

プロジェクト実施上の問題点と対処方針

計画・設計基準

項目	内容	対処方針
<p>1. 計画策定時の地形図</p>	<p>(1) 現在利用可能な地形図は、1/50,000のみで計画策定のためには縮尺が小さすぎる。また現在DLDが事業実施時に作成している1/2,000の平面図は、測量範囲が非常に限定されているため、計画時に行う計画区域の絞り込みや周辺地域の状況把握の作業ができないという問題点がある。また、いきなり1/2,000の平面図を作成するため、内容的にも錯誤が多い。</p> <p>パイロット地区規模 100 ～ 600ha 調査計画対象範囲 1,000 ～ 2,000ha</p>	<p>(1) 基本的には、1/5,000 または1/10,000の地形図を航空写真から作成することを計画上の原則としたい。</p> <p>したがって、1/2,000の平面図の作成は、計画策定に伴う事業区域の確定後、実施設計段階で行い、上記縮尺の地形図を参考にコンターを修正、追加するかたちで作成するようにしたい。</p>
<p>2. 計画策定上の課題</p>	<p>(1) 計画段階の作業は、実質的には1/2,000の図面づくりが主な仕事になっている。したがって、事業の必要性の有無の検討、事業区域の検討、対策工法の選定、事業費の見積もり等の具体的検討はこの段階で不十分である。</p>	<p>(1) DLDも計画段階の作業が実質的に現況調査の一部の項目だけになっていることの問題点に気づきつつある。これは事業プランがないことに伴い、事業予算確保が困難になっていることに基づくものである。</p> <p>したがって、左記の内容に応じた調査・検討項目を選定し、その項目に基づき最低限の作業を抽出して標準化すれば、かなり有益な作業になると思われる。</p> <p>侵食被害状況調査 排水状況調査 対策工法の選定 事業費の概算</p>

項目	内容	対処方針
3. 経済効果算定及び事業の評価	<p>(1) 事業実施の妥当性を明確にするためにも経済効果の算定及び事業評価の手法を確立する必要がある。</p> <p>(2) タイ側のこの分野での技術レベルを含む実体が不明確で、協力活動の内容、スケジュールのめどが立たない。</p>	<p>(1) この分野を担当する短期専門家を派遣し、カウンターパートにその手法の技術移転を行う。</p> <p>(2) 早急に短期専門家を派遣し、現状の分析、作業項目の選定及び短期専門家の派遣を含む活動スケジュールを検討する。</p>
3. 計画排水量または設計流量の決定	<p>(1) 現状の計画・設計作業の中では、計画排水量または設計流量の決定といった計画・設計上の基礎的な事項が欠落しているため、水路系の設計がほとんど根拠のないものとなっている。</p>	<p>(1) 計画段階では排水状況調査で現況の排水系統及びその流域面積の把握が必要である。このためにも事業区域周辺を含む適当な縮尺の地形図が必要である。</p> <p>設計段階では、施設ごとのリターンピリオドの設定などが必要である。</p>
4. 設計と工事の関係	<p>(1) 現状では設計が工事のためというより、予算示達のために行われているという要素が強いようである。</p> <p>このため、工事の現場では必ずしも設計に基づいて工事が行われていないことがみられる。</p>	<p>(1) 設計に基づく工事仕様の決定、さらに標準的な作業工程の決定を行い、設計と工事の関係を明確にし、C/Pに理解させる必要がある。</p>
5. 設計基準の内容	<p>(1) ユーザーが土木技術者でないことを考慮して作成しなければならぬ。したがって、専門的な記述、多岐にわたる内容は避けなければならない。</p>	<p>(1) 必要最小限の具体的な工種に限定し、その作業内容、作業手順を明確にする必要がある。</p> <p>例えば、排水路の設計は台形草生水路のみ実施できるようにすることを目標にする。</p>

策定されたカバークロープの体系については、それ自身が目的ではなく、それにより収益をあげ、土壌改良をしながら、さらに果樹の導入などにより収益の高い安定した技術への発展を念頭に置くべきである。

また栽培・土壌関係ではDLDの成果をよく吸収するべきである。試験地の土壌分析値が一部しか入手できなかったが、これらは今後早急に分析され、結果はファイルされねばならない。今後土壌分析部に分析を依頼することになるだろうが、LWCCの試験に関する分析費用は当然DLDで負担すべきであろう。しかし一方で、分析部門の機器は古いものが多いので、これを更新したり、試薬を購入する場合の経費などについては、プロジェクト事業費で負担すべき面も考えられる。

6.2 プロジェクト運営上の留意事項

(1) 農民の農地保全事業に対する意欲

タイは過去10年間、年率7.9%に及ぶ高度経済成長をとげている。とくに東部タイ地域は、東部臨海工業地帯開発に代表されるように、開発の波に洗われ、地域内幹線道路沿いでは工業団地、コンドミニアム用地、ゴルフ場などの土地開発により、地価が高騰している。このため東部タイの農民の中には土地を売却する者、あるいは海岸部へ農外所得を求める者が生じ、農地保全事業に対する意欲が減退する要因をはらんでいる。しかし、幹線道路を離れると農業を主たる正業をする農家が多く、これらの農家の所得向上のためには土地生産高の増大が必要とされている。ただし、農民は利益追及を優先し、投入が少なく収益の多い農法を選択しがちで、農地保全のように投入に対する便益の発現が明瞭でない事業には消極的である。農民の事業意欲の高い分野は、直接的な効果のある小規模ため池の建設と農道整備であり、特にため池は低投入、高収益の果樹栽培用灌漑水を供給するものとして需要が高い。農地保全は国土保全という側面が強く、農民主導よりは国家主導で促進されるべき事業と考えられる。したがって、農地保全事業に対する農民の意欲を喚起するために、LWCCの活動では以下に留意する必要がある。

- a) DLDの進めている政府関係者及び農民に対する土壌水保全研修事業を技術的に支援し、研修効果を一層確実なものにする。
- b) パイロット地区における、農地保全事業に農民のニーズの高いため池及び農道建設を積極的に取り入れるほか、ため池を利用した灌漑（灌漑方法、作物栽培など）につき技術的な支援を検討する。
- c) パイロット地区における農地保全事業後の営農部門による農民の指導・モニタリングを積極的に支援し、収益性及び農地保全効果の高い農法の確立に寄与する。

(2) LWCC組織の確立

政府の組織・定員の拡大に厳格な制約のあるタイ国において、協力の対象となるセンターが組織的に明確に位置付けられず、専任カウンターパートが配置できないことは、他のセンター型技術協力プログラムでも共通の問題である。しかし、センターの活動が活性化し、政策推進の上で重要な機能を果たすことになれば、他組織との統廃合などにより、正式な組織として発足する可能性は高い。タイ国においては土壌流亡、土壌劣化が重要な問題として認識されており、近年における環境配慮・環境保全論議の高まりとともに、その政策上のウエイトも増しつつある。LWCCは工学的かつ農学的に農地保全を進めるための技術センターとして設置されており、その活動の発展如何によっては重要性が増大し、正式な組織として発足することは十分考えられる。LWCCの活動を発展させるためには以下が重要である。

- a) LWCCの活動を通じDLD内の技術部、土壌水保全部及び研修部の連携を強化し、農地保全にかかわる工学的手法と農学的手法の相互の技術確立及び研修を進める。
- b) LWCCと第2地方事務所との連携強化により、農地保全事業の技術的指導・審査を行うセンターとしてのLWCCと事業実施機関である地方事務所とのモデル的な関係を確立し、他地域への農地保全事業の波及可能性を実証する。
- c) LWCC活動の活性化によりカウンターパートの実質的な専任化を進める。
- d) 国策として農地保全を推進するための根拠の明確な政策的な提言（補助政策など）を積極的に行う。
- e) 農業局、農業普及局など農地保全にかかわる他の関連機関からの情報収集活動を積極的に行う。

参 考 资 料

1. ミニッツ

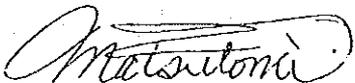
MINUTES OF UNDERSTANDING
BETWEEN THE JAPANESE CONSULTATION SURVEY TEAM
AND THE AUTHORITIES CONCERNED OF THE GOVERNMENT OF
THE KINGDOM OF THAILAND
ON THE JAPANESE TECHNICAL COOPERATION
FOR THE LAND AND WATER CONSERVATION CENTER PROJECT
IN THE EAST OF THAILAND

The Japanese Consultation Survey Team (hereinafter referred to as "the Team"), organized by Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Mr. Tsuneo Matsutomi, has been visiting The Kingdom of Thailand since March 10, 1994 for the purpose of formulating the detailed work plan for the Land and Water Conservation Center Project (hereinafter referred to as "the Project") as well as discussing the major issues related to the implementation of the Project.

