UNITED STATES INTERNATIONAL DEVELOPMENT COOPERATION AGENCY

AGENCY FOR INTERNATIONAL DEVELOPMENT

WASHINGTON, D.C. 20523

PROJECT PAPER

THAILAND

HIGHLAND AREA DEVELOPMENT

493-0294

AUGUST 1980

MAE CHAEM WATERSHED DEVELOPMENT

PROJECT PAPER

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CHARTS AND TABLES

ABBREVATIONS AND ACRONYMS

ADB	-	Asian Development Bank
ARD	-	Office of Accelerated Rural Development (MOI)
BAAC	-	Bank for Agriculture and Agricultural Cooperatives
BOB	-	Bureau of the Budget
BUREC	-	U.S. Bureau of Reclamation
CDD	-	Community Development Department (MOI)
CP	-	Condition Precedent
CSC	-	Civil Service Commission
DLD	-	Department of Land Development (MOAC)
DOA	-	Department of Agriculture (MOAC)
DOAE	-	Department of Agricultural Extension (MOAC)
DOCP	-	Department of Cooperative Promotion (MOAC)
DOH	-	Department of Health (MOPH)
DOLA	-	Department of Local Administration (MOI)
DTEC	-	Department of Technical and Economic Cooperation (Prime Minister's Office)
HAD	-	Highland Area Development
IBRD	-	International Bank for Reconstruction and Development
IF Team	-	Interface Team
MOAC	-	Ministry of Agriculture and Cooperatives
MOE	-	Ministry of Education
MOF	-	Ministry of Finance
MOI	-	Ministry of Interior

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MOPH	-	Ministry of Public Health
NADC	-	Northern Agricultural Development Center (MOAC)
NCU	-	Narcotics Control Unit (Am. Emb.)
NEB	-	National Environment Board
NESDB	-	National Economic and Social Development Board
ONCB	-	Office of the Narcotic's Control Board
PWD	-	Public Welfare Department (MOI)
RFD	-	Royal Forest Department
RID	-	Royal Irrigation Department
RTG	-	Royal Thai Government
USAID	-	United States Agency for International Development

Thai Language Terms

Changwat - province

Amphur (amphoe) - district

Tambon (tambol) - sub-district

Muu Baan - village

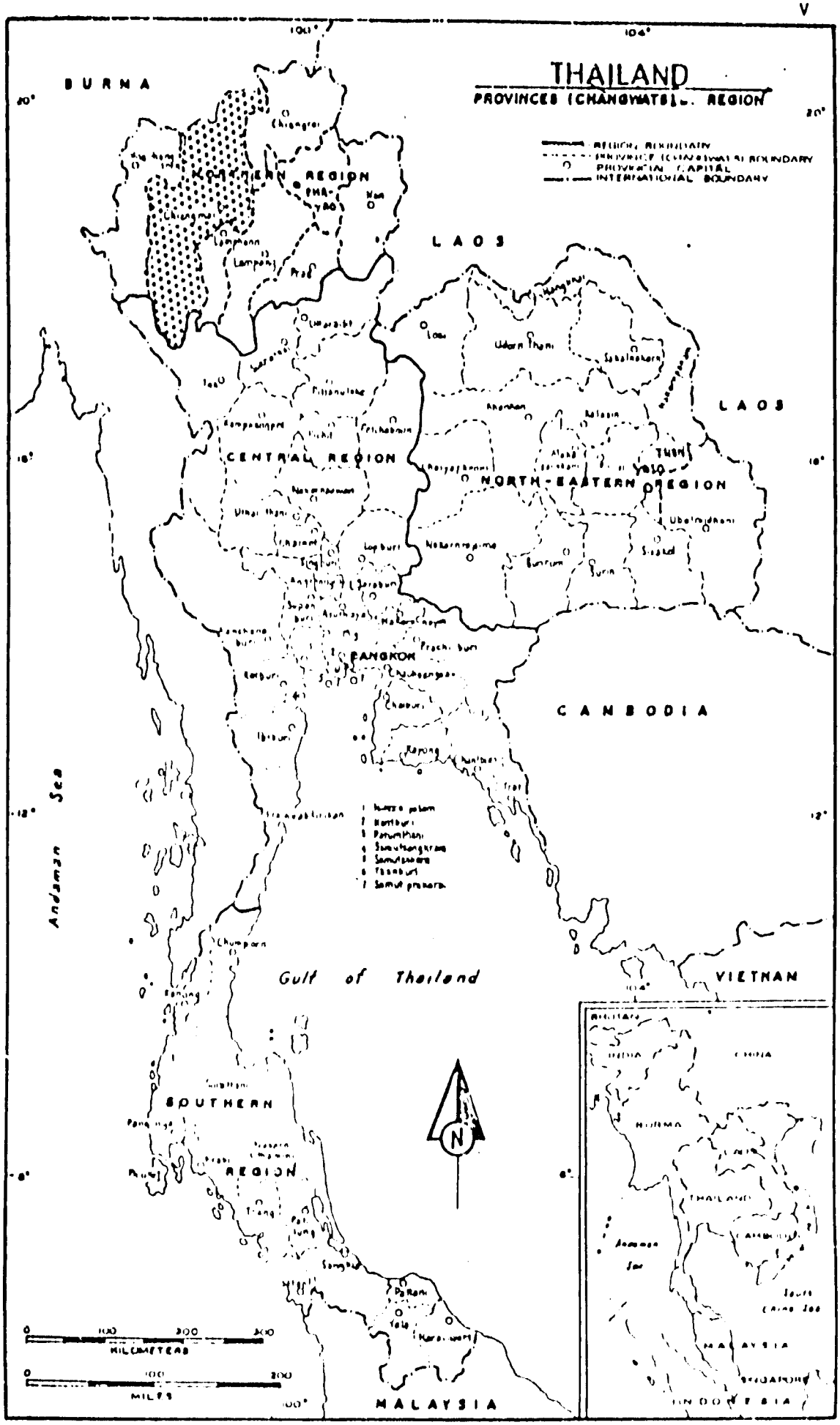
Naa - flood irrigated cropland

Nai Amphur - chief district officer

Kaset Amphur - district ag. ext. officer

Kaset Tambon - tambon ag. ext. agent

Rai - upland field or swidden field


THAILAND
PROVINCES (CHANGWATS) & REGIONS
REGION BOUNDARY
PROVINCE (CHANGWAT) BOUNDARY
PROVINCIAL CAPITAL
INTERNATIONAL BOUNDARY
BURMA
LAOS
LAOS
CAMBODIA
VIETNAM
MALAYSIA
NORTHERN REGION
CENTRAL REGION
NORTH-EASTERN REGION
SOUTHERN REGION
BANGKOK
Andaman Sea
Gulf of Thailand
KILOMETERS
MILES
INDONESIA

