditure

(Unit : US$)

FY*	General Cost	LLDC Special Cost	Technical Extension Cost	Project Security Cost	Field Applicable Cost	Technical Exchange Cost	Total
1999	48,219.13	27,022.37	12,530.24				87,771.74
2000	60,908.55	10,350.05		2,990.00	57,008.79	16,532.82	147,790.21
2001	16,557.00				14,715.00		31,272.00

*FY=Japanise Fisical Year starts on April 1

The Costs in 2001 FY is the total of 1st and 2nd quarters' costs in 2001FY.

ANNEX 5

Assignment of Counterparts

FY	1999	2000	2001
Name	4 - - 7 - - 10 - - 1	4 - - 7 - - 10 - - 1	4 - - 7 - - 10 - - 1
Administration			
U Maung Maung Than			
U Aye Thein			
Daw Htay Htay Win			
U Kyaw Lwin			
Water Management for Main Facility			
U Aung Bo			
Daw Than Than Oo			
U Aung Thu Kywe			
U Ye Myint			
Daw Mu Mu Than			
U Maung Zaw Wann			
Water Management for Terminal Facility			
Daw Myint Myint Than			
U San Win Naing			
U Aung Than Oo			
U Myo Zaw Zaw			
U Aung Myo Swe			
U Maung Maung Naing			
System Development			
U Kyaw Lin Oo			
U Thaung Theike			
U Myo Aung			
Daw Than Win			
U Kyaw Min Naing			
Information Management			
U Soe Htun Aung			
U Myo Aung			
U Ne Win			
U Zaw Zaw Latt			
U Aung Win Swe			
Training			
Daw Aye Aye Hlaing			
Daw Htar Htar Win			
U Aung Naing			
Head Quarter			
U Mya Win			
U Tun Naing			
U Ne Win			
U Than Aung			

C/P Training in Japan

Monbusho Scholarship

ANNEX - 6

List of Facility and Equipment
(Prepared after Phase I for Phase II by Myanmar Side)

Institution	Facility		Equipment
Hlegu (Sub-Project Office)	- Project Office Building	1 No	- Exhaust Fan
	- Cars Gaurage	2 Nos	
	- Store godown	1 No	
	- Staff House	3 Nos	
	- Generator & Pump House	1 No	- Pump and Compressor for Tube Well
	- Tube Well, Trestle and Water Supply System	1 Unit	
	- Garden and Lawn	1 Unit	
	- Decoration Works in Office		
	- Office Furniture	1 Lot	
	- Meteorology Station	1 Unit	
Test Farm	- Training Hall	1 No	
	- Intensive Type Test Farm	1 Unit	
	- Extensive Type Test Farm	1 Unit	
	- Electric Power Supply System	1 Unit	
	- Water Supply System by Tube Well	1 Unit	- Pump and Compressor for Tube Well
	- Office Furniture	1 Lot	
	- Meteorology Station	1 Unit	
Bago (Main Office)	- Minor Repair of Dormitory and Multi-hall for Trainees		
	- Repair of Office Equipment		
	- Operation and Maintenance of Office Building and Facilities		
Ngamoeyeik	- Auto-Water Level Gauge House	5 Nos	

ANNEX - 7

Allocated Budget by Myanmar

Unit = Kyat

Location	Organization	1999/2000	2000/2001	2001
Bago (Main Office)	Irrigation Department (ID)	15, 540, 200	22, 521, 200	10, 389, 400
Hlegu (Sub - Office) Technical Cooperation Program for ITC Project Phase II	ID	9, 421, 600	31, 336, 400	7, 517, 700

1999 / 2000 = From Apr 1999 to Mar 2000

2000 / 2001 = From Apr 2000 to Mar 2001

2001 = From Apr 2001 to Aug 2001

ANNEX - 8

PROJECT ACHIEVEMENT CHART FOR WATER MANAGEMENT (MAIN FACILITIES) FIELD

Out put : Irrigation technology of water management and maintenance in main facilities is improved

Activities	Target / Indicators	Schedule (fiscal year) 1999 2000 2001 2002 2003	Distinguished Achievement	Problems and Countermeasures	Remarks
1. Water Management for Main Facilities					
1.1 Survey and evaluation on present water management in model area					
1.1.1 Collection of data concerning water management on Ngamoyeik Project					
1.1.1.1 Project Plan	Reports of Ngamoyeik Project		Collected Report		Purpose is different, Finished, Annex-1, 2
1.1.1.2 Existing problems on water management	Report of problems in present condition		Prepared report		Finished, Annex-10
1.1.1.3 Operation manuals	Operation manual of Dam/Canal system		Dam operation manual		Finished, Annex-3
1.1.1.4 Water discharge of Dam and distribution at each intake facilities	Water discharge and distribution table		Daily dam released discharge		There is no water distribution data , Finished,Annex-4
1.1.1.5 Present land utilization	Present land utilization map		Canal wise irrigated area		Not detailed , Finished, Annex-5
1.1.1.6 Irrigation and drainage system	Irrigation and drainage network map and table		Yearly irrigated area and report on canal data and irrigated area		Difficult to draw map Finished, Annex-5.17
1.1.2 Survey present water management situation on the field					
1.1.2.1 Cropping pattern	Cropping pattern table		Cropping pattern in Ngamoeyeik area		Finished, Annex-15
1.1.2.2 Measurement of water distribution of each intake facilities	Water distribution table		Daily water distribution data for 1999-2000		Finished, Annex-11
1.1.2.3 Survey on structure of intake facilities	Inventory of facilities		Inventory list		Finished, Annex-6
1.1.2.4 Longitudinal and cross section survey	Profiles, Cross section view		LS,CS surveying for main and branch canal were finished. Canal CS at six places were surveyed for sediment study.		Annex-7 , 8
1.1.2.5 Measurement of water flow in canal	H-Q curve, Coefficient of roughness		H &Q relationship based on measured data in 99-2000 were calculated. Water flow for 2000-2001 was measured.		Finished, Annex-11
1.1.2.6 Survey on other water resources	Report on other water resources		Arranged the measured data and prepared report.		Finished, Annex-19
1.1.3 Evaluation on present water management	Report of the evaluation		Arranged data.		

ANNEX - 8

Activities	Target / Indicators	Schedule (fiscal year) 1999	2000	2001	2002	2003	Distinguished Achievement	Problems and Countermeasures	Remarks
1.2 Study on techniques to improve irrigation facilities									
1.2.1 Study to improve irrigation facilities									
1.2.1.1 Study on flow capacity of canals	Report on flow capacity of canals						Analysis of flow capacity on MC, RMC, LMC, Dy2 were finished. Report on flow capacity of canal was finished.		Finished, Annex-19
1.2.1.2 Study on water distribution facilities	Report on water distribution facilities Installation of intake gates						Installed new intake gates. Some intake canal cross section were surveyed to set up weir box and construction of weir box is being prepared.		Annex-9
1.2.1.3 Study on leakage and sedimentation	Report on leakage and sedimentation						Cross-Section at six places were measured two times.		
1.2.1.4 Study on improvement of facilities	Report on improvement of facilities						Report on improvement of facilities is being prepared.		
1.2.2 Making proposal report on improvement of main facilities	Recommendation of proposal report						Arranged data		
1.3 Improvement of operation and maintenance techniques of irrigation facilities									
1.3.1 Study to improve operation and maintenance techniques									
1.3.1.1 Study on water distribution plan	Water distribution plan						Plan for water distribution is being prepared.		
1.3.1.2 Study on Dam operation for water discharge	Report on Dam operation						Auto water level gauges in the reservoir and main canal have been set up.Report of study on dam operation is being prepared.		
1.3.1.3 Study on operation of distribution facilities	Report on operation of intakes						Leaf-let for Ngamoeyeik irrigation system was Prepared. Report on operation of intake for (1999-00) is being prepared.Report on operation of intae is being prepared. Auto water level gauge in left and right main canal have been setup.		Annex-16