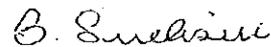
During its stay in the Kingdom of Thailand, the Team exchanged views and had a series of discussions with the authorities concerned of the Government of the Kingdom of Thailand in respect of various issues for sharing common understanding on the Project.

As a results of the discussions, the Team and the authorities concerned of the Government of the Kingdom of Thailand agreed to recommend to their respective Government the matters referred to in the document attached hereto.

Bangkok, March 17, 1994



Mr. Tsuneo Matsutomi
Leader
Consultation Survey Team
JICA
Japan



Mr. Boonyaruk Suebsiri
Acting Director General
Department of Land Development
Ministry of Agriculture and
Cooperatives
The Kingdom of Thailand

ATTACHMENT

1. Project Ownership

The Team emphasized that the Project is implemented by the Thai side as an owner and accordingly the Thai side should make clear the way how to use the outputs of the Project to other areas and how to promote land and water conservation works in the eastern Thailand as a whole after having finished the Project.

The Thai side answered that the extension of the Project output and the promotion of land and water conservation will be proceeded through the Land Development Village scheme and training program to Government officials and key farmers at regional level for which six ministries or agencies are concerned.

2. Future Role and Organizational Position of LWCC

The Team requested that the future role and organizational position of LWCC in DLD should be examined and determined by the Thai side as soon as possible.

The Thai side answered that the organizational relation shown in the attached figure is approved as permanent in DLD and the members of Working Groups, Sub-Committees and Joint Committee as well as counterpart personnel are formally announced.

3. Counterpart and Working Group

The Team and Thai side agreed to make clear the work sharing among counterpart personnel corresponding to the each itemized activity in the work plan and to vitalize the activities of the Working Groups in order to assure the output from the each itemized activity.

4. Pilot Project

The Team and Thai side agreed that the appropriate or socio-economically acceptable technology, especially in mechanical measures, for land and water conservation should be established before positively accelerating the construction of pilot areas.

5. Model Infrastructure Improvement Work

The Team and Thai side confirmed the followings concerning the Model Infrastructure Improvement Work in Rayong Station of LDRO II.

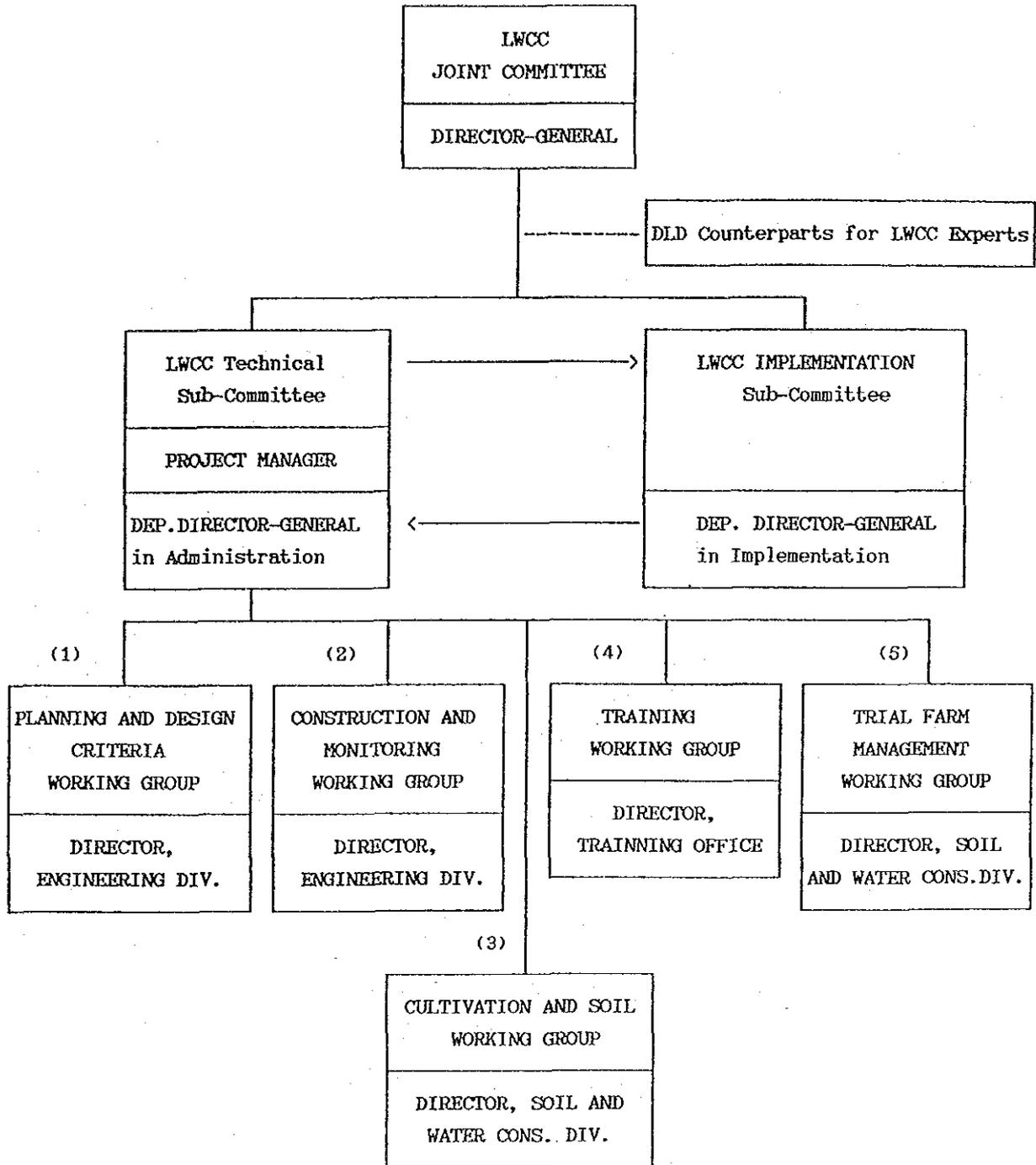
- a) Thai side will fully support the work technically and give appropriate advice for completing the work.
- b) Japanese contribution will be restricted within the amount total indicated in the Note Verbal exchanged between the Embassy of Japan and the Department of Technical and Economic Cooperation.

6. Office Space

The Team and Thai side agreed on the further effort by the Thai side to ensure the additional office space for storing and using the machinery and equipment which will be provided by the Japanese side, working space of counterpart personnel, and meeting room combined with working space for short-term experts.

B.S

ORGANIZATION CHART
OF
LAND AND WATER CONSERVATION CENTER PROJECT IN THE EAST OF THAILAND (LWCC)



Me

B.S.

2. 団長レター

Bangkok, March 17, 1994

Mr. Sitilarp Vasuvat
Director General
Department of Land Development
Ministry of Agriculture and Cooperatives

SUBJECT: SUMMARY REPORT ON THE CONSULTATION SURVEY FOR
THE LAND AND WATER CONSERVATION CENTER PROJECT
IN THE EAST OF THAILAND

Dear Sir,

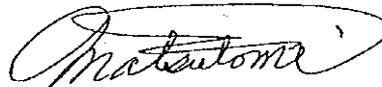
The Japanese Consultation Survey Team (hereinafter referred to as "the Team"), organized by Japan International Cooperation Agency (hereinafter referred to as "JICA") has been visiting The Kingdom of Thailand since March 10, 1994 for the purpose of formulating the detailed work plan for the Land and Water Conservation Center Project (hereinafter referred to as "the Project") as well as discussing the major issues related to the implementation of the Project.

During its stay in the Kingdom of Thailand, the Team exchanged views and had a series of discussions with the authorities concerned of the Government of the Kingdom of Thailand and conducted field survey.

I am pleased to submit herewith the Summary Report on the Consultation Survey for the Project to the Department of Land Development. The Team will report the result of the survey and convey necessary data and information, which have been obtained by the survey, to the Government of Japan.

I would like to express my heartfelt thanks for you and your staff for the kind cooperation and necessary arrangement extended to us during our stay.