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT DATA SHEET

1. TRANSACTION CODE: A (A = Add, C = Change, D = Delete) — Amendment Number: v1 — DOCUMENT CODE: 3

2. COUNTRY/ENTITY: Thailand

3. PROJECT NUMBER: 493-0294

4. BUREAU/OFFICE: Asia — 04

5. PROJECT TITLE (maximum 40 characters): Mae Chaem Watershed Development

6. PROJECT ASSISTANCE COMPLETION DATE (PACD): MM 08 DD 30 YY 87

7. ESTIMATED DATE OF OBLIGATION (Under "B." below, enter 1, 2, 3, or 4): A. Initial FY 80 B. Quarter 4 C. Final FY 83

8. COSTS ($000 OR EQUIVALENT $1 =)

A. FUNDING SOURCE	FIRST FY 80-81 B. FX	FIRST FY 80-81 C. L/C	FIRST FY 80-81 D. Total	LIFE OF PROJECT E. FX	LIFE OF PROJECT F. L/C	LIFE OF PROJECT G. Total
AID Appropriated Total						
(Grant)	(1,200)	(3,200)	(4,400)	(1,900)	(8,100)	(10,000)
(Loan)						
Other U.S. 1.						
Other U.S. 2.						
Host Country	-	5,100	5,000	-	11,800	11,800
Other Donor(s)						
TOTALS	1,200	8,200	9,400	1,900	19,900	21,800

9. SCHEDULE OF AID FUNDING ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE 1. Grant	C. PRIMARY TECH. CODE 2. Loan	D. OBLIGATIONS TO DATE 1. Grant	D. OBLIGATIONS TO DATE 2. Loan	E. AMOUNT APPROVED THIS ACTION 1. Grant	E. AMOUNT APPROVED THIS ACTION 2. Loan	F. LIFE OF PROJECT 1. Grant	F. LIFE OF PROJECT 2. Loan
(1) FN	250B	210				4,400		10,000	
(2)									
(3)									
(4)									
TOTALS						4,400		10,000	

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each)

11. SECONDARY PURPOSE CODE

12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)

A. Code

B. Amount

13. PROJECT PURPOSE (maximum 480 characters)

To establish a self-sustaining upward trend in real income and access to social services for the rural households of the Mae Chaem Watershed with emphasis on the landless poor, and reverse the deterioration in environmental quality within the watershed.

14. SCHEDULED EVALUATIONS

Interim: MM 02 YY 82 | MM 02 YY 83 — Final: MM 07 YY 87

15. SOURCE/ORIGIN OF GOODS AND SERVICES

[X] 000 [ ] 941 [X] Local [ ] Other (Specify) _____

16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a _____ page PP Amendment.)

17. APPROVED BY

Signature: Robert S. Queener

Title: Acting Director, USAID/Thailand

Date Signed: MM 06 DD 23 YY 80

18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION: MM DD YY

AID 1350-4 (8-79)

PROJECT AUTHORIZATION

THAILAND

Highland Area Development
Project No. 493-0294

Pursuant to Section 103 of the Foreign Assistance Act of 1961, as amended (the "FAA"), I hereby authorize the Highland Area Development Project (the "Project") for Thailand (the "Cooperating Country") involving planned obligations of an amount not to exceed Ten Million United States Dollars ($10,000,000) in grant funds over a seven year period from date of authorization, subject to the availability of funds in accordance with the A.I.D. OYB/allotment process, to help in financing foreign exchange and local currency costs for the Project, and subject also to the mutual agreement of both governments to proceed beyond Phase I of the Project as explained below.

The Project is designed to assist the Cooperating Country in increasing the productivity of existing crop land, in developing additional crop land and in providing ancillary facilities for irrigation, agricultural credit, extension and research in the Mae Chaem watershed. The Project will be implemented in three overlapping phases of five years each. Such phasing will be on a geographic basis expanding project operations in accordance with the capacity of implementing agencies. Phase I will provide an opportunity for the Cooperating Country to gain experience in such projects in relatively more accessible areas of the watershed prior to movement into the outlying areas of the watershed covered by Phases II and III. At the end of the first and second years of project implementation, A.I.D. will decide whether to proceed with Phases II and III, respectively. These decisions will be based on an evaluation of, inter alia, socio-economic viability, site conditions, and progress in the development of institutions and processes.

The Project Agreement which may be negotiated and executed by the officer to whom such authority is delegated in accordance with A.I.D. regulations and Delegations of Authority shall be subject to the following essential terms and covenants and major conditions, together with such other terms and conditions as A.I.D. may deem appropriate:

a. Source and Origin of Goods and Services

Goods and services, except for ocean shipping, financed by A.I.D. under the Project shall have their source and origin in the Cooperating Country or in the United States, except as A.I.D. may otherwise agree in writing. Ocean shipping financed by A.I.D. under the Project shall, except as A.I.D. may otherwise agree in writing, be financed only on flag vessels of the United States.

b. Terms and Conditions

1) Conditions Precedent

a) Prior to any disbursement, or the issuance of any documentation pursuant to which disbursement will be made under the Project Agreement, the Cooperating Country shall furnish, in form and substance satisfactory to A.I.D., evidence that the Cooperating Country has taken appropriate steps:

i) to establish a system of land allocation based in principle on land use planning maps which have been completed, and on mutually agreed upon beneficiary criteria; and

ii) to establish a plan for the timely issuance of land use permits.

b) Prior to any disbursement of grant funds for Phase II or for Phase III of the Project, and except as A.I.D. may otherwise agree in writing, such disbursement shall be subject to agreement by A.I.D. and the Cooperating Country, based on the findings and recommendations of a joint evaluation of the project, on the measures to be taken to implement such recommendations.

c) Prior to any disbursement or to the issuance of any documentation pursuant to which disbursements will be made under the Project Agreement for any construction activity, the Cooperating Country will furnish, in form and substance satisfactory to A.I.D., the results of soil tests, engineering and implementation plans and final cost estimates for the construction activity to be financed under the Project.