ANNEX - 8

Activities	Target / Indicators	Schedule (fiscal year) 1999 2000 2001 2002 2003 (I II III IV)	Distinguished Achievement	Problems and Countermeasures	Remarks
1.3.1.4 Utilization of operation record books	Operation record books		Format of maintenance record book. Confirmed intake operation record book.		Annex-12
1.3.2 Making trials of studied techniques					
1.3.2.1 Operation on outlet of Dam and distribution facilities	Data on operation record books		Distribution data were recorded under operation of new gates. Water flow in main canal and intake were measured by ID Hydrological branch for 2000-01 irrigation period. Discussion of operation on dam and distribution facilities is being prepared.		
1.3.2.2 Enforcement of operation data recording	Data on operation record books		Collected the operation data recording.		
1.3.2.3 Checking-up of operation record book	Check list		Record book is being checked.		
1.3.2.4 Re-improvement of water management techniques					
1.3.3 Making proposal report on improvement of operation and maintenance techniques of main facilities	Proposal report		Prepared content		
1.4 Preparation of materials for Training					
1.4.1 Study on water management instruction			The seminar, and in service training were held.		
1.4.2 Study on instruction materials for water management			Seminar and training materials were prepared		Annex-13.14

..... Plan —— Implementation —— Revised Plan

ANNEX. 8

PROJECT ACHIEVEMENT CHART FOR WATER MANAGEMENT (TERMINAL FACILITIES) FIELD

Out put : Study method for water management of terminal irrigation system is improved

Activities	Target / Indicators	Schedule (fiscal year) 1999 I II III IV	2000 I II III IV	2001 I II III IV	2002 I II III IV	2003 I II III IV	Distinguished Achievement	Problems and Countermeas	Remarks
2. Water Management for Terminal Facilities Field									
2.1 Survey and evaluation on present water management in study area									
2.1.1 Evaluation of present situation by using of existing data									
2.1.1.1 Collection of soil map	Report to be prepared						Finished		Annex-4
2.1.1.2 Water requirement of terminal farm	Report to be prepared						Finished		Annex-8a
2.1.1.3 Irrigated area of study area	Report to be prepared						Finished		Annex-5
2.1.1.4 Water distribution of terminal farm	Report to be prepared						Finished		Annex-8b
2.1.1.5 Water users' association of terminal farm	Report to be prepared						Finished		Annex-6
2.1.2 Evaluation of present situation by using of existing data									
2.1.2.1 Topographic survey	Making of topographic map						Finished		Annex-1a,1b
2.1.2.2 Survey on terminal facilities condition	Report to be prepared						Finished		Annex-10
2.1.2.3 Measurement of water flow	Report to be prepared						Calculated discharge and analyzed results.		Annex-12
2.1.2.4 Survey on attainment time of irrigation water	Report to be prepared						Finished		Annex-9
2.1.2.5 Measurement of water requirement rate	Report to be prepared						Calculated requirement rate and considered results.		Annex-13
2.1.2.6 Survey on management of study area	Report to be prepared						Finished		Annex-11
2.2 Study on techniques to improve terminal facilities and water management in test farm									
2.2.1 Construction of test farm									
2.2.1.1 Drawing of construction plan	Plan to be prepared						Finished		Annex-2a,2b
2.2.1.2 Estimation and preparation	Construction to be prepared						Finished		Annex-3a,3b
2.2.1.3 First construction work	Test farm to be improved						Finished		Annex-7
2.2.1.4 Second construction work	Test farm to be improved						Cement had enough for B/L, construction will be started in next dry season.		
2.2.2 Observation of test farm after construction									
2.2.2.1 Survey on terminal facilities condition	Proposal report to be prepared						Preparing B/L for drains. Cement and sand do not yet ready	It is needed to repair the drains.	
2.2.2.2 Measurement of water flow	Proposal report to be prepared						Calculated discharge and analyzed results		Annex-12
2.2.2.3 Survey on attainment time of irrigation water	Proposal report to be prepared								
2.2.2.4 Measurement of water requirement rate	Proposal report to be prepared						Calculated water requirement rate and considered results.		
2.2.3 Making of proposal report of water management for terminal facilities	Progress of water management techniques								
2.2.3.1 Analysis of result of observation							Analyzed results		
2.2.3.2 Study on arrangement of water course									
2.2.3.3 Study on water requirement in various levels of water course density									
2.2.3.4 Study on proposal report #									
2.3 Preparation of materials for Training	Improvement of awareness for water management						Materials are preparing for next trainings.		

..... Plan ——— Implementation —— Revised Plan

#Contents of the report: Proposal report indicate positive and negative impacts of each on-farm facilitiy from the view points of water management and other factors based on the results of activities in test farms.

ANNEX 8 PROJECT ACHIEVEMENT CHART FOR SYSTEM DEVELOPMENT FIELD

Output: Technical supporting system for water management is improved

Activities	Target/ Indicators	Schedule (fiscal year) 1999-2000 I II III IV; 2000-2001 I II III IV; 2001-2002 I II III IV; 2002-2003 I II III IV; 2003-2004 I II III IV	Distinguished Achievement	Problems and Countermeasure	Remarks
3. System Development field					
3.1 Development of data base system of irrigation area					
3.1.1 Data management system using existing data and supplemental survey					
3.1.1.1 Making a land use ledger system	Basic land use ledger system		Ngamoeyeik irrigation area database (draft)		IIM
3.1.1.2 Addition of various management parameters to the land use ledger system after survey	Improvement of land use ledger system				IIM, WMI
3.1.2 Study on introduction of other measuring methods on irrigable and irrigated area					
3.1.2.1 Introduction and training of the advanced measuring methods	All the counterparts master skills of advanced measuring methods		Report on GPS survey training		
3.1.2.2 Practice of these measuring methods to improve surveying efficiency	Result of measurement and evaluation report of the method				
3.2 Development of supporting programs for water management					
3.2.1 Hydraulic phenomena simulation for operation of water management					
3.2.1.1 Examination of the programs developed in Phase - I	Contents of the programs to be understood				WMI
3.2.1.2 Improvement of data analysis technique by using computer and other appliances	Improvement of utilization programs and analysis report				
3.2.2 Calculation of water traveling time in canal					
3.2.2.1 Measurement of water reaching time at the distribution points in main and left canals	Water reaching time table				WMI
3.2.2.2 Analysis of the obtained data by using computer	Report on water flow in canal				WMI
3.2.3 Water balance simulation for study of storage of irrigated fields					
3.2.3.1 Study of Japanese water management programs	Contents of the programs to be studied with Japanese programs		Translated program		Finish
3.2.3.2 Comparison of Japanese programs with the programs utilized in Myanmar	Report on comparison result of both programs				
3.2.3.3 Revising and improvement of the program by reforming program structure	Water management program for Ngamoeyeik area				IIM, WMI, WMII
3.3 Improvement of monitoring method of water storage of reservoir					
3.3.1 Survey on water inflow of reservoir	Report on Estimation of Inflow				
3.3.2 Survey on water discharge of reservoir	Report on Result of Survey				WMI
3.3.3 Study on measurement method of dam capacity by ordinary survey method	Report on Water Spread Area and Volume Estimation		Digitized Topographic map of Ngamoeyeik reservoir		IIM
3.3.4 Study on introduction of advanced methods of dam capacity measurement	Report on advanced methods of dam capacity measurement				
3.4 Preparation of materials for training	Manuals, reference books and handouts and etc.				TR

Initial plan ——— Implementation ——— Revised plan

Annex-8

PROJECT ACHIEVEMENT CHART FOR ACTIVITY OF IRRIGATION INFORMATION MANAGEMENT FIELD

Output : Irrigation information management technology is improved to monitor irrigation projects