Sincerely yours,



Tsuneo MATSUTOMI
Team Leader
The Consultation Survey Team
JICA

- cc:1. Chief of Japan Sub-Division,
Department of Technical and Economic Cooperation
2. Mr. Boonyaruk Suebsiri, Project Manager of LWCC,
Deputy Director General, DLD
3. Mr. Sompong Theerawong, Deputy Director General, DLD
4. Mr. Sima Morakul, Deputy Director General, DLD
5. First Secretary (agricultural attache), Embassy of Japan
6. Resident Representative, JICA Thailand Office
7. Mr. Yasuhiko Mishima, Team Leader, LWCC

SUMMARY REPORT ON CONSULTATION SURVEY
FOR
THE LAND AND WATER CONSERVATION CENTER PROJECT
IN THE EAST OF THAILAND

1. Objectives

The Consultation Survey Team is dispatched by JICA for the purpose of confirming the actual progress of the activities concerning the Land and Water Conservation Center Project, examining the appropriateness of the Tentative Schedule of Implementation, formulating the detailed work plan of the Project for cooperation term, discussing the problems raised in the course of the Project activities, and suggesting the methods how to solve the problems.

2. Team Member

Mr. MATSUTOMI, Tsuneo: Team Leader

Deputy Director, Design Division, Construction Department,
Agricultural Structure Improvement Bureau, Ministry of
Agriculture, Forestry and Fisheries (MAFF)

Mr. DAIO, Mineo: Planning and Design Criteria

Section Chief, Irrigation and Drainage Division, Construction
Department, Agricultural Structure Improvement Bureau, MAFF

Mr. KIKUCHI, Kazuo: Construction and Monitoring

Director, Dam Construction Division, Asahikawa Agricultural
Branch Office, Asahikawa Development and Construction Department,
Hokkaido Development Bureau, Hokkaido Development Board

Mr. MIYAZAWA, Kazuo: Cultivation and Soil

Ex-Director, Soil and Fertilizer Research Division III,
Department of Environmental Research II, Kyushu National
Agricultural Experiment Station, MAFF

Mr. MATSUBARA, Eiji: Coordinator

Deputy Director, Agricultural Technical Cooperation Division,
Agricultural Development Cooperation Department, JICA

3. Schedule

The schedule of the Team's activities from March 10 to 19, 1994 (10 days) is as follows:

Mar. 10: Arrive in Bangkok

Mar. 11: Courtesy call to Department of Technical and Economic

Cooperation and Department of Land Development, and meeting
with JICA Thailand Office

Visit to LWCC and discussion about the Work Plan of the Project

Mar. 12: In-house meeting

- Mar. 13: Visit to Chachoengsao Station Office, Chachoengsao No. 3 Pilot Area, and Land Development Regional Office II
- Mar. 14: Visit to Rayong Station, return to Bangkok
(Visit to Chantaburi Station Office and Chantaburi No. 2 Pilot area by another party)
- Mar. 15: Joint Working Group Meeting
- Mar. 16: Technical Sub-Committee
- Mar. 17: Joint Committee, sign the Minutes of Meeting and submit the Summary Report
- Mar. 18: Leave for Japan
- Mar. 19: Arrive in Tokyo

4. Contents of Survey

The Project started on June 10, 1993, on the basis of the Record of Discussions ("R/D") and TSI signed between the Leader of the Implementation Survey Team and the Director General of Department of Land Development (DLD) on March 26, 1993. In order to smoothly implement the Project as agreed on the R/D, the Team surveyed and discussed the following matters with the DLD staff concerned:

- (1) Progress of the Project activities
- (2) Detailed work plan of the Project
- (3) Actual and planned input from both Japanese and Thai side
- (4) Future role and organizational position of the Land and Water Conservation Center (LWCC)
- (5) Others

5. Progress of the Project Activities

5.1 Planning and Design Criteria

(1) General

As the first year of the Project, LWCC activities have been made mainly on the examination of existing situation and its problem of the work concerning planning and design on land and water conservation. LWCC established the Working Group for Planning and Design Criteria as an organization for managing its activities. LWCC made a draft detailed work plan on planning and design criteria after discussion among counterpart personnel and expert.

(2) Planning Criteria

- a) LWCC collected data on planning in order to clarify contents of planning work in pilot area projects. LWCC also observed the actual work at project sites and examined the contents of the work
- b) LWCC tried to find problems in existing planning work according to the collected data and the result of the examination. LWCC

prepared a draft detailed work plan for planning criteria which mainly consisted of practical manuals for planning in order to improve the planning work.

(3) Geographic Information System (GIS)

- a) LWCC examined the hardware, the software of the computer system and the contents of the present activities concerning GIS in DLD.
- b) LWCC prepared a draft detailed plan concerning GIS in which LWCC proposed that LWCC should develop a soil erosion monitoring system and some kinds of database made on the basis of Universal Soil Loss Equation (USLE) utilizing GIS.

(4) Trial Farm (JICA Model Infrastructure Improvement Project)

- a) LWCC planned to install erosion plots in Rayong Station of DLD in order to clarify the effect of countermeasure which will be applied to the land and water conservation work in the East of Thailand. For this purpose, LWCC requested Model Infrastructure Improvement Work to JICA.
- b) LWCC established the Working Group for Trial Farm Management to examine the contents of tests, implement the tests and maintain the facilities in the trial farm.
- c) LWCC designed to install 17 erosion plots and decided the specification of measuring equipments. LWCC will conduct the erosion test to obtain data for determining coefficient of USLE. At present LWCC examines the detailed test plan for each items of measurement.

(5) Design Criteria

- a) LWCC collected data on design such as some kinds of design criteria, soil conservation handbook and engineering textbook on land and water conservation in order to clarify the contents of existing design work. LWCC also observed the actual work of pilot areas and elaborated the contents of the work.
- b) LWCC tried to find problems in the existing design work according to the collected data and the result of the examination. LWCC prepared a draft detailed work plan for design criteria which mainly consisted of practical manuals for design in order to improve the design work.

(6) Monitoring for Planning and Design

LWCC decided to measure the following items as monitoring in order to improve planning and design work:

- Soil loss from field
- Sedimentation in sediment traps and small reservoirs
- Rainfall
- Water level of small reservoirs

5.2 Construction and Monitoring

(1) General

LWCC made effort to grasp the present situation and arrange the problems concerning cost estimation and construction management system of DLD and examined LWCC work plan based on the TSI.

(2) Examination of Present Situation

a) LWCC collected reference data about the implementation system of construction in order to grasp the present situation concerning cost estimation and construction management system of DLD.

b) LWCC collected reference data about cost estimation and construction management in order to prepare cost estimation and construction management method for land and water conservation works.

(3) Improvement of Construction Technique

LWCC made investigation about construction method and technique and advised how to improve the problems at the site of pilot area project.

(4) Monitoring at Pilot Area Project for Construction

LWCC began monitoring about the following items at pilot area project (CS-No. 3).

- Rainfall
- Water level of farm pond
- Water level of underground
- Demonstration field

(5) Establishment of Working Group

LWCC established the Working Group of Construction and Monitoring in order to manage LWCC Project smoothly.

(6) Draft Work Plan

LWCC made the examination of the contents of draft detailed work plan concerning cost estimation criteria, construction manual and monitoring items in consideration of collected data, site investigation and the arranged problems.

5.3 Cultivation and Soil

(1) Data Collection and Examination of Existing Cropping System

LWCC collected data about cropping tests made by DLD and other organizations. LWCC also examined farmer's cropping system, cultivation methods and present situation of intercropping in pilot areas and other field.

(2) Test on Intercropping

Based on the survey on present situation, LWCC formulated leguminous intercropping test with cassava.

(3) Test on Keeping Soil Moisture

LWCC has been implementing a preliminary experiment on effective methods of keeping soil moisture such as partial (minimum) tillage,

conventional tillage, deep tillage, application of organic matter, and mulching of soil surface with grass or cover crops as well as intercropping mentioned above in order to examine their effect on cassava production.

(4) Establishment of Working Group

LWCC established the Working Group for Cultivation and Soil which consists of Japanese Expert and Thai counterpart personnel. The Working Group formulated a draft detailed work plan on cultivation and soil.

5.4 Training

(1) Working Group

LWCC established the Working Group for Training and prepared a draft detailed work plan.

(2) Seminar

LWCC implemented a seminar as the beginning of the training program as shown below:

- a) Period: 1994. 1. 17-1994. 1. 21
- b) Number of subject: 13 subjects
- c) Number of participants: 61 personnel

(3) Analysis of Present Situation

LWCC collected information about DLD's training implementation systems and existing teaching materials for "Soil and Water Conservation Course" from Office of Training.

(4) Formulation of Training Plan

Taking into consideration the advice from short-term expert, LWCC formulated training plan and curriculum from the view of extending technology established by LWCC to DLD staff and key farmers in the East of Thailand.