2) Covenants

The Cooperating Country covenants that assistance provided under the Project will not be used in any manner for the cultivation of poppy crops or opium and further covenants that it will effectively monitor and enforce such prohibition and take appropriate steps to terminate benefits to individuals using such assistance for the cultivation of poppy crops or opium.

a. Waivers

The following waivers to A.I.D. regulations are hereby approved:

1) A waiver of the provisions of Section 636(i), FAA, to permit the procurement of:

a) twelve (12) one ton, right-hand-drive, pick-up trucks from a country included in A.I.D. Geographic Code 935 (Japan) or

the Cooperating Country on the basis that there are no U.S. manufacturers of right-hand drive pick-up trucks rated at one ton and no alternative financing for the vehicles could be arranged under this Project. The total expected cost is One Hundred and Forty-Four Thousand United States Dollars ($144,000).

b) thirty-three (33) light-weight motorcycles (125 cc or less) from the Cooperating Country on the basis that there are no U.S. manufacturers of motorcycles in this size range and no alternative financing for the vehicles could be arranged under this Project. The total expected cost is Forty-One Thousand Two Hundred Fifty United States Dollars ($41,250).

2) A proprietary procurement waiver to permit the procurement of fifteen (15) quarter-ton right-hand, four-wheel drive American Motors Corporation vehicles on the basis that spare parts and services are available only for such United States manufactured vehicles. The total expected cost is One Hundred Eighty Thousand United States Dollars ($180,000).

3) A nationality waiver to permit the Mission to consider a direct contract with a citizen of New Zealand, a country included in A.I.D. Geographic Code 935, to be the long-term advisor stationed in the project area who will assist in coordinating the various project inputs. This waiver is based on the fact that the project was developed with the advice of Mr. Grahame Keen, a New Zealander, and a foremost expert on land use in North Thailand. The total expected cost of a long term consultant under direct contract with A.I.D. is Three Hundred Fifty Thousand United States Dollars ($350,000).

Clearance	Date	Initial
A/AA/ASIA, Fredrick W. Schieck	8/15/80	FWS
GC, Norman Holmes	8/15/80	
AA/PPC, Alexander Shakow	8/22/80	

Douglas J. Bennet, Jr., Acting
Douglas J. Bennet, Jr.
Administrator

August 26, 1980
Date

GC/ASIA:AdeGraffenried-ASIA/PD/EA:SSchwartz:jk:8/14/80:58850

PART I SUMMARY, RECOMMENDATIONS FINDINGS AND ISSUES

A. Recommendations

It is recommended that a grant of $10 million of FAA Section 103 Grant Funds be authorized for this project; and that the money be obligated in three separate five-year phases covering a seven year life of project. The three phases will be obligated in FY 80, FY 82, and FY 83. Proposed obligations for the three phases are $4.4 million, $2.9 million and $2.7 million respectively. The following waivers are requested under the Project (See Part IV for justifications):

A. 636I Waiver and Source Waiver to Code 935 of the AID Geographic Code Book for 12 right hand drive pickup trucks as identified in Part IV.

B. 636I Waiver to procure 33 locally made light motorcycles.

C. A proprietary procurement waiver for 15 AMC jeeps.

D. Waiver of competitive requirements and Source Waiver to Code 935 for five person years of Technical Assistance.

B. Summary Project Description

This Project aims at increasing real income and access to social services of the rural poor in the Mae Chae watershed while restoring and maintaining important environmental attributes of the watershed. The Project is particularly targeted on resolving the major causes of poverty in Mae Chaem and accordingly will increase the productivity of existing cropland, develop additional crop land and provide ancillary facilities for irrigation, agricultural credit, extension and research. Environmental concerns will be addressed through erocion control, experimental development of woodlots and fire control measures. Major AID inputs include support for a Project management/outreach component, technical assistance, land development/irrigation capital costs, training costs, funds for a credit component, construction costs for road rehabilitation and project support facilities, and commodities/equipment support.

C. Issues

Issues raised in the PID review cable State 073081 (Annex A) and subsequent cables have been addressed in the body of this PP. The status of major issues is summarized below:

1. What is the rationale for requesting such a large commitment of scarce grant funds? Why was the Mae Chaem chosen for the Project?

While this Project is designed to have direct and immediate impact on a clearly defined group of beneficiaries, it is a demonstration activity for watershed development that involves a significant amount of risk due to its innovative nature. In order to mobilize the substantial host country resources needed to carry out a high-risk, potential high-payoff Project

that will provide substantial relevant information for development of the Northern Thailand watersheds in the future, grant funds have long been considered a necessity by both AID and the RTG to finance the AID inputs.

Mae Chaem is aptly chosen for a demonstration project because of its proximity to Chiang Mai, relatively easy access, and convergence of administrative and geographic boundaries (all but one village cluster, or tambol, are in one district). The people of the watershed represent the rural poor since Mae Chaem has less developed land per area than most other watersheds and also less developed land per household. It is otherwise a fairly typical watershed.

2. Capital Investment/Beneficiaries

Although the number of direct project beneficiaries in the watershed is limited to about 40,000, many thousands of downstream inhabitants should also benefit, as will others in nearby areas. Benefits for the watershed inhabitants are more than adequate to justify the Project economically with an overall benefit cost ratio of 1.30 using conservative assumptions. While it is difficult to quantify benefits for indirect beneficaries, they are likely to be substantial over the life of the Project. The RTG is fully aware of the important benefits to the whole country of properly managing its watersheds, and is committed to replicating successful watershed development projects. This issue is further discussed in Section III-D.

3. Ambitiousness of Project within Time Frame and Relation to Other Donor Efforts.

Efforts have been made to address the "ambitiousness/complexity" issues raised in State 073081 by eliminating interventions not directly concerned with poverty and environmental improvement. The life-of-project has been expanded from 5 to 7 years to provide a more realistic time frame for the remaining project components. These remaining Project inputs are considered to be essential to the Project's integrity and considered feasible within the expanded Project life.