Activities	Target / Indicators	Schedule (Fiscal Year) 1999 2000 2001 2002 2003	Distinguished Achievement	Problems and Countermeasures	Remarks
4. Irrigation Information Management Field					
4.1. Study on monitoring method of water management in existing irrigation projects					
4.1.1. Study on water management monitoring method			Fundamental and aspect of wmm	No practiced exact wmm. Use of existing manual.	Good Progress
4.1.1.1. Preparation of study plan	Study plan		Completion of study plan		
4.1.1.2. Collection of information on water management monitoring method	Information list		Completion of Information list on wmm method		
4.1.2. Collection of water utilization data information for evaluation of present monitoring method			Depth of irrigation water to one acre of summer paddy	No recorded distribution data for a canal. Implementing field survey	
4.1.2.1. Collection and check of data on Ngamoeyeik irrigation project and project area	Data list		Data list		
4.1.2.2. Collection of data on irrigation projects and projects areas	Data list				
4.1.3. Study on water management condition survey system and test survey of it			Materials of actual condition to be considered.	Transporation. Repair of old motorcar.	On going.
4.1.3.1. Investigation on actual condition of water management	Materials for consideration				
4.1.3.2. Study on water management condition survey system	Water Management Condition Survey System (Proto-type)				
4.1.3.3. Implementation of test survey	Test survey				
4.1.3.4. Improvement of the water management condition survey system and extension of it	WMCS System (Improved type)				
4.1.4. Study on improvement method of irrigation facilities					
4.1.4.1. Analysis of water utilization data information	Materials for consideration			Can not get actual water distribution data of every canal. WMI will measure.	
4.1.4.2. Check-up of subjects to be improved	Subject list				
4.1.4.3. Information study on the improvement method of irrigation facilities	Report				
4.1.5. Study on function of water users' association			Actual condition of WUA in Ngamoeyeik irrigation project.	Comparing with other dynamic associations. Field observation.	On going with good progress.
4.1.5.1. Making study plan	Study plan		Completion of study plan.		
4.1.5.2. Field observation and investigation	Materials for consideration				
4.1.5.3. Information study on function of water users' association	Report				
4.2. Improvement of storage system of irrigation information					
4.2.1. Selection and collection of project design reference				Scattered or lost data. Communicating data source.	Taking much share of time.
4.2.1.1. Study on necessary information of design reference	Necessary information list				
4.2.1.2. Information collection on design reference	Information list of design reference		Information list.		

Annex-8

PROJECT ACHIEVEMENT CHART FOR ACTIVITY OF IRRIGATION INFORMATION MANAGEMENT FIELD

Output : Irrigation information management technology is improved to monitor irrigation projects

Activities	Target / Indicators	Schedule (Fiscal Year) 1999 2000 2001 2002 2003	Distinguished Achievement	Problems and Countermeasures	Remarks
4.2.2. Selection and collection of project construction reference				Scattered or lost data Communicating data source	Taking much share of time.
4.2.2.1. Study on necessary information of construction reference	Necessary information list				
4.2.2.2. Information collection of irrigation facilities constructies constructed by the project	Irrigation facilities list		Facilities list		
4.2.2.3. Information collection of irrigation facilities constructed by farmers in the project site	Irrigation facilities list		Facilities list		
4.2.3. Development and maintenance of storage system for design study				Widely scattered storage. Storage convergencies.	Taking much share of time.
4.2.3.1. Investigation on actual condition of irrigation data storage	Materials for consideration		Enquires to offices Report on consideration of media selection		
4.2.3.2. Development of the data storage system and study on the method to maintain and manage the system	Data Storage System (Prototype)				
4.2.3.3. Implementation of design study	Design study				
4.2.3.4. Making guidance	Guidance				
4.2.3.5. Report on improvement of the data storage system	DS System (Improved Type)				
4.3. Preparation of materials for training	Materials for training		Human resources for ID	Language Translation.	Good progress

--------- Plan ——— Implementation ——— Revised plan

ANNEX 8

PROJECT ACHIEVEMENT CHART FOR TRAINING SECTION

Out put : Water management technology is disseminated to technical staff of Irrigation Department and farmers in test farm through training

Activities	Target/ Indicators	Schedule (Financial Year) 1999 I II III IV / 2000 I II III IV / 2001 I II III IV / 2002 I II III IV / 2003 I II III IV	Distinguished Achievement	Problems and Counter-measurement	Remarks
5. Training					
5.1 Implementation of Training for Water Management					
5.1.1 Preparation of Implementation Plan					
5.1.1.1 Study on Present Condition	Study report to be prepared.		Completed	-	Report
5.1.1.2Course Settlement Plan	Course Settlement Plan to be prepared and authorized.		Continued	Need to authorize	Tentative Plan
5.1.1.3 Detailed Implementation Plan	Detailed Implementation Plan to be prepared and authorized.		Continued	Need to authorize	Detailed implementation Plan (SD, WM I & II, IIM)
5.1.2 Preparation of Training Facilities	Necessary facilities to be prepared for each course.		Continued	Cooperation & assistant	ITC Facilities
5.1.3 Preparation of Teaching Materials	Necessary Materials to be prepared for each course		Continued	Cooperation & assistant	Prepared Lecture notes & video tape
5.1.4 Implementation of Water Management Training					
5.1.4.1 Basic Course for Farmers	Training to be conducted.		Continued	Cooperation & assistant	Fifteen courses
5.1.4.2 Basic Course for ID Staff	Training to be conducted.		Continued		One course (WM II)
5.1.4.3 Intermediate Course for Farmers	Training to be conducted.				
5.1.4.4 Intermediate Course for ID Staff	Training to be conducted.				
5.1.4.5 Advanced Course for ID Staff	Training to be conducted.				
5.1.4.5 Special Course of each Fields	Training to be conducted.		Continued		Nine Seminar
5.2 Formulation of Training Master Plan					
5.2.1 Working Schedule	Tentative Schedule to be fixed.		Completed	-	Plan of operation
5.2.2 Study on Presentation					Report
5.2.2.1 Existing Master Plan	Study report to be prepared.		Completed	-	
5.2.2.2 Present Training Implementation	Study report to be prepared.		Completed	-	
5.2.3 Preparation of proposal for establishment procedure of New Master Plan					Report on function of SSC
5.2.3.1 Preparation of proposal	Procedure to be proposed at 2nd JCCM.		Completed	-	
5.2.3.2 Authorization of the procedure	Procedure to be proposed by JCCM.		Completed	-	
5.2.4 Preparation of Draft Master Plan					
5.2.4.1 Preparation first draft	First draft to be examined in ITC, to be second draft.		Completed	-	
5.2.4.2 Examination of the draft	The second draft to be examined by Sub-Special Committee (SSC), formed in ID.		Completed	-	Draft MP (Part I & II)
5.2.4.3 Authorization of the draft Master Plan	Special Committee to be formed in ID. The final draft to be examined and authorized as the New Master Plan.		Continued	Cooperation, Suggestions & guidance	Formation of SC, 1st SC meeting
5.2.4.4 Maintenance of Master Plan	Maintenance plan of training system to be considered.			This task should be started after finished the drawing of Training Master Plan	