6. Input from Both Japanese and Thai Side

6.1 Input from Japanese Side

(1) Dispatch of Experts

a) Long-term Expert

- Team Leader: Mr. Yasuhiko MISHIMA, 1993. 6. 10-1995. 6. 9
- Coordinator: Mr. Yoshinori TAKAHASHI, 1993. 6. 21-1995. 6. 20
- Planning and Design Criteria: Mr. Akira MIYAZAKI, 1993. 6. 10-1995. 6. 9
- Construction and Monitoring: Mr. Tsumunari SAGAWA, 1993. 8. 3-1995. 8. 2
- Cultivation and Soil: Mr. Hirochika INOUE, 1993. 6. 10-1995. 6. 9

b) Short-term Expert

- Monitoring and Adaptability Trial
Mr. Tamotsu FURUYA, 1993. 10. 27-1993. 11. 22
- Cover Crop Cultivation: Mr. Kazumi MAEDA, 1993. 11. 28-1993. 12. 22

- System Engineer (GIS): Mr. Ryota MAGASAWA, 1993. 12. 15-1994. 2. 28
 - Training Planning: Mr. Masafumi NONAKA, 1994. 2. 19-1994. 3. 6
- (2) Provision of Equipment and Machinery
- Total 10,340,000 Baht (44,029,000 Yen) (planning)
- Equipment for model infrastructure project
 - soil moisture meter, rain gauge, water level gauge, etc.
 - Minibus (26 seats) 1 unit, pick up truck 3 units
 - Automatic level
 - Soil compaction test set, basic field density set, Schmidt concrete test hammer
 - Personal computer 2 units
 - Overhead projector, slide projector, copy machine, facsimile, electric typewriter, electronic white board, big screen TV set
 - Portable water pump, power carrier, brush cutter, mini backhoe, etc.
- (3) Acceptance of Thai Personnel for Training in Japan
- Ms. Phachongchit Boonyarach, 1993. 10. 20-1993. 11. 21
 - Mr. Pornchai Suthatorn, 1993. 10. 20-1993. 11. 12
 - Mr. Decha Daochalermwong, 1993. 11. 1-1993. 11. 26
 - Mr. Surapol Hiruwatsiri, 1993. 11. 1-1993. 11. 26
- (4) Local Cost Bearing
- Seminar holding cost: 281,600 Baht (1,200,000 Yen)
- (5) Dispatch of Mission
- Detailed Design Survey Team: 1993. 11. 15-1993. 12. 14
- Leader: Mr. Tsuneo MATSUTOMI
 - Coordinator: Mr. Hirofumi HAYASHI
 - Agricultural Land Design: Ryosuke SAKANASHI
 - Irrigation Facility Design: Noriyasu SHIMIZU

6.2 Input from Thai Side

- (1) Counterpart
- a) For Long-term Expert
 - See attachment 1
 - b) For Short-term Expert
 - Monitoring and Adaptability Trial
 - Same personnel as the C/P for Planning and Design Criteria and Cultivation and Soil
 - Cover Crop Cultivation
 - Same personnel as the C/P for Cultivation and Soil
 - System Engineer (GIS)
 - See attachment 2
 - Training Planning
 - Same personnel as the C/P for Training
- (2) Land, Buildings and Facilities

- a) Project offices at DLD HQ and Chonburi LDRO II
 - b) Garage and workshop for construction machineries provided by Japanese grant aid
 - c) Experimental farm for cultivation test in Rayong Station
 - d) Land for model infrastructure improvement work in Rayong Station
 - e) Land for pilot area (no problem happens because pilot area is selected from where farmers want to do land and water conservation work)
- (3) Running Expenses
- a) Reform for Project Office (fiscal year 1993, Oct. 1992-Sept. 1993)
 - DLD HQ: 676,830 Baht (2,882,000 Yen)
 - Chonburi LDRO II: 320,946 Baht (1,367,000 Yen)
 - Total 997,776 Baht (4,248,530 Yen)
 - b) Fiscal Year 1994 (Oct. 1993-Sept. 1994)
 - Planning and Design Criteria: 769,100 Baht (3,275,000 Yen)
 - Construction and Monitoring: 16,537,900 Baht (70,418,378 Yen)
 - Total 17,307,000 Baht (73,693,206 Yen)
- (4) Supporting Staff
- Three (3) secretaries are assigned for LWCC.

7. Detailed Work Plan of the Project

(1) Priority

Since various activities are scheduled in the work plan in each field of technical cooperation, it is necessary to implement them effectively according to the priority being set by the Working Group after sufficiently discussing their importance and urgency.

(2) Planning and Design Criteria

a) Judging from urgency, the following manuals should be prioritized for planning in the detailed work plan:

- Drainage survey
- Damage survey
- Selection of conservation measures
- Approximate cost estimation.

Taking into account the progress of preparing the above, the rest of planning manuals shown below will be examined:

- Topographic map
- Soil map
- Land holding map
- Land use map
- Soil loss prediction map.

b) The change of work title "Feasibility Study" to "Benefit Estimation and Project Evaluation" will be suitable, because the problem to be solved urgently is the way how to measure benefit in land and water conservation project. From Japanese side,

short-term expert in the field of agricultural economics will be dispatched to cooperate with Thai counterpart personnel for this work. Before starting the work, its basic implementation plan concerning clarifying the contents of the work and schedule should be decided through discussion between Thai side and short-term expert, therefore, the work is better to be classified as "Others" in the work plan for the time being.

- c) Drainage survey is urgently needed for planning. It is desirable to start the work from the second quarter of 1994.
- d) For planning work, topographic map with practical scale is indispensable. It is important the Thai side continue to secure sufficient budget for map making from aerial photographs.
- e) The cooperation of Japanese side on GIS will be implemented by some short-term experts. The difficulty in Japanese side is to recruit and dispatch a right expert in right time. Then the change of the work plan is recommended to reduce from eleven activities to six ones, in spite of DLD's request to establish GIS at institutional level. A model area, which will become the basis for the Thai side to apply GIS method to other areas, will be selected for the cooperation work. In order to facilitate the activities of short-term experts, the Thai side is required to prepare the followings in advance before their arrival in Thailand.

- Assignment of counterpart personnel

- Collection and provision of requested data from short-term experts

- Others necessary for the work

- f) CAD should not be included in the work plan, because it is not an activity but a tool for designing. Introduction of CAD will be considered as an item of equipment the Japanese side could provide when its necessity for technical cooperation is recognized in the course of preparing design manuals.

(3) Construction and Monitoring

- a) Standardized cost estimation of land and water conservation works could be prepared as a "Cost Estimation Manual" by compiling existing official cost tables, except the works which are not included in the tables and necessary to be newly prepared. The problem is the difference between estimated cost and actually required expense. Priority should be given to establish the method to collect information about the actual contents of construction work for clarifying the cause of the cost difference.
- b) The various guidelines concerning construction work could be compiled as a "Construction Manual", which will include the

detail of work contents, work procedure, check points of work management, etc. and be devised to be easily understood.

- c) The various guidelines concerning monitoring work could be compiled as a "Monitoring Manual", which will indicate the purpose of necessary study and survey and the detail of monitoring contents and methods from the view of follow-up investigation on the actual change of constructed works and the effect in land and water conservation.

(4) Cultivation and Soil

- a) It is reasonable to allocate sufficient budget for the monitoring activities of pilot areas from the view of agricultural aspect by the Thai side because of its importance for confirming the effect of land and water conservation.
- b) Intercropping method of cassava with leguminous crops, which is thought to be realistic at present, should be tried in pilot areas as soon as possible with due consideration of climate and soil conditions in order to make the mechanical measures effective after the completion of engineering work.

(5) Training

Pilot area projects are designed and constructed by Regional Office, whose staffs are mostly skilled in the field of agriculture with insufficient knowledge about construction work. For those staffs, a comprehensive training for a certain term is desirable for transferring necessary knowledge and information on minimum needed basic agricultural engineering. It is expected that the Thai side may evaluate and revise the training method, its contents, curriculum, teaching materials, and training period after finishing each training course for improving the effect of the training courses.

8. Others

(1) Engineering Aspect

Since the examination from engineering point of view is indispensable in the course of proceeding mechanical measures in land and water conservation work in the East of Thailand, it is expected that there continues furthermore positive participation of Engineering Division to the LWCC activities concerning preparing the manuals of planning, design and construction.

(2) Cooperation with Other Organization

Cooperation with the organization concerned should be strengthened at regional level for implementing, demonstrating and disseminating effectively agricultural measures for land and water conservation after completing mechanical measures in pilot project.

(3) Evaluation

The appropriate appraisal and inspection should be conducted in each stage of planning, design and construction of land and water conservation project to improve the quality of the project. The evaluation of the project after completion is also important for accumulating experiences and contributing to the improvement of future works.

(4) Propagation of Project Activities

The Project activities as well as the importance of land and water conservation should be well propagated to officials concerned and key farmers in the East of Thailand in order to promote land and water conservation work and ultimately to protect soil and water resources, then contribute to the increase of farmer's income.