There is no redundancy between this and other donor efforts. Although the World Bank's Northern Agricultural Development Project involves similar activities in selected areas outside the watershed, it does not have an intensive area focus, nor does it attempt to integrate functions and services in the way proposed by this Project. Also, there is no other known project activities which are designed to address poverty of an entire watershed-lowlands, uplands and highlands. USAID has opened and will maintain a dialogue with other donors with mutual concerns in the Mae Chaem and other areas of the North. (See II B1(e) for additional details on other agency activities in Mae Chaem).

4. Procurement Issues

No pesticides are planned to be purchased in conjuction with this Project except for minor amounts that may be used to support agricultural

research activities. These latter will be applied by trained scientists and technicians under controlled conditions. All foreseeable requests for procurement waivers are included in this PP. Section IV discusses procurement plans and arrangements in detail.

5. Security Issue and Provision for Project Termination

There have been no overt security incidents reported in the Mae Chaem watershed during recent months, and the RTG has advised the Mission that the security situation appears to be improving. A border patrol unit has recently been established in Mae Chaem, and normal security measures will be taken for Project personnel such as close coordination with district security personnel to monitor safety conditions. Security conditions will be an important element of each annual evaluation, and if there is any significant deterioration, the Project could be suspended or terminated. Measures that will be taken to facilitate early termination include: (a) maximum of one or two year contracts, (b) standard contract termination clauses, "for the convenience of the Government", (c) Grant Agreement covenant to terminate Project for security or other major implementation constaints that endanger lives or otherwise preclude achievement of the Project's purpose. (In addition to Standard Provision Annex Section D.1).

6. Monitoring Arrangements for Opium Cultivation

The Office of Narcotics Control Board (ONCB) has facilities and an ongoing operation to monitor changes in opium cultivation (a pre-condition to land certification will be the farmer's agreement not to grow opium on that land). ONCB will have an input into the regular monitoring and evaluation components of the Project.

7. Access and Support

A survey has been made of the accessibility of proposed Project areas and access has been determined to be adequate (See Annex D-IV). In addition, the Royal Forest Department plans to construct 300 KM of new roads during the life of the Project for activities related to its regular forest management responsibilities. Many of these roads will improve accessibility to project villages. Necessary support arrangements have been built into the Project.

8. Land Tenure Issues

The RTG has agreed in principle to provide land use certificates to beneficiaries of the Project's land development component. A condition precedent to disbursement will insure that legally approved plans for expedited issuance of certificates are submitted for AID acceptance.

9. Citizenship Issue

Several of the Project's components will assist people to become citizens. These include (a) improved contact with the outside world, (b) provisions for increaing incomes and access to Government services, (c) non-formal basic literacy training by outreach (Interface) teams (the

RTG Department of Nonformal Education also plans to support basic literacy training through its own initiative in Mae Chaem), and most important (d) land certification will provide evidence of residence that is the primary prerequisite for "hilltribes" attaining citizenship.

D. Summary Findings

The results of the analyses prepared for this Project indicate that the proposed interventions are technically sound and that the cost projections are realistic and reasonable. The analyses conclude that significant and near-universally distributed benefits should accrue to the residents of the watershed at acceptable cost with additional benefits also accruing to areas outside and downstream of the watershed. The Project meets all applicable statutory criteria as shown in the Statutory Checklist in the annexes.

PART II DETAILED PROJECT DESCRIPTION

A. Background and Definition of the Problem

The majority of the 40,000 inhabitants of the 4,200 sq.km. Mae Chaem Watershed in Northern Thailand belong to two ethnic groups: Skaw Karen (47%) and North Thai (45%). The North Thai in the Mae Chaem are primarily lowland wetrice farmers. The Karen are one of several hilltribes in the North. Like other Northern hilltribes, the Karen characteristically depend on rotational swiddening in secondary forest growth areas.

Nearly 20,000 persons in the watershed are among the poorest of Thais: these people exist below the rice subsistence level. More than three fourths of Mae Chaem's population have incomes below the poverty line by the World Bank's definition ($90 p.a. in 1975/76 prices) compared with an estimated one-fourth for Thailand as a whole. These figures indicate quite clearly that Mae Chaem is one of the most impoverished areas in Thailand.

Besides existing under conditions of intesnse poverty, the people of Mae Chaem also lack most basic Government services. Health and education services are far less adequate than for lowland Thais. Agricultural extension and credit facilities are almost non-existent. Given these conditions, it is evident that basic human needs of many of Mae Chaem's inhabitants are not being met.

Accelerating environmental deterioration is another serious problem in the Mae Chaem. Satellite imagery indicates that forests in Northern Thailand generally are shrinking by 4 to 7% per year. Approximately 30% of Thailand's forest resources were depleted between 1961 and 1973 according to satellite data. These data also show that less than 40% of the country is forested today, and if forest clearing activities for logging and agricultural purposes are not balanced with watershed improvement measures, this figure will continue to decrease. Concurrently, population in the watersheds is increasing by as much as 5% per year.

Poorly constructed and/or maintained roads, annual fires, increased population pressure and decreased forest-cover have been partially responsible for increased soil erosion and surface runoff from the watershed in recent years, and the contrast between flood peaks and low flows in the Mae Chaem river has increased commensurably. Excessive quantities of suspended sediment are also present in the water. Such factors, if unmitigated and aggregated across several Northern watersheds, will eventually cause serious problems for Mae Chaem's inhabitants as well as for the great numbers of downstream inhabitants who depend on water from the watershed for hydro-electric power generation, irrigation, and domestic use. (Probably more than 60 percent of the water supply of norghern and central Thailand is derived ultimately from this type of watershed).

During recent years the RTG has made an effort to address some of Mae Chaem's development problems. On average, the Royal Irrigation Department (RID) has been constructing two diversion weirs/small dams per year to increase irrigated areas, and several kilometers of roads have been built/rehabilitated annually by various agencies. The Royal Forest Department (RFD) is reforesting parts of the most severely denuded areas. The number of agriculture extension agents is gradually being increased and a UNFDAC sponsored crop substitution effort is underway in two limited areas. Despite the Government's commitment to improve the situation, however, the current programs are neither sufficient in scope nor well enough coordinated to have any significant immediate impact on the major problems in Mae Chaem. What is needed is a well-coordinated campaign that addresses the problems in a single package - in short, a comprehensive watershed development project to overcome the major causes of poverty and environmental deterioration.