--------- Plan ——— Revised Plan ——— Implementation

ANNEX 9

SITUATION OF PROJECT ACTIVITIES FOR WATER MANAGEMENT (MAIN FACILITIES) FIELD

Detailed Tentative Schedule of Implementation				Project Activities		Present Result and Evaluation	Achievement (%)	Final target
Large Item	Medium Item	Small Item	Sub Item	Past and Present Condition of implementation	Next Task			
1 Water management for main facilities	1.1 Survey and evaluation on present water management in model area	1.1.1 Collection of data concerning water management on Ngamoeyeik Project	1.1.1.1 Project Plan	Project pre-feasibility report and project completion report have been collected	Nothing	Collected report (Annex- 1, Annex-2)	100%	(Large Item) Irrigation technology in main facilities is improved focused on water management and maintenance
			1.1.1.2 Existing problems on water management	Problems related to present water management have been collected from maintenance office and some farmers. Report preparation for problems on present water management was finished.	Nothing	Report on present water management problem (Annex- 19)	100%	
			1.1.1.3 Operation manuals	Reservoir regulation and operation rules have been collected.	Nothing	Report on reservoir regulation and operation rules (Annex - 3)	100%	(Medium Item) To improve the techniques of water management in the model area, the present water management is surveyed and evaluated.
			1.1.1.4 Water discharge of dam and distribution at each intake facilities	Daily dam released discharge data have been collected. There is no water distribution data for each intake.	Nothing	Daily dam Released Discharge Data (1995-2000) (Annex - 4)	100%	
			1.1.1.5 Present land utilization	Yearly irrigated areas for each canal have been collected.	Nothing	Canal wise irrigated area for summer paddy and other crop (Annex - 5)	100%	

ANNEX 9

SITUATION OF PROJECT ACTIVITIES FOR WATER MANAGEMENT (MAIN FACILITIES) FIELD

Detailed Tentative Schedule of Implementation				Project Activities		Present Result and Evaluation	Achieve-ment (%)	Final target
Large Item	Medium Item	Small Item	Sub Item	Past and Present Condition of implementation	Next Task			
			1.1.1.6 Irrigation and drainage system	Irrigated areas for each canal have been collected. Canal wise irrigated areas, prepared by Maintenance Office were received	Nothing	Canal wise irrigated area for summer paddy and other crops (Annex - 5) Report on canal data of Ngamoeyeik reservoir and irrigated area (Annex -17)	100%	
		1.1.2 Survey present water mangement situation on the field	1.1.2.1 Cropping pattern	Actual cropping pattern for the last four years was receipt from Irrigation Information management section.	Nothing	Cropping pattern for last four years in Ngamoeyeik Irrigation areas. (Annex - 15)	100%	
			1.1.2.2 Measure-ment of water distribution of each intake facilities	Staff gauges were set up in Main canal, Left and Right main canal and each intakes. Water distributions were recorded every day in dry season and preparation of the water distribution table was finished, based on the data recorded in last Dec. 99 to May. 00.	Nothing	Daily water distribution data measured in 1999 - 2000. (Before providing gates) (Annex - 11)	100%	
			1.1.2.3 Survey on structure of intake facilities	Surveying of the structure location, sill level and opening sizes were carried out. Inventory of facilities has already been prepared.	Nothing	Inventory of the facilities. (Annex - 6)	100%	
			1.1.2.4 Longitudi-nal and cross-section survey	LS. CS of Main canal, Left main canal RD 0+000 to 42+000, Left canal DY2 RD 0+000 to 42+500, Right main canal RD 0+000 to 52+000 have already been surveyed. Profiles and cross-sections have already been drawn. Canal cross section at six places were surveyed for study on sedimentation.	To survey the canal cross section after rainy season (2001,Nov) at six places for investigation of sedimentation	Canal longitudinal section data and drawing. (Annex -7) Canal cross section data and drawing (Annex - 8)	95%	

ANNEX 9

SITUATION OF PROJECT ACTIVITIES FOR WATER MANAGEMENT (MAIN FACILITIES) FIELD

Detailed Tentative Schedule of Implementation				Project Activities		Present Result and Evaluation	Achievement (%)	Final target
Large Item	Medium Item	Small Item	Sub Item	Past and Present Condition of implementation	Next Task			
			1.1.2.5 Measurement of water flow in canal	Flow measurements have already been carried out in Main canal and their intakes in 1999-00.	Nothing	Manning roughness coefficient in main and branch canal, relationship between H and Q, H-Q curve measured in canal for 1999-2000. (Annex-11)	100%	
			1.1.2.6 Survey on other water resources	Staff gauges have been set up in two creeks. Daily water levels are measured. And prepared H-Q curve. Measurement was carried on and arranged the measured data and prepared report.	Nothing	Measurement of daily water levels, Water flow measurement data, H-Q curve and daily flow rate data.Report of survey on other water resources	100%	
		1.1.3 Evaluation on present water management		The collected data, observed data and surveyed result data have been arranged. Present canal flow capacity were analyzed, present dam & intake operation were being studied. Discussion with ID maintenance office is being carried out to confirm the present water management, report is being prepared.	To arrange the data & continue a report.	Result of 1.1.1 and 1.1.2.	70%	
	1.2 Study on techniques to improve irrigation facilities	1.2.1 Study to improve irrigation facilities	1.2.1.1 Stydy on flow capacity of canals	Analysis method of canal flow capacity, non-uniform flow analysis, were introduced using prepared CS data together with short-term expert. Analysis of canal flow capacity on MC, RMC, LMC, Dy2 were finished.Report on flow capacity analysis of canal was finished.	Nothing	Analysis result of canal flow capacity on MC, RMC, LMC & Dy2. Report of non uniform flow analysis on canal flow capacity. (Annex-18)	100%	(Medium Item) The techniques to improve irrigation facilities are studied.

ANNEX 9

SITUATION OF PROJECT ACTIVITIES FOR WATER MANAGEMENT (MAIN FACILITIES) FIELD

Detailed Tentative Schedule of Implementation				Project Activities		Present Result and Evaluation	Achieve-ment (%)	Final target
Large Item	Medium Item	Small Item	Sub Item	Past and Present Condition of implementation	Next Task			
			1.2.1.2 Study on water distribu-tion facilities.	50 numbers of new intake gates were provided by JICA and installations of new gates were set up by ID Maintenance office. Some canal CSs of intakes were surveyed to set up weir box as a measuring facility. Report on weir box design was made and construction of weir box is being prepared. Position of every intake structure is being checked.	To construct the weir box. To make a report and to continue the checking of intake sill level	Installed new intake gates and report of Hydraulic design calculation for weir box. (Annex-9)	70%	
			1.2.1.3 Study on leakage and sedimenta-tion	Canal cross-section at six places were chosen and measured to study the sedimentation during the period, after rainy season and before & after irrigation season.	To survey the canal cross section after rainy season (2001,Nov) at six places for investigation of sedimentation in canal and to make a report	A result of canal cross-section at six places.	40%	
			1.2.1.4 Study on improve-ment of facilities	Canal flow capacity was analyzed. Appropriate check structure and flow measurement device were studied during the short-term expert training. Suggestion of improvement for canal bank is being prepared. Report on weir box design was made and construction of weir box is being prepared. Construction of auto water level gauge in LMC & RMC are being prepared.	To give the suggestion for the improvement of the canal bank. To set up the weir box and auto water level gauge	Analysis result of canal flow capacity. Having knowledge about check structure and flow measurement device.	60%	
		1.2.2 Making proposal report on improvement of main facilities.	-	Arrangement of collected materials.	To make a proposal report	Material arrangement	10%	