Counterpart for Land and Water Conservation Center Project in the East of Thailand (LWCC)

Japanese Expert	Counterpart	Position / Office	Tel	Ext 579-0111
1. Mr. Yasuhiko MISHIMA (Team Leader)	Mr. Boonyaruk Suebsiri	Deputy Director General	579-1560	203
	Mr. Chairat Seniwong Na Ayudhaya	Director, Engineering Div.	579-4820	382
	Mr. Ard Somrang	Director, Planning Div.	579-0752	276
	Mr. Padege Kanchanakul	Director, LDRO II	(038) 351-409,10	-
2. Mr. Yoshinori TAKAHASHI (Coordinator)	Miss Bhatra Chindanon	Chief of Foreign Relations, Planning Div.	579-5571	376
	Miss Phachongchit Boonyarach	Planning Div.	579-0752	276
	Mr. Pornchai Sutthathorn	Chief of Technical Section, LDRO II	(038) 351-409,10	-
	<u>Main Channel</u>			
	Mr. Pongpiya Piyasiranond	Director, Training Div.	579-8514	228
	Mr. Piyaporn Salikupt	Chief of Staff Development Section, Training Div.	579-5571	228
	<u>Supporting Channel</u>			
	Mr. Sutham Paladsongkram	Soil and Water Conservation Div.	-	235, 236, 335
	Miss Bhatra Chindanon	Chief of Foreign Relations Section, Planning Div.	579-5571	376
	Miss Phachongchit Boonyarach	Planning Div.	579-0752	276

Training

Japanese Expert	Counterpart	Position / Office	Tel	Ext 579-0111
3. Mr. Akira MIYAZAKI (Planning and Design Criteria)	<u>Main Channel</u>	Chief of Engineering Technology Section, Engineering Div.	579-8538	394
	Mr. Narong Atsilarat	Chief of Civil Engineering Section, Engineering Div.	579-4088	383
	Mr. Takpong Harnpitakvart	Soil and Water Conservation Div.	-	235,236
	Mr. Sutham Paladsongkram	Chief of Technical Section, LDRO II	(038)351-409,10	
	Mr. Pornchai Suthathorn	Director, Land Use Planning Div.	579-4601	298
	<u>Supporting Channel</u>	Chief of Photogrammetry, Section, Surveying and Cartographic Div.	580-5947	315
	Mr. Sophon Chomchan	Chief of Information Section, Planning Div.	579-8538	363
	Mrs. Wannarat Thothong	Planning Div.	579-0752	276
	Mr. Kasem Thongpan			
	Miss. Phachongchit Boonyarach			
4. Mr. Tsuminari SAGAWA (Construction and Monitoring)	<u>Main Channel</u>	Chief of Engineering Technology Section, Engineering Div.	579-8538	394
	Mr. Narong Atsilarat	Chief of Mechanical Equipment Section, Engineering Div.	579-5021	285
	Mr. Anan Sukwivat	Soil and Water Conservation Div.	-	235,236
	Mr. Sutham Paladsongkram	Chief of Technical Section, LDRO II	(038)351-409,10	
	Mr. Pornchai Suthathorn			

Japanese Expert	Counterpart	Position / Office	Tel	Ext 579-011
	<u>Supporting Channel</u>			
	Mr. Takpong Harnpitakart	Chief of Civil Engineering Section, Engineering Div.	579-8537	383
	Mr. Pisoot Wijarnsorn	Chief of Soil Correlation (Standards) Section, Soil Survey and Classification Div.	579-1938	346
	Mr. Narong Chinbuttara	Soil Analysis Div.	579-8538	394
	Miss Kittima Trowattana	Planning Div.	579-0752	377
	Mr. Sophon Chanchaoensook	Chief of Land Development Station, Chachoengsao	(038)531200	-
	Mr. Chumpol Pawapootanond	Chief of Land Development Station, Chonburi	(038)289291	-
	Mr. Lertchai Poolporn	Chief of Land Development Station, Rayong	(038)613060	
	Mr. Chawin Chermuwan	Chief of Land Development Station, Chantaburi	(039)371230	-
	Mr. Paisarn Tosawat	Chief of Land Development Station, Prachinburi	(037)241197	

Japanese Expert	Counterpart	Position / Office	Tel	Ext 579-0111
S. Mr. Hirochika INOUE (Cultivation and Soil)	<u>Main Channel</u> Mr. Sutham Paladsongkram Mr. Pailoon Pramojanee Mr. Udon Poolawat <u>Supporting Channel</u> Mr. Sukda Sukwiloon Mr. Pornchai Sutthathorn	Soil and Water Conservation Div. Soil Survey and Classification Div. Chief of Soil Survey and Land Use Planning Section, LDRO II Soil and Water Conservation Div. Chief of Technical Section, LDRO II	- - (038) 351-409,10 - - (038) 351-409,10	235,236,335 246 - - 235,236

Counterparts for LWCC short-term expert (15 Dec 93 - 28 Feb 94)

DLD-HQ

1. Mr. Taweesak Viensilp, Soil Survey and Clasification Division
2. Ms. Wannarat Thotong, Surveying and Cartagraphic Div.
3. Mr. Kasem Thongpan, Planning Div.
4. Mr. Kamron Saifug, Office of Coastal Land Development
5. Mr. Somboon Mekpaiboonwattana, Land Use Planning Div.
6. Mr. Pitayakorn Limthong, Soil and Water Con.Div.
7. Ms. Nongkawee Butramara, Soil and Water Cons.Div.
8. Mr. Sathaporn Jaiaree, Soil and Water Cons.Div.
9. Mr. Surapol Hiranwattanasiri, Engineering Div.
10. Ms. Phachongchit Boonnyarach, Planning Div.

LDRO II

1. Mr. Pornchai Suthathorn, Technical Section
2. Mr. Duriya Pattanaprasith, Technical Section

3. 詳細 5 年計画

**Tentative Schedule of Implementation in Detail
LWCC Project (June 10,1993 – June 9,1998)**

Tentative Schedule of Implementation in Detail
LMCC Project (June 10, 1993 - June 9, 1998)

(1/5)

Activities	1993	1994	1995	1996	1997	1998
	(Japanese F/Y)					
	1993	1994	1995	1996	1997	1998
(Thai F/Y)	1993	1994	1995	1996	1997	1998
I. Preparation of technical criteria for land and water conservation						
1-1 Data collection and the improvement of an analyzing system for land and water conservation						
1-1-1 Collection and examination of existing planning and design criteria						
a) Planning criteria						
b) Design criteria						
1-1-2 Examination of existing planning methods and consideration of improvement						
1-1-3 Examination of existing design methods and consideration of improvement						
1-1-4 Collection and introduction of other criteria and technical manuals						
a) From other organization in Thailand						
b) From other countries						
1-1-5 Collection and examination of existing computer systems						
a) GIS ; Geographic Information System						
1-1-6 Improvement of the systems and establishment of utilization methods						
a) GIS						
1-1-7 Trial farm						
a) Planning and design						
b) Collecting data						
c) Analysis						
1-2 Implementation of adaptability trial for introduced basic criteria concerning planning and design for land and water conservation in selected pilot areas						
1-2-1 Implementation and evaluation of adaptability trial of planning criteria						
1-2-2 Implementation and evaluation of adaptability trial of design criteria						

Tentative Schedule of Implementation in Detail
 LWCC Project (June 10, 1993 - June 9, 1998)

(2/5)

Activities	1993	1994	1995	1996	1997	1998		
	(Japanese F/Y)		1993	1994	1995	1996	1997	1998
	(Thai F/Y)		1993	1994	1995	1996	1997	1998
1-2-3 Monitoring of pilot areas								
1-3 Preparation of basic criteria for planning and design of land and water conservation								
1-3-1 Compilation of existing planning and design criteria and technical manuals								
a) Examination and consideration of problems in the existing planning and design criteria and technical manuals								
b) Consideration on introduction of other criteria and technical manuals								
1-3-2 Preparation of basic criteria for planning and design on the land and water conservation in the East of Thailand								
2. Management of land and water conservation works								
2-1 Introduction of standardized cost estimation, construction and supervision methods for land and water conservation works								
2-1-1 Examination of existing cost estimation methods and consideration of improvement								
2-1-2 Examination of existing construction and supervision methods and consideration of improvement								
2-1-3 Introduction and application of other methods for for cost estimation, construction and supervision								
2-1-4 Trial farm								
2-2 Monitoring of construction works and overall evaluation of land and water conservation works								
2-2-1 Collection and examination of existing monitoring and evaluation methods of land and water conservation works of DLD								
2-2-2 Arrangement of the result of monitoring and evaluation of construction work in selected pilot areas								