An examination of the major cause of poverty and environmental deterioration in Mae Chaem indicates that land scarcity, low productivity of agricultural land, and limited access to socio-economic services are at the root of most problems. Typically a Mae Chaem farmer runs out of rice each year about 5 months before harvest and must borrow rice in order to live. With the high interest rates that Mae Chaem farmers are forced to pay (50-100%), little if any investment capital is left to the farmer for cash cropping, thus ensuring that the poverty cycle is maintained. Moreover, farmers are forced to look for intermittent wage labor just to subsist at minimal levels.

Three ways to address low productivity and land scarcity problems are evident: (1) expand the amount of agricultural land, (2) enhance the potential productivity by water and land development, and (3) intensify land use through multiple cropping and increased inputs. Resolving the constraints associated with improving the use of distribution of land in an environmentally sound manner while increasing the people's access to important socio-economic services are essential project concerns.

It should be noted that the above problems are not unique to the Mae Chaem Watershed. Indeed the Mae Chaem watershed represents less than 10 percent of the total upland/highland area of the North and lessons

from Mae Chaem will undoubtedly be valuable for determining the best approaches to developing other areas. The RTG has already demonstrated its commitment to these areas by laying the ground work for further efforts. This includes initiating a land use mapping program in the six other major watershed areas of the North. As a further manifestation of commitment, the RTG signed an agreement in 1979 with the World Bank to develop 200,000 plus hectares of uplands and lowlands in seven northern provinces. Care has been taken that the AID sponsored Project and World Bank effort are closely coordinated so that RTG absorptive capacity is not exceeded and experiences are shared for the mutual benefit of both these Projects and their successors.

B. Detailed Description

1. General

(a) Components

The Mae Chaem Watershed Development Project seeks over a seven-year period to provide the minimum essential requirements for initiating and sustaining the economic development process in the Watershed. By the end of the Project, real income and access to socio-economic services should be steadily increasing, and environmental degradation trends reversed. Due to the severity of the problems briefly discussed above and analyzed elsewhere in this PP, however, a considerable number of complementary interventions are needed to achieve end-of-project objectives. Key to the process is furnishing Mae Chaem's landless poor with the resources to develop flood irrigated land suitable for wetrice and upland fields (i.e. rainfed, unirrigated cropland). This will require the implementation of a strategy involving the distribution of additional cropland, construction of small scale irrigation facilities, associated land development and conservation measures, provision of necessary agricultural credit including a rice bank system, provision of agricultural extension servies, and establishment of an appropriate agricultural research program.

The poorest rural residents of Mae Chaem include over 20,000 hill tribe people who have never had a chance to participate in the mainstream of development. (Some of the hill peoples currently have no attractive income alternative to opium cultivation. (See Part IIB-1d for further discussion of the opium question.) For these people, as well as the large number of poor northern Thai residing in the watershed, the Project will emphasize self-help, community participation, and decision-making. To benefit the poor directly, the use of local labor and resources will be stressed. Agricultural production and self-help training programs will also be initiated under the Project, and special outreach teams (known as "Interface" teams) will be established in the watershed. These will be composed of educated and highly-motivated young people from within the region who will live and work at the local level encouraging local participation and acting as liaison between the people, representatives of appropriate RTG agencies and the Project staff. The interface teams will

also provide basic literacy and medical services on an interim basis until regular education and health programs are established. Interface teams are particularly important to the Project's success, since they will provide the intensive direct contact with the impoverished hill peoples that is needed to begin the development process and facilitate the effective implementation of the Project's many components.

To meet the environmental concerns of the Project, initial erosion control measures will be instituted, especially by correcting a major cause of erosion - poorly constructed and improperly maintained watershed access roads. Fire control measures will also be instituted to help protect the watersheds's forests and a pilot village woodlots program will be supported to help reverse the rapid deforestation that has been a major factor in other environmental problems.

(b) Implementation Approach

A detailed description and analysis of the implementing agencies and arrangements for carrying out the Project are contained in Part IV. Bascially, however, the Project will be carried out through a multi-agency effort coordinated in the field through a special project operations unit headed by a field manager and under the general responsibility of the Ministry of Agriculture's Northern Agricultural Development Center in Chiang Mai. Local level funding and control will be emphasized through a committee made up of representatives from various departments of the Ministry of Agriculture and other RTG agencies. Similarly, a broad based committee with multi-agency representation will have the primary responsibility for oversight at the Bangkok level. The Bank for Agriculture and Agricultural Cooperatives, Department of Local Administration, Land Department and Public Welfare Department of the Ministry of Interior and the Teacher Training Department of the Ministry of Education are also involved. The Office of Narcotics Control Board (ONCB) was instrumental in initiating the coordination needed to accomplish the planning and will continue to play a role as one of the monitoring and evaluation agencies as well as being represented on national and provincial level committees.

(c) Phasing

The Project is structured into three discrete phases covering a seven-year period. Figure 1 and Table 1 show the proposed sequence of the phasing and provide a breakdown of how the land area and total number of beneficiaries will be divided. The rationale for the phasing in the indicated manner is to provide an opportunity: (1) to test and redesign components as necessary; (2) to allow the project to be undertaken in manageable segments; (3) to balance the tasks geographically with available resources; (4) to work in the more relatively secure and heavily populated areas initially. The phasing will allow time to gradually establish the Project in each area and make the best use of project resources. It will also allow for early termination of substantial revision of the project after each phase, if necessary.

The implementation plan in Part IV provides a detailed description and justification for the phasing and extended project life. The USAID Mission strongly believes that a seven year implementation period is needed for this Project in order to provide a realistic time frame for accomplishing stated objectives. A carefully structured monitoring and evaluation plan, described in Part IV, will permit a close watch on project progress, and it sets out benchmarks which may be used for determining the timing and appropriateness of funding tranches subsequent to the first year of implementation.