ANNEX 9

SITUATION OF PROJECT ACTIVITIES FOR WATER MANAGEMENT (MAIN FACILITIES) FIELD

Detailed Tentative Schedule of Implementation				Project Activities		Present Result and Evaluation	Achievement (%)	Final target
Large Item	Medium Item	Small Item	Sub Item	Past and Present Condition of implementation	Next Task			
	1.3 Improvement of operation and maintenance techniques of irrigation facilities	1.3.1 Study to improve operation and maintenance techniques	1.3.1.1 Study on water distribution plan	Present water distribution data of canals for the last two years were arranged. Discussion with the ID maintenance office was made. Planned area for 1999-00 and 2000-01 were collected. Irrigation water requirement for them was calculated based on the planned area and unit requirement. Water distribution plan for 2001-02 irrigation period is being prepared.	To make a discussion on water distribution plan with maintenance office.	Irrigation water requirement for each intake was calculated based on the planed area and unit requirement.	50%	(Medium Item) The operation and maintenance techniques of irrigation facilities are improved.
			1.3.1.2 Study on Dam operation for water discharge	The daily inflow and out flow for the last 6 years of the reservoir were collected. These data were arranged. Auto water level gauge in reservoir and main canal have been setup.	To give the suggestion before starting the next irrigation period. To complete a report.	Arranged inflow and out flow data of reservoir.	50%	
			1.3.1.3 Study on operation of distribution facilities	The leaf-let of Ngamoeyeik irrigation system was made. Diagram of Ngamoeyeik irrigation system for operation. diagram of decision procedure to tertiary unit were made and confirmed with ID maintenance office. Installation of auto water level gauges in left and right main canal has been done. Report of study on intake operation is being prepared.	To give the suggestion before starting the next irrigation season. To complete a report.	Leaf-let for Ngamoeyeik irrigation sysetm. (Annex - 16)	50%	

ANNEX 9

SITUATION OF PROJECT ACTIVITIES FOR WATER MANAGEMENT (MAIN FACILITIES) FIELD

Detailed Tentative Schedule of Implementation				Project Activities		Present Result and Evaluation	Achieve-ment (%)	Final target
Large Item	Medium Item	Small Item	Sub Item	Past and Present Condition of implementation	Next Task			
			1.3.1.4 Utilization of operation record books	Operation and maintenance record book, and a format of intake operation record were made and confimed with ID maintenance office to use.	To review and to use the operation record book.	Format of maintenance record book for intake (Annex -12)	50%	
		1.3.2 Making trial of studied techniques	1.3.2.1 Operation on outlet of dam and distribution facilities	Some intakes are operated by using new gates. Water flow in main canal and intake were measured by ID Hydrological branch for 2000-01 irrigation period after installation of new intake gates.	To continue the measurement for the remaining points in the coming irrigation period of 2000-01 by Hydrological branch. To make trial with study on 1.3.1.2 and 1.3.1.3. To record operation result.	Operation of new intake gates.	10%	
			1.3.2.2 Enforce-ment of operation data recording	Water distribution data are being recorded under newly installed intake gate operation.	To collect the recorded data. To store the data.	Water distribution data at intake.	10%	
			1.3.2.3 Checking up of operation record book	Record book is checked.	To make the check list. To check up operation record book.	-	10%	
			1.3.2.4 Re-improve-ment of water management techniques		To study the problems of 1.3.2.1 and 1.3.2.2 based on result 1.3.2.3.	-	0%	

ANNEX 9

SITUATION OF PROJECT ACTIVITIES FOR WATER MANAGEMENT (MAIN FACILITIES) FIELD

Detailed Tentative Schedule of Implementation				Project Activities		Present Result and Evaluation	Achieve-ment (%)	Final target
Large Item	Medium Item	Small Item	Sub Item	Past and Present Condition of implementation	Next Task			
		1.3.3 Making proposal report on improvement of operation and maintenance techniques of main facilities		Contents were made.	To make a proposal report	Contents were made.	10%	
	1.4 Preparation of material for training	1.4.1 Study on water management instruction		Plan of training course was prepared. The subject of seminar for farmers was discussed with ID maintenance office and MAS. Seminars on effective use of irrigation water for farmers have been carried out eight times. The training for Bintha, Bingaung of ID staff was held.	To discuss the detail of training subject. To hold some trainings.	Plan of training. Two courses of trainings was carried out.	50%	(Medium Item) The materials for training are prepared.
		1.4.2 Study on instruction materials for water management		The pamphlet was prepared and distributed to the farmers and Hlegu maintenance staff personnel. The training materials for Bintha, Bingaung, were also prepared.	To prepare some materials for training.	Pamphlet, training materials for farmers. Bingaung, Bintha. (Annex - 13, 14)	50%	

ANNEX. 9

SITUATION OF PROJECT ACTIVITIES FOR WATER MANAGEMENT (TERMINAL FACILITIES) FIELD

Detailed Tentative Schedule of Implementation				Project Activities		Present Result and Evaluation	chieve ment (%)	Final Target
Large Item	Medium Item	Small Item	Sub Item	Past and Present Condition of Implementation	Next Task			
2. Water Management for Terminal Facilities	2.1 Survey and evaluation on present water management in study area.	2.1.1 Evaluation of present situationby using of existing data.	2.1.1.1 Collection of soil map	Collected report for present land use of Ngamoeyeik Dam Project Area from Irrigation Department (Head Office) and considered the soil maps and specifications.	Nothing	Report was prepared.	100	(Large Item) Irrigation technology in terminal facilities improved focused on water management. (Medium Item) To survey and evaluate on present water management in study area.
			2.1.1.2 Water requirement of terminal farm	Collected necessary data from Maintenance Office (Hlegu) and analyzed data.	Nothing	Report was prepared.	100	
			2.1.1.3 Irrigated area of study area	Collected necessary data from Maintenance Office (Hlegu) and Settlement and Land Record Department (Hlegu) analyzed data.	Nothing	Report was prepared.	100	
			2.1.1.4 Water distribution of termial farm	Collected necessary data from Maintenance Office (Hlegu) and WM-I section and compared data.	Nothing	Report was prepared.	100	
			2.1.1.5 Water users' association	Collected necessary data from Maintenance office (Hlegu) and observed data.	Nothing	Report was prepared.	100	
		2.1.2 Evaluation of present situationby using survey result in study area	2.1.2.1 Topographic survey	Detail topographic survey in intensive and extensive area was already finished.	Nothing	Contour maps were prepared	100	
			2.1.2.2 Survey on terminal facilities condition	Already surveyed for all study area.	Nothing	Report was prepared.	100	
			2.1.2.3 Measurement of water flow	Concerned farmers could not understand the purpose and condition of measuring devices and some disputes occurred on the flow measurement.	To continue collection of water level data in next irrigation season.	Already constructed measuring devices and collected water level data.	30	

ANNEX. 9

SITUATION OF PROJECT ACTIVITIES FOR WATER MANAGEMENT (TERMINAL FACILITIES) FIELD

Detailed Tentative Schedule of Implementation				Project Activities		Present Result and Evaluation	chieve ment (%)	Final Target
Large Item	Medium Item	Small Item	Sub Item	Past and Present Condition of Implementation	Next Task			
			2.1.2.4 Survey on attainment time of irrigation water	Informations were received from concerned farmers.	Nothing	Report was prepared.	100	
			2.1.2.5 Measurement of water requirement rate	N-type meter water requirement measuring method was introduced by the guidance of short term expert and continue measurement in study area.	To continue measurement in next irrigation season.	Collected data.	35	
			2.1.2.6 Survey on management of study area.	Collected necessary data from concerned departments and surveyed the present management of study area.	Nothing	Report was prepared.	100	
	2.2 Study on techniques to improve terminal facilities and water	2.2.1 Construction of test farm	2.2.1.1 Drawing of construction plan	Intensive test farm and extensive test farm construction plans were drawn by concerned expert and counterparts.	Nothing	Plan for first and second construction were already prepared.	100	(Medium Item) To study on techniques to improve terminal facilities and water management in test farm
			2.2.1.2 Estimation and preparation	Estimate preparation for both intensive and extensive type test farms based on construction design were done.	Nothing	Estimates for first and second construction were already submitted.	100	
			2.2.1.3 First construction work	Assigned to Yangon Division Maintenance Office as deposits work.	Nothing		100	
			2.2.1.4 Second construction work	Construction implementations were done by water management for terminal facilities section. Insufficient construction equipments and delay of cement support were constrained to finish in time.	To continue construction work in dry season.	Already collected the required cement and ready for construction.	90	