Tentative Schedule of Implementation in Detail
LRCC Project (June 10, 1993 - June 9, 1998)

(3/5)

Activities	1993	1994	1995	1996	1997	1998
	(Japanese F/Y)					
	1993	1994	1995	1996	1997	1998
	(Thai F/Y)					
1993	1994	1995	1996	1997	1998	
2-2-3 Arrangement of the result of monitoring and evaluation of effects of construction works in selected pilot areas						
2-2-4 Arrangement of the result of monitoring and evaluation of farming and economy for land and water conservation works						
2-3 Implementation of adaptability trial for the introduced standardized methods in the selected areas						
2-3-1 Implementation of adaptability trial for the introduced standardized cost estimation methods						
2-3-2 Implementation of adaptability trial for the introduced standardized construction and supervision methods						
2-3-3 Monitoring of pilot areas						
2-4 Preparation of standardized cost estimation, construction, supervision, monitoring and evaluation methods for land and water conservation works						
2-4-1 Compilation of existing cost estimation, construction and supervision methods						
2-4-2 Preparation of standardized cost estimation, construction and supervision methods						
2-4-3 Preparation of standardized monitoring and evaluation methods						
3. Preparation of a manual on cultivation and soil management for land and water conservation						
3-1 Selection of cultivation methods effective for land and water conservation						
3-1-1 Collection and examination of existing data of cultivation and soil conservation of OLD						
3-1-2 Collection and examination of existing data of cultivation and soil conservation of others						

Tentative Schedule of Implementation in Detail
LWCC Project (June 10, 1993 - June 9, 1998)

(4/5)

Activities	1993	1994	1995	1996	1997	1998
	(Japanese F/Y)					
	1993	1994	1995	1996	1997	1998
(Thai F/Y)	1993	1994	1995	1996	1997	1998
3-1-3 Experimental field						
a) Cover crop experiment (Rayong Station)						
b) Keeping soil moisture test (Rayong Station)						
3-2 Implementation of adaptability trial for selected cultivation methods in the selected pilot areas						
3-2-1 Implementation of demonstration farms for adaptability trial in selected pilot areas						
a) Cover crop experiment						
b) Keeping soil moisture test						
3-2-2 Monitoring of pilot areas						
3-3 Preparation of an appropriate manual on cultivation and soil management						
3-3-1 Compilation of existing guidelines for cultivation and soil management						
3-3-2 Preparation of an appropriate manual on cultivation and soil management in the East of Thailand						
a) Cover crop						
b) Keeping soil moisture						
4. Training on land and water conservation						
4-1 Formulation of training plan and curriculum						
4-1-1 Analysis of existing training implementation systems						
4-1-2 Collection and analysis of existing teaching materials						
4-1-3 Consideration of application of other training systems						
4-1-4 Formulation of training plan and curriculum						
4-2 Preparation of teaching materials						
4-2-1 Data collection for training from pilot areas and trial farm area through LWCC's activities						

Tentative Schedule of Implementation in Detail
 LWCC Project (June 10, 1993 - June 9, 1998)

(5/5)

Activities	1993	1994	1995	1996	1997	1998								
	(Japanese F/Y)		1993		1994		1995		1996		1997		1998	
	(Thai F/Y)		1993	1994	1995	1996	1997	1998						
4-2-2 Preparation of teaching materials a) Textbooks, manuals, etc. b) Slides, video, etc.														
4-3 Implementation of training courses														
4-3-1 Training to DLD's officials														
4-3-2 Evaluation of training effect and modification of teaching materials														
Plan of Budget (unit : million Baht)			17.3	28.3	33.6	37.8	27.7							

4. 詳細年次計画

Annual Work Plan of LWCC

Annual Work Plan of LWCC

(1/12)

Items	Contents of Activities	1993			1994			1995					
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept
1. Preparation of technical criteria for land and water conservation 1-1 Data collection and improvement an analyzing system for land and water conservation	1-1-1 Collection and examination of existing planning and design criteria a) Planning criteria b) Design criteria												
	1-1-2 Examination of existing planning methods and consideration of improvement a) RY-No.10 b) CT-No. 5 c) CN-No. 4 d) RY-No.11 e) CS-No.10 f) Others												
	1-1-3 Examination of existing design methods and consideration of improvement a) CS-No. 9 b) CN-No. 4 c) RY-No.10 d) CT-No. 5												

Annual Work Plan of LWCC

(2/12)

Items	Contents of Activities	1993			1994			1995					
		Oc	No	De	Ja	Fe	Mc	Ap	My	Jn	Jl	Au	Se
1-1-4 Collection and introduction of other criteria and technical manuals a) From other organizations in Thailand b) From other countries													
1-1-5 Collection and Examination of existing computer systems a) GIS													
1-1-6 Improvement of the systems and establishment of utilization methods a) GIS													
1-1-7 Trial farm a) Planning and design b) Collecting data c) Analysis													

Annual Work Plan of LWCC

(3/12)

Items	Contents of Activities	1993			1994			1995					
		Qc	No	De	Ja	Fe	Mc	Ap	My	Jn	Jl	Au	Se
1-2 Implementation of adaptability trial for introduced basic criteria concerning planning and design for land and water conservation in selected pilot areas	1-2-1 Implementation and evaluation of adaptability trial of planning criteria a) CS-No. 11 b) CT-No. 6 c) Others												
	1-2-2 Implementation and evaluation of adaptability trial of design criteria a) PC-No. 2 b) Others												
	1-2-3 Monitoring of pilot areas a) CS-No. 3 b) RY-No. 1 c) Others												

Annual Work Plan of LWCC

(4/12)

I t e m s	Contents of Activities	1993			1994			1995		
		Dec	Nov	Oct	Dec	Nov	Oct	Dec	Nov	Oct
1-3 Preparation of basic criteria for planning and design of land and water conservation	1-3-1 Compilation of existing planning and design criteria and technical manuals a) Examination and consideration of problems in the existing planning and design criteria and technical manuals b) Consideration of introduction of other criteria and technical manuals 1-3-2 Preparation of basic criteria for planning and design on the land and water conservation in the East of Thailand									

Annual Work Plan of LMCC

(5/12)

Items	Contents of Activities	1993			1994			1995					
		Oc	No	De	Ja	Fe	Mc	Ap	My	Jn	Jl	Au	Se
2. Management of land and water conservation works													
2-1 Introduction of standardized cost estimation, construction and supervision methods for land and water conservation works													
	2-1-1 Examination of existing cost estimation methods and consideration of improvement a) CN-No.11 b) RY-No.10 c) Others												
	2-1-2 Examination of existing construction and supervision methods and consideration of improvement a) CS-No. 9 b) CN-No.11 c) Others												
	2-1-3 Introduction and application of other methods for cost estimation, construction and supervision												
	2-1-4 Trial farm a) Cost estimation b) Construction & supervision												

Annual Work Plan of LWCC

(7/12)

Items	Contents of Activities	1993			1994			1995					
		Oc	No	De	Ja	Fe	Mc	Ap	My	Jn	Jl	Au	Se
2-3 Implementation of adaptability trial for the introduced standardized methods in the selected pilot areas	2-2-4 Arrangement of the result of monitoring and evaluation of farming and economy for land and water conservation works a) CS-No. 3 b) RY-No. 1 c) Others												
	2-3-1 Implementation of adaptability trial for the introduced standardized cost estimation methods a) b) c)												
	2-3-2 Implementation of adaptability trial for the introduced standardized construction and supervision methods a) PC-No. 1 b) CI-No. 5 c) Others												

Annual Work Plan of LWCC

(8/12)

Items	Contents of Activities	1993			1994			1995					
		Oc	No	De	Ja	Fe	Mc	Ap	My	Jn	Jl	Au	Se
2-4 Preparation of standardized cost estimation, construction and supervision, monitoring and evaluation methods for land and water conservation works	2-3-3 Monitoring of pilot areas a) CS-No. 3 b) RY-No. 1 c) Others												
	2-4-1 Compilation of existing cost estimation, construction and supervision methods												
	2-4-2 Preparation of standardized cost estimation, construction and supervision methods												
	2-4-3 Preparation of standardized monitoring and evaluation methods												

Items	Contents of Activities	1993			1994			1995					
		Oc	No	De	Ja	Fe	Mc	Ap	My	Jun	Jl	Au	Se
3. Preparation of a manual on cultivation and soil management for land and water conservation													
3-1 Selection of cultivation methods effective for land and water conservation													
	3-1-1 Collection and examination of existing data of cultivation and soil conservation of DLD												
	3-1-2 Collection and examination of existing data of cultivation and soil conservation of others												
	3-1-3 Experimental field a) Cover crop experiment (including cropping system) (Rayong Station and pilot areas) b) Keeping soil moisture test (Rayong Station and pilot areas)												