(d) Conformance to AID and RTG Policy

As discussed above this Project is aimed at resolving several of the major causes of poverty. The Project is consistent with USAID's FY 81 CDSS in this regard. Like this Project the CDSS describes the major causes of poverty as poor access to private and public services, land scarcity, poor land security, poor access to credit, an overcentralized government bureaucracy, and environmental problems. It notes that the most disadvantaged of the ethnic groups are the various hill peoples, and it indicates the importance of watershed areas to North as well as Central Thailand. The Project utilizes a decentralized administrative structure with substantial involvement of the beneficiaries to channel resources into an extremely deprived area. The Project approach is to concentrate on one geographic area and to provide all the minimum essential requirements needed to meet the Project Purpose while demonstrating a development approach worthy of wider replication. All of these elements are important components of USAID's general development strategy in Thailand as stated in the CDSS.

The RTG's Fourth National Economic and Social Development Plan (1977-1981) also indicates the importance of addressing the needs of the rural poor in the North, particularly the tribal people, while "checking further deforestation and destruction of watershed areas" (p. 91). It particularly notes that an acute shortage of arable land is the main constraint on development of the North. Watershed conservation and improvement programs are given high priority in the list of RTG investment programs for the Plan. This emphasis is expected to continue under the Fifth Plan now being developed.

We are proposing a Project implementation period of 7 years, 2 years longer than the standard under AID guidelines. The longer timeframe is needed for several reasons. The watershed constitutes a socio-ecological unit, and it would be a mistake to offer the prospects of a better life to only a portion of its population, creating a have/have-not dichotomy. Management concerns and the evolutionary nature of project planning dictate the need for phasing while the deliberate pace of effecting awareness, participation, and finally initiative among the target population requires a minimum five-year effort in each phased area. The phasing arrangements discussed above and the incremental funding plans contingent on adequate project reviews insure that no expenditure period for a single

FIGURE II.1

Characteristics of Mae Chaem Watershed, by Tambons

TAMBOL BAN CHAN

Population & Household	%	Persons	Household	Villages/ Hamlets
Total	100	5,182	838	37
Karen	89	4,605	781	34
Hmong	9	407	45	2
Lisu	2	107	12	1

Area 550 sq.km. or 13% of total area
Interface Teams 9
Rice Banks 9

TAMBOL MAE NA CHON

Population & Household	%	Persons	Household	Villages/ Hamlets
Total	100	4,805	777	40
Thai	33	1,596	283	4
Karen	63	3,024	461	34
Hmong	4	185	33	2

Area 856 sq.km. or 20% of total area
Interface Teams 7
Rice Banks 7

TAMBOL MAE SUK

Population & Household	%	Persons	Household	Villages/ Hamlets
Total	100	4,824	797	34
Thai	29	1,380	273	3
Karen	54	2,633	417	27
Hmong	17	811	107	4

Area 527 sq.km. or 12% of total area
Interface Teams 9
Rice Banks 9

TAMBOL CHANG KHOENG

Population & Household	%	Persons	Household	Villages Hamlets
Total	100	[illegible]	[illegible]	[illegible]
Thai	91	[illegible]	[illegible]	[illegible]
Karen	[illegible]	[illegible]	[illegible]	[illegible]

Area [illegible] sq.km. or [illegible] of total area
Interface Teams [illegible]
Rice Banks [illegible]

TAMBOL BAN THAP

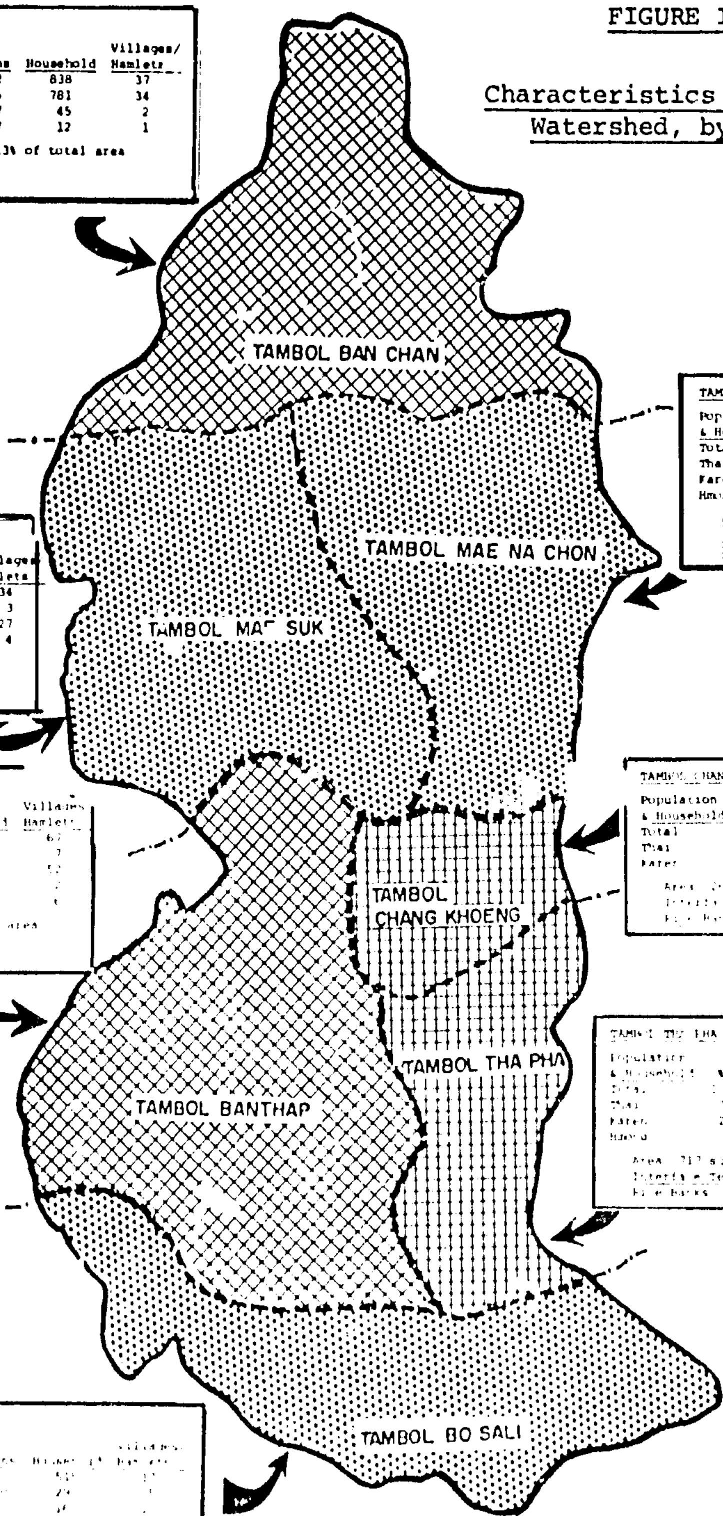
Population & Household	%	Persons	Household	Villages Hamlets
Total	100	6,461	1,165	[illegible]
Thai	[illegible]	[illegible]	[illegible]	[illegible]
Karen	71	[illegible]	[illegible]	[illegible]
Hmong	6	[illegible]	[illegible]	[illegible]
Lua	15	1,002	[illegible]	[illegible]