ANNEX. 9

SITUATION OF PROJECT ACTIVITIES FOR WATER MANAGEMENT (TERMINAL FACILITIES) FIELD

Detailed Tentative Schedule of Implementation				Project Activities		Present Result and Evaluation	chieve ment (%)	Final Target
Large Item	Medium Item	Small Item	Sub Item	Past and Present Condition of Implementation	Next Task			
		2.2.2 Observation of test farm after construction	2.2.2.1 Survey on terminal facilities condition	Several times of observation on terminal facilities in the intensive type test farm were done.	To continue detail survey and repair.	Already surveyed. Field level and drains condition should be repaired.	20	
			2.2.2.2 Measurement of water flow	Farmers made embankments at end of drains disturbed in measurement of water level.	To continue measurements in next irrigation season.	Water level data were collected and calculated flow discharge.	27	
			2.2.2.3 Survey on attainment time of irrigation water.	Postponed to the next irrigation season.	To start the survey in next irrigation season.	-	-	
			2.2.2.4 Measurement of water requirement rate.	N-type meter water requirement measuring method was introduced by the guidiance of short term expert and continue measurement.	To continue measurements in next irrigation season.	Data were collected and calculated the water requirement.	30	
		2.2.3 Making of proposal report of water management for terminal facilities	2.2.3.1 Analysis of result of observation	Being under analysis on the results.	To continue the analysis.	Under analysis.	12	
			2.2.3.2 Study on arrangement of water course	Postpond to the next irrigation season.			-	
			2.2.3.3 Study on water requirement in various levels of water course density	Postpond to the next irrigation season.			-	

ANNEX. 9

SITUATION OF PROJECT ACTIVITIES FOR WATER MANAGEMENT (TERMINAL FACILITIES) FIELD

Detailed Tentative Schedule of Implementation				Project Activities		Present Result and Evaluation	chieve ment (%)	Final Target
Large Item	Medium Item	Small Item	Sub Item	Past and Present Condition of Implementation	Next Task			
			2.2.3.4 Study on proposal report	Postpond to the final fiscal year.			-	(Medium Item)
	2.3 Preparation of materials for training			Training materials were being prepared. Proper water management training in intensive type test farm was not started yet because of unequal adjusted field condition of the blocks. Staff of MAS collaborates with our section and gave training about agricultural matters.	To continue training in next irrigation season.	We had already given water management trainings farmers. CI and ACI on 6th,20th on Dec: 2000 and 3rd, 17th on Jan: 7th, 28th on Feb: and 22 nd March 2001 according to training program.	27	To prepare the training materials.

ANNEX 9

SITUATION OF PROJECT ACTIVITIES FOR SYSTEM DEVELOPMENT FIELD

Detailed Tentative Schedule of Implementation				Project activities		Present Result and Evaluation	Achievement (%)	Final Target
Large Item	Medium Item	Small Item	Sub Item	Past and Present Condition of Implementation	Next Task			
3 System Development	3.1 Development of database system of irrigation area	3.1.1 Data management system using existing data and supplemental survey	3.1.1.1 Making a land use ledger system	-Developed in ITC Phase I, modification of the system is being made for Ngamoeyeik Irrigation Area by the guidance of short term expert.	-Modification of the system	-System under modification	70%	Supporting system for water management is improved.
			3.1.1.2 Addition of various management parameters to the land use ledger system after survey	-Addition of watercourse in the system -Addition of canal codes	-To add up necessary items	-System under modification	40%	To develope the database system for irrigation area
		3.1.2 Study on introduction of other measuring methods on irrigable and irrigated area	3.1.2.1 Introduction and training of the advanced measuring methods	-Short Training Courses on GPS Survey received by SD counterparts. -Receiving remote sensing lecture from short term expert -Observing the remote sensing activities in Forest Department -One counterpart attended the counterpart training (Remote sensing Fundamental Course) in Japan and held presentation on Nov 2000. -Study of Civil CAD software and GPSIITN software	-Exercising of GPS Survey in Ngamoeyeik irrigation area. -Introductory course on Remote Sensing and GPS Survey to ID staff	-Acquired GPS Survey basic practice and experience	70%	To get skill on measurement methods on irrigable and irrigated area

Detailed Tentative Schedule of Implementation				Project activities		Present Result and Evaluation	Achievement (%)	Final Target
Large Item	Medium Item	Small Item	Sub Item	Past and Present Condition of Implementation	Next Task			
			3.1.2.2 Practice of these measuring methods to improve surveying efficiency	-GPS Surveying test measurements conducted - GPS Survey on Ngamoeyeik Main Canal Alignment -GPS Survey for Control Points for Laukai-Kongyan Road in Lashio	-GPS Surveying in Ngamoeyeik irrigation area.	-Practical field survey experience received.	70%	
	3.2 Development of supporting programs for water management	3.2.1 Hydraulic phenomena simulation for operation of water management	3.2.1.1 Examination of the programs developed in Phase-I	-Checked the content of programs developed in phase I	Nothing	-Programs in phase I had been tested	100%	To develop the supporting programs for water management
			3.2.1.2 Improvement of data analysis technique by using computer and other appliances	Data Collection	-Practical utilization of programs	- collected Canal cross section data	10%	To improve required skill on data analysis practice
		3.2.2 Calculation of water traveling time in canal	3.2.2.1 Measurement of water reaching time at the distribution points in main and left canals	-Collected canal map and considered measurement points	- data collection of water traveling time from Water Management for Main Facility section	-Collected the map	10%	Water reaching time at specified points
			3.2.2.2 Analysis of the obtained data by using computer		- Data Collection -Calculation on computer using measured data			

Detailed Tentative Schedule of Implementation				Project activities		Present Result and Evaluation	Achievement (%)	Final Target
Large Item	Medium Item	Small Item	Sub Item	Past and Present Condition of Implementation	Next Task			
		3.2.3 Water balance simulation for study of storage of reservoir	3.2.3.1 Study of Japanese water management programs	-Translated the program to English and study.	Nothing	-Contents of program is studied	100%	Water balance simulation program
			3.2.3.2 Comparison of Japanese programs with the programs utilized in Myanmar	-Collected the programs using in ID -CROWAT program from FAO report was also studied.	Nothing	-Comparison was made.	100%	
			3.2.3.3 Revising and improvement of the program by reforming program structure	-Short-term expert training on water requirement calculation program was conducted and continuation of data analysis activities.	-Revise and improve the program by reforming program structure according to the guidance of short-term expert		20%	
	3.3 Improvement of monitoring method of water storage of reservoir	3.3.1 Survey on water inflow of reservoir		- installation of automatic rainguages in Ngamoeyeik reservoir area and in irrgable area	- estimation of inflow	- data collection	10%	To improve the monitoring method of water storage
		3.3.2 Survey on water discharge of reservoir		- data collection from Water Management for Main Facility section	- data collection	-data collection	10%	

Detailed Tentative Schedule of Implementation				Project activities		Present Result and Evaluation	Achievement (%)	Final Target
Large Item	Medium Item	Small Item	Sub Item	Past and Present Condition of Implementation	Next Task			
		3.3.3 Study on measurement method of dam capacity by ordinary survey method		-Digitizing of Ngamoeyeik basin topomap , image enhancement and area and volume estimation	-Calculation of reservoir water spread area and capacity from digitized topomap	-Digitized basin area topomap - Water spread area and volume estimation of reservoir	90%	measured dam capacity
		3.3.4 Study on introduction of advanced methods on dam capacity measurement		-Considering the measurement operation -GPS sessions for satellite map resampling was made and Ngamoeyeik reservoir area's image data was processed. -Test GPS survey at the neighbouring area of ITC - Preparation of Ngamoeyeik reservoir capacity measurement	-Consider the measure points and method -Making to have good skill on using remote sensing and GPS and surveying and surveying instruments -Understanding the measurement methods, procedure and software	-Considered measurement operation -Made a numbers of practical field practices.	20%	
	3.4 Preparation of materials for training			-Necessary documents, manuals and hand-outs were collected	-To prepare curriculums and texts for GPS & Remote sensing training	-Collected the documents for training	40%	To prepare the training materials