Annual Work Plan of LWCC

(10/12)

Items	Contents of Activities	1993			1994			1995					
		0c	No	De	Ja	Fe	Mc	Ap	My	Jn	Jl	Au	Se
3-2 Implementation of adaptability trial for selected cultivation methods in the selected pilot areas	3-2-1 Implementation of demonstration farms for adaptability trial in the selected pilot areas a) Cover crop experiment b) Keeping soil moisture test												
	3-2-2 Monitoring of pilot areas												
3-3 Preparation of an appropriate manual on cultivation and soil management	3-3-1 Compilation of existing guidelines for cultivation and soil management												
	3-3-2 Preparation of an appropriate manual on cultivation and soil management in the East of Thailand a) Cover crop b) Keeping soil moisture												

Annual Work Plan of LWCC

(11/12)

Items	Contents of Activities	1993			1994			1995					
		Oc	No	De	Ja	Fe	Mc	Ap	My	Jn	Jl	Au	Se
4. Training on land and water conservation													
4-1 Formulation of training plan and curriculum													
	4-1-1 Analysis of existing training implementation systems												
	4-1-2 Collection and analysis of existing teaching materials												
	4-1-3 Consideration of application of other training systems												
	4-1-4 Formulation of training plan and curriculum												
4-2 Preparation of teaching materials													
	4-2-1 Data collection for training from pilot areas and trial farm area through LWCC's activities												
	4-2-2 Preparation of teaching materials a) Textbooks, manuals, etc. b) Slides, video, etc.												

Annual Work Plan of LNCC

(12/12)

Items	Contents of Activities	1993												1994												1995											
		Dec	Nov	Oct	Sept	Aug	July	June	May	April	March	Feb	Jan	Dec	Nov	Oct	Sept	Aug	July	June	May	April	March	Feb	Jan	Dec	Nov	Oct	Sept	Aug	July	June	May	April	March	Feb	Jan
4-3 Implementation of training courses	4-3-1 Training to DLD's officials 4-3-2 Evaluation of training effect and modification of teaching materials																																				

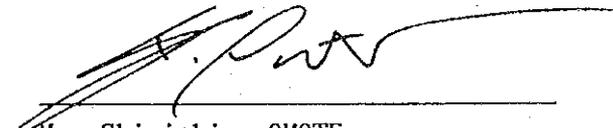
5. モデルインフラ整備事業R/D追記

THE RECORD OF DISCUSSIONS
ON THE SUPPLEMENTARY PROVISION
OF THE JAPANESE TECHNICAL COOPERATION
FOR THE LAND AND WATER CONSERVATION CENTER PROJECT
IN THE EAST OF THAILAND

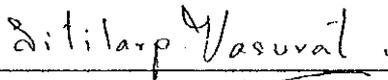
Shinichiro OMOTE, Resident Representative of the Japan International Cooperation Agency (hereinafter referred to as "JICA") in the Kingdom of Thailand, held a series of discussions with the Kingdom of Thailand authorities concerned with regard to the special measures to be taken by the Government of Japan for the successful implementation of the Land and Water Conservation Center Project in the East of Thailand (hereinafter referred to as "the Project").

As a result of the discussions, both sides agreed to recommend to their respective Governments the matter referred to in the document attached hereto which will be added to the Article II of the Record of Discussions concerning the Project, signed in Bangkok on March 26, 1993.

Bangkok, March 26, 1994



Mr. Shinichiro OMOTE
Resident Representative
in the Kingdom of Thailand
Japan International Cooperation Agency



Mr. Sitilarp Vasuvat
Director General
Department of Land Development
Ministry of Agriculture and
Cooperatives, the Kingdom of Thailand

THE ATTACHED DOCUMENT

4. SPECIAL MEASURES TO BE TAKEN BY THE GOVERNMENT OF JAPAN

To ensure the smooth implementation of the Project, the Government of Japan will take, in accordance with the laws and regulations in force in Japan, special measures through JICA to supplement a portion of the local cost expenditures necessary for the execution of the physical infrastructure.

6. D L D 組織図

Department of Land Development

Director-General (Dr. Narong Mananadana)		Senior Specialists
Deputy Director-General (Mr. Sompong Theerawong)	Deputy Director-General (Mr. Boonyaruk Suebsiri)	Deputy Director-General (Mr. Sima Morakul)
Soil & Water Conservation Div. (Mr. Upatham Pottisuan)	Office of Secretary (Mr. Charan Sanguanpong)	Land Development Regional Office 1 Pathumthani (Mr. Kien Apichonthiung)
Sections : - General Administration - Degraded Soil - Watershed Conservation - Soil & Water Conservation - Organic Matter & Waters - Acid & Organic Soils - Soil Salinity	Sections : - General Administration - Legal - Coordination - Extension & Public Relation - Library	Specialists in Soil & Land Use (Mr. Chaleo Changprai)
Survey & Cartographic Div. (Mr. Thaweesak Karnchanakanok)	Personnel Div. (Mr. Seri Tanchanpong)	Specialists in Soil & Water Conservation (Mr.)
Sections : - General Administration - Cartography (Mapping) - Printing - Land Holding Survey & Mapping - Survey & Mapping-Contour & Mapping - Technical	Sections : - General Administration - Staff Requirement & Record - Manpower - Staff Development	
Land Use Planning Div. (Mr. Manu Omakupt) (Mr. Sophon Chomchan) *	Finance Div. (Mr. Panumat Attthakorn)	
Sections : - General Administration - Land Information and Statistics - Land Economics - Land Use Survey - Land Use Planning I - Land Use Planning II	Sections : - General Administration - Supplies (Procurement) - Finance - Accounting - Budget	Remarks There are 4 internal newly established office in DLD, namely (1) Training Division (Mr. Pong Piva Piyasirananda) (2) Office of Land Development Committee (Mrs. Ancheen Pennamee) (3) Office of Coastal Land Development (Mr. Chakrit Manotham) (4) Office of Highland Development (Mr. Samcham Charas Rachanee)
Soil Survey & Classification Div. (Mr. Tanit Tongjuta)	Planning Div. (Mr. Ard Somrang)	Land Development Regional Office 2 Chon Buri (Mr. Padege Kanchanakool)
Sections : - General Administration - Map Preparation - Soil Survey & Classification - Soil Correlation (Standards) - Soil Classification Research - Soil Interpretation	Sections : - General Administration - Planning Project - Special Evaluation - Information System - Research Work & Statistical - Analysis - Foreign Relation	Land Development Regional Office 3 Nakhon Ratchasima (Mr. Chammien Krueo)
Soil Analysis Div. (Mrs. Nuaisri Kanchanakool)	Sections : - General Administration - Planning Project - Special Evaluation - Information System - Research Work & Statistical - Analysis - Foreign Relation	Land Development Regional Office 4 Ubon Ratchatani (Mr. Sirichai Kitayarak)
Sections : - General Administration - Soil Chemistry - Soil Chemistry II - Soil Physics - Clay Mineralogy - Soil Micro-Morphological - Soil Ecological - Soil Bio-Technology	Sections : - General Administration - Technology - Planning and Architectural Design - Civil Engineering - Equipment Engineer (Mechanical)	Land Development Regional Office 5 Khon Kaen (Mr. Rungroj Puengphan)
		Land Development Regional Office 6 Chiang Mai (Mr. Sahat Nilphan)
		Land Development Regional Office 7 Nan (Mr. Chaiyasit Aneksamphan)
		Land Development Regional Office 8 Phitsanulok (Mr. Chaowalit Orphanon)
		Land Development Regional Office 9 Nakhon Sawan (Mr. Pisanu Autaviroj)
		Land Development Regional Office 10 Ratchaburi (Mr. Sophon Chomchan) *
		Land Development Regional Office 11 Surat Thani (Mr. Poonsuk Paichayon)
		Land Development Regional Office 12 Songkhla (Mr. Chaleao Chirachanya)
	Engineering Div. (Mr. Chairat Seniwangse Na Ayuthaya)	

7. モニタリングに係る調査項目について

モニタリングに係る調査項目について

1 栽培・土壌分野

1-1. 土壌：農地保全事業実施前後の土壌を調査内容に従い比較し、土質の変化を調査する。

(1) 工事実施前

- ① 数点を選定し、サンプリングを行なう。
できれば、事業実施後作物の転換を図る圃場がよい。
- ② 調査内容
 - 1) 土層の確認
 - 2) pH
 - 3) 有機物の含有率