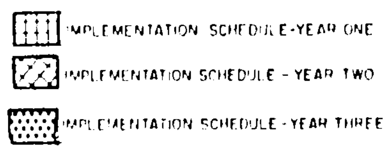
Area 851 sq.km. or 20% of total area
Interface Teams 11
Rice Banks 11

TAMBOL THA PHA

Population & Household	%	Persons	Household	Villages Hamlets
Total	[illegible]	[illegible]	[illegible]	51
Thai	[illegible]	[illegible]	[illegible]	[illegible]
Karen	29	[illegible]	[illegible]	24
Hmong	[illegible]	72	[illegible]	[illegible]

Area [illegible] sq.km. or 17% of total area
Interface Teams [illegible]
Rice Banks [illegible]





TAMBOL BO SALI

Population & Household	%	Persons	Household	Villages Hamlets
Total	100	[illegible]	[illegible]	[illegible]
Thai	[illegible]	[illegible]	[illegible]	[illegible]
Karen	[illegible]	[illegible]	[illegible]	[illegible]
Hmong	[illegible]	[illegible]	[illegible]	[illegible]

Area 527 sq.km. or 12% of total area
Interface Teams 6
Rice Banks 6

MAE CHAEM WATERSHED DEVELOPMENT PROJECT

Population & Household	%	Persons	Household	Villages Hamlets
Total	[illegible]	[illegible]	[illegible]	[illegible]
Thai	[illegible]	[illegible]	[illegible]	76
Karen	[illegible]	[illegible]	[illegible]	164
Hmong	[illegible]	[illegible]	[illegible]	13
Lua	2	[illegible]	[illegible]	[illegible]
Lisu	0.2	[illegible]	12	1