ANNEX - 9

SITUATION OF PROJECT ACTIVITIES FOR IRRIGATION INFORMATION MANAGEMENT FIELD

Detailed Tentative Schdule of Implementation				Project activities		Present Result and Evaluation	Achievement (%)	Final Target
Large Item	Medium Item	Small Item	Sub Item	Past and Present Condition of Implementation	Next Task			
4 Irrigation Information Management Field	4.1 Study on monitoring method of management in existing irrigation projects	4.1.1 Study on water management monitoring method	4.1.1.1 Preparation of study plan	Study plan on monitoring method of water management in existing irrigation projects has been made.		Study plan (Attachment 1)	100%	(Large Item) Irrigation management is improved to monitor irrigation projects
			4.1.1.2 Collection of information on water management monitoring method	First necessary information has been considered to support data collection. Seasonal information on water supply, demand and performance etc. are considered and collected (Irrigable area & irrigated area ,mean discharge of main canal and no: of days for each season) Existing manual and instruction for water management monitoring method and present conditions of information on monitoring system of water management have been collected and studied.		Information list (Attachment 2)	100%	(Medium Item) Proposal reports on monitoring method of water management
		4.1.2 Collection of water utilization data information for evaluation of present monitoring method	4.1.2.1 Collection and check of data on Ngamoeyeik project and project area	(1) Actual irrigated area for each intake from irrigation form B-113 of (1997-2001) has been collected. (2) Daily dam released discharge (1995-2001) has been collected and checked. (3) Comparing the design duty of Ngamoeyeik Project canals with present duty by design discharge and actual irrigated area.	To collect and check of water utilization data for intake based on actual discharge and irrigated area.	Collected materials (Attachment 3)	75%	

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SITUATION OF PROJECT ACTIVITIES FOR IRRIGATION INFORMATION MANAGEMENT FIELD

Detailed Tentative Schdule of Implementation				Project activities		Present Result and Evaluation	Achievement (%)	Final Target
Large Item	Medium Item	Small Item	Sub Item	Past and Present Condition of Implementation	Next Task			
				(4) Studying the flow measurement point and rotation system of Ngamoeyeik area based on the information which has been received from WM I Section.				
			4.1.2.2 Collection of data on irrigation project and project area	Monthly dam released discharge of 114 irrigation projects have been collected for the year of (1996-2000). Preparing to get the up-to-date data from I.D head office.	Selection of appropriate projects and collection of water utilization data of them.	Collected materials (Attachment 4)	50%	
		4.1.3 Study on water management condition survey system and test survey of it	4.1.3.1 Investigation on actual condition of water management	Actual condition of water management on Ngamoeyeik irrigation project has been investigated based on (1) Water supply control system (2) Information regarding to water management Report on present condition of water management monitoring has been already finished.	Water distribution data collected by WM I and WM II will be studied and stored.	Materials for consideration and Report on present condition of water management monitoring.	85%	
			4.1.3.2 Study on water management condition survey system	Preparation for illustration of design irrigation network including design discharge and irrigable area according to the data of design drawings and actual irrigation network with design discharge and irrigated area according to irrigation form B-113 has been made. Present water management condition has been studied and method of survey has been considered.	To study the present water management condition and consider how we can survey.	Initiation of water management condition survey system.	30%	

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SITUATION OF PROJECT ACTIVITIES FOR IRRIGATION INFORMATION MANAGEMENT FIELD

Detailed Tentative Schdule of Implementation				Project activities		Present Result and Evaluation	Achievement (%)	Final Target
Large Item	Medium Item	Small Item	Sub Item	Past and Present Condition of Implementation	Next Task			
			4.1.3.3. Implementation of test survey	Not yet started				
			4.1.3.4 Improvement of the water management condition survey system	Not yet started				
		4.1.4 Study on improvement method of irrigation facilities	4.1.4.1 Analysis of water utilization data information	Actual water utilization data of some canals measured by WM(I) section and daily utilization data of main canal for (2000-2001) irrigation season have been collected and studied how to analyze them.	Continue to collect and analyze water utilization data	Collected data and study on analysis of data	35%	
			4.1.4.2 Check-up of subject to be improved	Not yet started				
			4.1.4.3 Information study on the improvement method of irrigation facilities	Not yet started				
		4.1.5 Study on function of water users' association	4.1.5.1 Making study plan	Study plan on function of water users' association has been made.		Study plan (Attachment 5)	100%	

ANNEX - 9

SITUATION OF PROJECT ACTIVITIES FOR IRRIGATION INFORMATION MANAGEMENT FIELD

Detailed Tentative Schdule of Implementation				Project activities		Present Result and Evaluation	Achievement (%)	Final Target
Large Item	Medium Item	Small Item	Sub Item	Past and Present Condition of Implementation	Next Task			
			4.1.5.2 Field observation and investigation	The function of water users' association on Ngamoeyeik irrigation project has been studied. Institutional structure and duties of water distribution committee for Ngamoeyeik irrigation project have been investigated. New organization of WUAs for (2000-2001) was collected. In this fiscal year, field investigation has been made together with short-term expert in Ngamoeyeik area and Shwebo canal system to study the functions of WUAs there. Report on comparison study of WUAs in Ngamoeyeik area and upper Myanmar has been submitted.	Field investigation to other dynamic area and interview with WUAs members	Report of field investigation in upper Myanmar Report on comparison study of WUAs (Attachment 6)	50%	
			4.1.5.3 Information study on function of water users' association	Information study is now being started based on the result from field observation.	Continuation of information study	Consideration and study of information on functions WUAs	5%	
	4.2 Improvement of storage system of irrigation information	4.2.1 Selection and collection of project design reference	4.2.1.1 Study on necessary information of design reference	Necessary information on design reference has been considered and studied to support data collection.	Preparation of necessary information list	Study on necessary information	50%	(Medium item) Proposal Reports on improvement of storage system of irrigation information
			4.2.1.2 Information collection on design reference	Design reference such as pre-feasibility report, survey maps, design drawings and design programs for Ngamoeyeik project have been collected as possible as we could find. And information list on design reference has been prepared.	Field investigation and collection of missing design data will proceed.	Tentative information list on design reference (Attachment 7)	50%	

ANNEX - 9

SITUATION OF PROJECT ACTIVITIES FOR IRRIGATION INFORMATION MANAGEMENT FIELD

Detailed Tentative Schdule of Implementation				Project activities		Present Result and Evaluation	Achievement (%)	Final Target
Large Item	Medium Item	Small Item	Sub Item	Past and Present Condition of Implementation	Next Task			
		4.2.2 Selection and collection of project construct refernce	4.2.2.1 Study on necessary information of construction reference	Necessary information on construction reference has been considered and studied to support data collection.	Preparation of necessary information list	Study on necessary information	50%	
			4.2.2.2 Information collection of irrigation facilities constructed by the project	Construction reference i.e completion report and quality control report for Ngamoeyeik project have been collected and irrigation facilities list has been made. Report on dam data, canals and their irrigated area prepared by maintenance office was collected. And then it has been checked and compared with the facilities list from completion report.	Storage of collected data and collection of missing data	Collected irrigation facilities list (Attachment 8)	50%	
			4.2.2.3 Information collection of irrigation facilities constructed by farmers	Irrigation form B-113 showing watercourse and their irrigated area was collected for (1996-2001) irrigation season and Making watercourse list by canal wise has been already finished.	Collection of irrigation facilities constructed by farmers & making facilities list	Collected data and List of watercourse by canal wise (Attachment 9)	50%	
		4.2.3 Development and maintenance of storage system for design study	4.2.3.1 Investigation on actual condition of irrigation data storage	Observation and investigation have been carried out to grasp the actual condition of data storage. Report on data storage media selection was prepared .	To observe actual data storage system	Report on data storage media selection (Attachment 10)	80%	