(2) 工事実施後

- ① 事業実施前に選定した箇所を定点とする。
- ② 工事実施直後に1回、以降毎年一回定点観測を行なう
- ③ 調査内容
 - 1) 土層の確認
 - 2) pH
 - 3) 有機物の含有率

1-2. 作物マップの作成：計画どおりに、農家が作付体系を変更したかを調査する。

(1) 工事実施前

- ① 1/1,000～1/2,000の地形図を作成する。
- ② 圃場ごとの作物を調査し、地形図上に色分けする。
- ③ 作物ごとの作付け面積一覧表を作成する。

(2) 工事実施後

- ① 毎年、事業実施前と同様の作業を行なう。
- ② 変化のあったものについては、変更の動機等について聞き取り調査をおこなう。

1-3. 実証展示圃場の運営：工事実施後

- ① inter cropping, rotation cropping 等、推奨する作付体系、作物、栽培技術を実証展示し、農家の関心を高める。
- ② 簡易なかんがい方式を導入し、作物へのかんがい効果を実証展示する。
- ③ 収穫量等から、農家の収入を計算し、農家の経営指標の作成、営農普及の参考資料とする。

1-4. 土壌水分の推移：工事実施後

- ① 定点観測を行なうため、下記の条件を考慮し、数点を選定する。
 - 1) ファームpondからの距離、高低差及びかんがいの有無
 - 2) 作付内容（果樹、野菜、キャッサバ、飼料作物ほか）
 - 3) 栽培方法（inter cropping, mulching, tillage method）
- ② 自記記録計つきテンシオメータを定点に設置し、土壌水分の変化を観測する。（併せて、雨量データも観測する）
- ③ 作物、耕作方法、ファームpond等による水分保持効果を観測し、推奨する技術の有用性を確認する。

1-5. 農家経済調査：工事実施、及び未実施農家の経済調査を行い、事業の経済効果測定 の資料とする

2 設計・計画基準分野

2-1. 圃場からの流亡土砂量：観測圃場内からの流亡土砂量測定より、各傾斜ごとの単位 流亡土砂量を推定する。また流亡土砂の土質についても併せて測定する。

- ① 圃場単位からの土砂流出を測定する。斜面の状況（斜面長及び傾斜度）及び作付け状況等を考慮し、いくつかの圃場を観測圃場として選定する。
- ② 最低位部に土砂溜（sand trap）をつくり、これによって、流出土砂の一部を捕捉する。レベル測量により、沈砂面高を測定し、土砂量を体積で測定する。
- ③ 測定は原則として月1回とする。
- ④ 沈澱した土砂の密度及び粒度分布を測定する。（年1回）

2-2. 沈砂池及びファームpondにおける流亡土砂の捕捉：各施設の規模を決定する資料 とする。

(1) 沈砂池

- ① 沈砂池に沈澱した土砂量を測定する。
- ② 土砂量の測定は、2mメッシュに切り、各メッシュ点の高さを測定し、沈砂池内にたまった土砂の体積を測定する。
- ③ 測定は、原則として月1回とする。
- ④ 沈澱した土砂の密度及び粒度分布を測定する。（年1回）

(2) ファームpond

- ① ファームpondに沈澱した土砂量を測定する。
- ② 土砂量の測定は、10mメッシュに切り、各メッシュ点の高さを測定し、沈砂池にファームpond内にたまった土砂の体積を測定する。
- ③ 測定は、原則として年1回とする。
- ④ 沈澱した土砂の密度及び粒度分布を測定する。（年1回）

2-3. 雨量観測

- ① 上記1-1~1-4、及び2-1~2-2の観測に係る基礎資料として、雨量データを収集する必要がある。とくに、1-4、2-1、2-2の観測には、雨量観測のデータが不可欠である。
- ② 雨量観測地点は原則としてパイロット地区の中央付近に置くことが望ましいが、維持管理、台数等を考慮のうえ決定するものとする。
- ③ 雨量計は、自記記録のできるものとし、測定時間間隔（10分間データ、1時間データ）及び維持管理を考慮のうえ、機種を選定することとする。

2-4. ファームボンドの水位：水位の異常な変化より堤体の損傷を推測する。

- ① ファームボンドの水位を毎日1回測定する。
- ② 測定水位と測定時刻を記録する。

3 施工・プロジェクト管理分野

3-1. 構造物の追跡調査：構造物の損傷、及び経年変化等を観測することにより、設計施工の一資料とする。

- ① 本プロジェクトにより構築された構造物を、月1回の定期巡回調査により測定する。
- ② 直接測量により、形状、寸法を確認する。
- ③ また、直接測定の状態を撮影記録として保存する。

(1) 農道・水路等線的な構造物

- ① 路線毎に測量するものとし、おおむね200mにつき1箇所測定する。200mに満たない場合は2箇所測定する。
- ② 破損等の被害が生じている箇所についても測定する。

(2) 沈砂池・落差工等の点的な構造物

- ① 箇所を決め測定する。
- ② 破損等の被害が生じている箇所についても測定する。

(3) ファームボンド

- ① 構造図の寸法箇所を測定する。
- ② 破損等の被害が生じている箇所についても測定する。

8. 土壤依頼分析項目と価格

土壤依賴分析項目と価格
 รายการวิเคราะห์ดินที่โครงการ

A. Physical Properties

1. Particle size analysis

1.1 Particles < 2 mm. (pipette method)

- sand (2-0.05 mm.)
 - silt (0.05-0.002 mm.)
 - clay (< 0.002 mm.)

 - very coarse sand (2-1 mm.)
 - coarse sand (1-0.5 mm.)
 - medium sand (0.5-0.25 mm.)
 - fine sand (0.25-0.1 mm.)
 - very fine sand (0.1-0.05 mm.)
- } 120 Bht
-
- } 250 Bht

1.2 Particles > 2 mm.

- weight estimate (%)
- volume estimate (%)

2. Bulk density 100 Bht

3. Water retention

- 1/3 bar
 - 15 bar
- } 100 Bht
-
- % water at field condition

4. Coefficient of linear extensibility (COLE)

5. Hydraulic conductivity 120 Bht

6. n-value (calculate)

$$n = \frac{A-0.2R}{L+3H}$$

B. Chemical Properties

- | | | |
|------------------------------|--|-----------|
| <input type="checkbox"/> 1. | Organic carbon | } 250 Bht |
| <input type="checkbox"/> 2. | Nitrogen | |
| <hr/> | | |
| <input type="checkbox"/> 3. | Extractable iron | |
| | <input type="checkbox"/> - Dithionite - citrate - bicarbonate extraction | |
| | <input type="checkbox"/> - Sodium - pyrophosphate extraction | |
| <input type="checkbox"/> 4. | Calcium carbonate | |
| <input type="checkbox"/> 5. | Gypsum | |
| <input type="checkbox"/> 6. | Extractable aluminum | |
| | <input type="checkbox"/> - KCl extraction | |
| | <input type="checkbox"/> - Dithionite - citrate - bicarbonate extraction | |
| | <input type="checkbox"/> - Sodium - pyrophosphate extraction | |
| <input type="checkbox"/> 7. | pH | |
| | <input type="checkbox"/> - 1 : 1 Soil : Water | 40 Bht |
| | <input type="checkbox"/> - 1 : 1 Soil : 1 NKCl | 50 Bht |
| | <input type="checkbox"/> - 1 : 2 Soil : .01 M CaCl ₂ | 50 Bht |
| <hr/> | | |
| <input type="checkbox"/> 8. | Extractable bases | 100 Bht |
| | <input type="checkbox"/> - Ca | 50 Bht |
| | <input type="checkbox"/> - Mg | 50 Bht |
| | <input type="checkbox"/> - Na | 50 Bht |
| | <input type="checkbox"/> - K | 50 Bht |
| <hr/> | | |
| <input type="checkbox"/> 9. | Extractable acidity | 120 Bht |
| <hr/> | | |
| <input type="checkbox"/> 10. | Cation exchange capacity (CEC) | |
| | <input type="checkbox"/> - Sum of cations | |
| | <input type="checkbox"/> - NH ₄ OAc pH 7.0 | 200 Bht |
| <hr/> | | |
| <input type="checkbox"/> 11. | Effective cation exchange capacity (ECEC) | |

12. Base saturation (BS)

- NH_4OAc pH 7.0

- Sum of cations

13. Exchangeable sodium percentage (ESP)

14. Sodium adsorption ratio (SAR)

15. Electrical conductivity (EC)

16. Available P 80 Bht

17. Available K 80 Bht

C. Mineralogical Properties

1. clay mineralogy

2. silt mineralogy

3. sand mineralogy

4. Total analysis

D. Micromorphological Properties 500 Bht

E. Others

- Soluble salts

- Water soluble sulfate

JICA