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Detailed Tentative Schdule of Implementation				Project activities		Present Result and Evaluation	Achievement (%)	Final Target
Large Item	Medium Item	Small Item	Sub Item	Past and Present Condition of Implementation	Next Task			
			4.2.3.2 Development of the data storage system and study on the method to maintain and manage system	Method of management system has been considered and studied to develop the data storage system. Irrigation project data form has been prepared. Proceeding to get necessary data from head office to develop irrigation project data form.	Consideration of materials to develop data storage system	Preparation of irrigation project data form	25%	
			4.2.3.3 Implementation of design study	Not yet started				
			4.2.3.4 Making guidance	Not yet started				
			4.2.3.5 Report on improvement of data storage system	Not yet started				
	4.3 Preparation of materials for training			Consideration and discussion with training section for selection of training materials and sources of them inside the country and abroad especially from japan. Course settlement plan and detail implementation plan for irrigation information management trainings has been already prepared.	Two levels of training materials for IIM will be made for S.A.E and C.I & A.C.I	Preparation of materials for training	45%	(Medium item) Materials for trainings

ANNEX 9

SITUATION OF ACTIVITIES FOR TRAINING FIELD

Detailed Tentative Schedule of Implementation				Project Activities		Present Result and Evaluation	Achieve-ment (%)	Final target
Large Item	Medium Item	Small Item	Sub tem	Past and Present Condition of implementation	Next Task			
5. Training	5.1 Implementation of Training for Water Management	5.1.1 Preparation of implementation plan	5.1.1.1Study on present condition	First , studied the present condition & collected necessary data for report. Then, prepared the Report on Water Management Training Implementation and delivered it.	Nothing	Report was finished. (Attachment 1)	100%	(Large Target) Water Management Technology is disseminated to technical staff of ID and farmers in test farm area.
			5.1.1.2Course settlement plan	After discussion with the other four fields, prepared the tentative course settlement plan. It was revised again in september, 2001. Now, It is ready to authorize.	To authorize.	Tentative course settlement plan was finished. (Attachment 2)	80%	(Medium Target) To implement the water management Training.
			5.1.1.3Detailed implementation plan	Draft detailed implementation plan of the four technical fields (Water management I, Water management II, System Development & Irrigation Information Management) were prepared.	To authorize.	Draft detailed implementation plan (SD, WM I & WM II, IIM) was finished. (Attachment 3)	80%	
		5.1.2 Preparation of training facilities		Present ITC facilities can be used as the water management training facilities. Test farm & briefing hall, which can be used as the training facilities, were constructed through the project. Collected training facility lists of other fields. Received some equipments from JICA as training facilities.	To continue.		60%	

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SITUATION OF ACTIVITIES FOR TRAINING FIELD

Detailed Tentative Schedule of Implementation				Project Activities		Present Result and Evaluation	Achieve-ment (%)	Final target
Large Item	Medium Item	Small Item	Sub Item	Past and Present Condition of implementation	Next Task			
		5.1.3 Preparation of teaching materials		With the cooperation of other sections and department, training section made necessary arrangements for the preparation of teaching materials for the following training courses. 1. Seminar on Fundamental Water Management for Farmers and TCI-(1) times 2. Effective use of Irrigation Water for Farmers (WM I) - (7) times 3. Basic Training Course for Farmers in Intensive Type Test Farm Area-(7) times 4. Effective use of Irrigation Water for Bingaung & Bingthas in Ngamoeyeik Irrigation System (1) times 5. JICA Short-term Experts' seminars-(8)times 6. GPS Surveying Training (By Concordia)-(1) times Made video records on some conducted training.	To continue.	Lecture notes and other necessary teaching materials for conducted water management training courses were prepared. Recorded videotapes list. (Attachment 4)	60%	
		5.1.4 Implementation of water management training		With the cooperation of the concerned Sections and Departments, training section made necessary arrangements for the imple- mentation of the following training courses. 1. Seminar on Fundamental Water Management for Farmers and TCI-(1) time 2. Effective use of Irrigation Water for Farmers (WM I) - (7) times 3. Basic Training Course for Farmers in Intensive Type Test Farm Area-(7) times 4. Effective use of Irrigation Water for Bingaung & Bingthas in Ngamoeyeik Irrigation System (1) times 5. JICA Short-term Experts' seminars-(8)times 6. GPS Surveying Training (By Concordia) - (1) times	To continue.	Total (25) nos of training courses were conducted. (Attachment 5)	60%	

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SITUATION OF ACTIVITIES FOR TRAINING FIELD

Detailed Tentative Schedule of Implementation				Project Activities		Present Result and Evaluation	Achieve-ment (%)	Final target
Large Item	Medium Item	Small Item	Sub Item	Past and Present Condition of implementation	Next Task			
	5.2 Formation of Training Master Plan	5.2.1 Working schedule		Working schedule was prepared by means of the plan of operation.	Nothing	Plan of operations was finished. (Attachment 6)	100%	(Medium Target) To formulate the training master plan.
		5.2.2 Study on present condition		First, studied Requirements in Proficiency of Departmental works for newly appointed Professional staff (ID/ 1977), Training Plan(ITC/95), Recommendation of JICA Short-term Expert Mr.Nakazawa, conducted training program at ID (Mech:&ITC) and present training implementation. Then, collected the necessary data and prepared the Report on Training Master Plan for ID.	Nothing	Report was finished. (Attachment7)	100%	
		5.2.3 Preparation of proposal for establishment procedure of training master plan		ITC proposed to DG to form the Sub-Special Committes (SSC) and DG formed it in January 2000 to draw the draft training master plan. The proper establishment procedure was prepared by ITC and it was submitted and set up through 3rd SSC meeting.	Nothing	SSC was formed by DG. Proper establishment procedure was finished. (Attachment 8a & 8b)	100%	
		5.2.4 Preparation of draft master plan	5.2.4.1 Preparation of first draft	Collected necessary data from other branches in ID, through 1st & 2nd SSC meetings. After that ITC prepared the first draft training master plan and submitted it to SSC through 3rd SSC meeting.	Nothing	First draft training master plan, prepared by ITC, was finished. (Attachment 9)	100%	
			5.2.4.2 Examination on the draft	SSC examined & prepared draft training master plan again and again up to sixth SSC meeting. According to the corrections & suggestions of SSC meetings, Draft Training Master Plan was prepared and it became in final stage.	Nothing	SSC submitted draft training master plan to Special Committee. (Attachment 10)	100%	

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SITUATION OF ACTIVITIES FOR TRAINING FIELD

Detailed Tentative Schedule of Implementation				Project Activities		Present Result and Evaluation	Achieve-ment (%)	Final target
Large Item	Medium Item	Small Item	Sub Item	Past and Present Condition of implementation	Next Task			
			5.2.4.3 Authorization of the draft master plan	DG formed the Special Committee (SC) to examine the draft training master plan and to prepare the authorized training master plan. SC held first meeting on (18.9.2001). Through this meeting, SC examined and prepared the draft training master plan to become the Authorized Training Master plan for ID.	SC will continue the examination and prep - aration on the draft training master plan until it becomes the Authorized Training Master Plan for ID.	Formation of Special Committee. (Attachment 11)	30%	
			5.2.4.4 Maintenance of master plan		This task will be start after authorized the training master plan.			