TABLE II.1

Area and Population Distribution, by Phase

MAE CHAEM WATERSHED DEVELOPMENT PROJECT

LAND AND PEOPLE

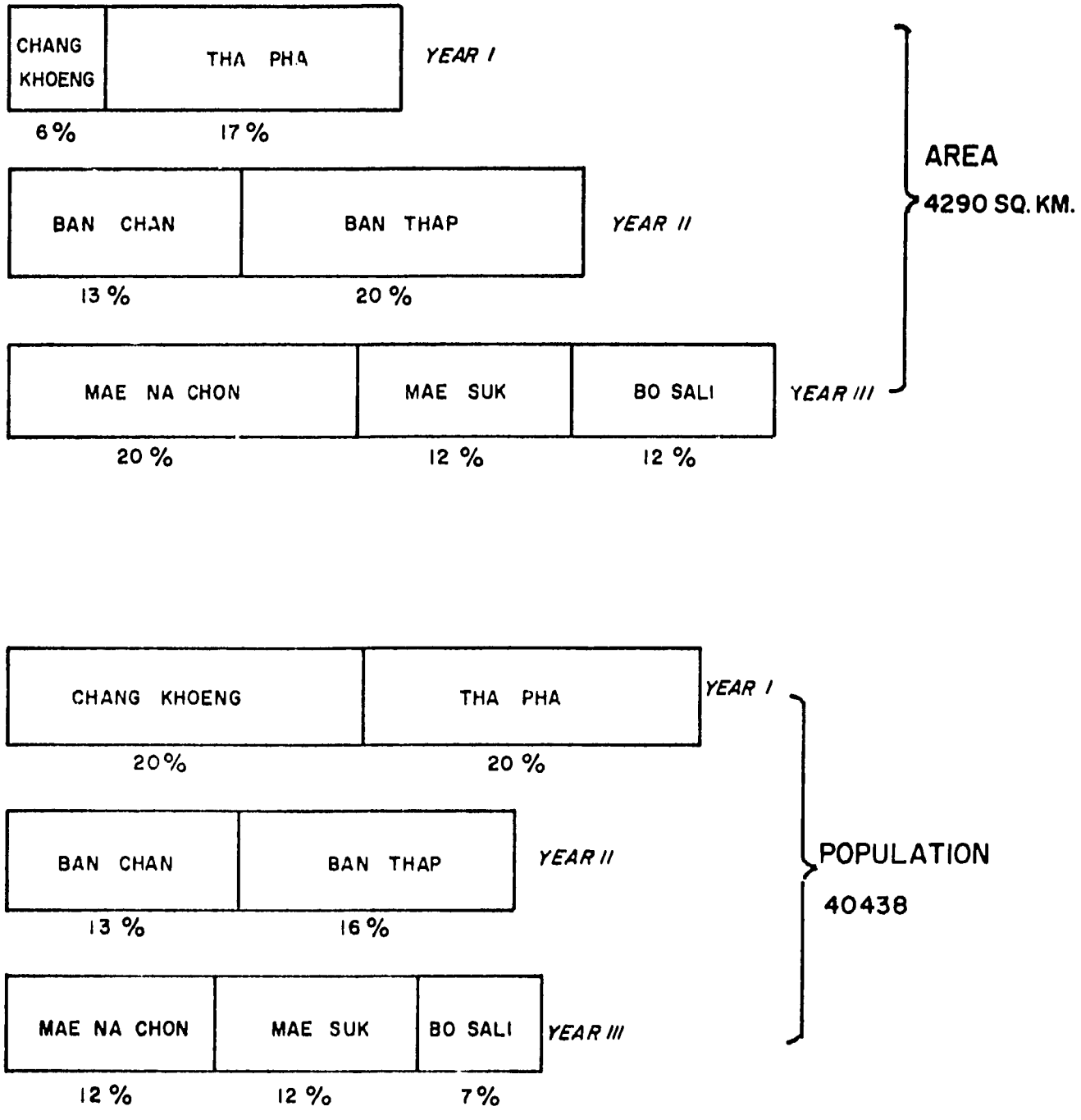


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TABLE II.2

DISTRIBUTION OF PROJECT BENEFITS BY TAMBONS

PHASE AREA	Area Characteristics		Project Benefits		
	Population	Wet Rice Land (Rai)	New Wet Rice Land (Rai)	Additional Upland (Rai)	Irrigation Works
PHASE I	16,166	11,100	300	4,000	26
Chang Khoeng	8,188	5,800	0	0	7
Tha Pha	7,978	5,300	300	4,000	19
PHASE II	11,643	4,700	4,000	6,000	34
Ban Chan	5,182	3,800	3,900	400	30
Ban Thap	6,461	900	100	5,600	4
PHASE III	12,629	5,900	3,700	4,000	42
Mae Na Chon	4,805	3,300	2,100	0	18
Mae Suk	4,824	1,500	900	2,700	15
Bo Sali	3,000	1,100	700	1,300	9
Watershed Total	40,438	21,700	8,000	14,000	102

obligation of funds will exceed five years. We believe our approach conforms with the Assistant Administrator's guidance in State 106907 that project implementation plans should be practical and realistic.

(e) Project Impact on Opium-Poppy Cultivation

In the genesis of the Mae Chaem Project several years ago, one of the factors contributing to the selection of Mae Chaem for development was the presumed high-level of opium-poppy cultivation in the highland areas of the watershed. Subsequent surveys have indicated that opium production in the Mae Chaem represents only a small fraction of the total output of North Thailand and relatively few of the watershed's inhabitants are engaged in opium-poppy cultivation. These latter are principally the Hmong who form only 6% of the total watershed population, with hired labor supplied by Karen.

The Mae Chaem Project is a comprehensive development project designed to address the conditions and causes of poverty in the watershed. It is not primarily a crop replacement project oriented to the substitution of remunerative cash crops for opium-poppy. However, opium-poppy cultivation is one of the conditions, or symptoms, of poverty among disadvantaged highland populations. In its concern for raising the income and overall welfare of the watershed population, including the opium-poppy cultivators, the Mae Chaem Project will also advance RTG and USG Narcotic Program objectives.

The project has as its immediate objective the development, enrichment and use of land for agricultural purposes throughout the watershed -- lowlands, uplands and highlands -- land that is, for the most part, not under opium production nor producing any other crop at this time. By providing a range of income-producing alternatives to the villagers, it is believed that both the short term and long term effect would be to decrease opium production. In the short term, paddy field construction, irrigation work and terracing should divert labor from opium field preparation. In the longer term, as profitable and more socially acceptable cash crop production begins to spread, and the population has made an investment in land development and has received guarantees of land security, it is assumed that opium production, with its high risks and problems, would be even less attractive.

(f) Other Development or Welfare Agencies in Mae Chaem

There are a number of agencies currently operating in Mae Chaem. These may be grouped as RTG agencies, international agencies and bilateral agencies.

(1) RTG Agencies

Several departments of the Royal Thai Government are working in Mae Chaem as part of their regular operations in the Northern

Region. The Community Development Department (MOI), which has the regular responsibility for CD work in lowland northern Thai villages, has a CD worker in each of two Tambols, (Changkhoeng and Tha Pha).

The highland/ethnic minority "counterpart" of the CD is the Public Welfare Department (MOI), Hill Tribe Division, which has 10 Mobile Teams working among Mae Chaem's ethnic minorities, giving some primary health care, crop promotion and a small and discontinuous school program for children. These teams have been reinforced in recent months by the Non-Formal Education Department (MOE) which has attached a teacher to each Mobile Team. This program of non-formal education is supervised by the Chiang Mai Education Supervision Division. The additional support from NFED is being partly funded by IBRD.

DOAE has an agricultural extension agent in each of 5 Tambols, the program being partly funded on a joint basis by the World Bank and USAID.

The gradual build up of these and other RTG agencies in Mae Chaem will contribute to the eventual development of the area, but present efforts are still insufficient to have a major impact which will reverse the poverty spiral without a coordinated area development effort such as this Project.

(2) International Agencies

The United Nations Program for Drug Abuse Control (UNFDAC) is supporting the CNCB in its Highland Agriculture and Marketing Project (HAMP) partly in Hmong villages on the rim of Mae Chaem Watershed. This is mainly a crop replacement program but includes welfare functions and a marketing development component, supported by UNPDAC funding.

(3) Bilateral Agencies

The Government of Japan has a team in Mae Chaem at present, conducting a feasibility survey for a proposed hydro-electricity generating plant in Tambol Mae Suk. No decisions on feasibility of the Project have yet been made public.

None of the above efforts are redundant to this USAID sponsored Project; rather, they are generally complementary. In the normal course of monitoring the Project, both the RTG and USAID will continue to assure that consideration is given to the efforts of other project agencies in Mae Chaem.

2. Logical Framework Narrative

(a) Goal

The broad goal to which this project contributes is to raise the quality of life of the people of watersheds in North Thailand in ways

which are self-sustaining and which lead to environmental restoration and ultimate stability.

From 30-50% of the rural people (both Thai and ethnic minorities) of North Thailand are legally landless. This large group is dependent either on swidden agriculture, unreliable wage labor or more commonly both, to produce or buy their subsistence rice. They are perennially poor, and when they use the land as most are forced to do, cannot avoid low input/low output, environmentally destructive methods. Without tenure of any kind, with no access to reasonable credit, they cannot escape from the downward trends process of declining fertility, breakdown of soil structure and declining yields. Poverty, conservatism and lack of a resource base together ensure that no escape from this "low level equilbrium trap" is possible. The goal then is to reverse this downward spiral and replace it with a self-sustaining growth process.

There are several measures of goal achievement. Incremental increases in area and productivity of land being cultivated in the northern watersheds would indicate that the growth process was underway. Similarly, increasing incomes from cash crops, local level decision making and general levels of functional literacy/health sensitivity and knowledge would indicate a major improvement in the quality of life and living standards in the watersheds. Environmental stability would be shown by stable or decreasing rates of sediment runoff and a decreasing range between the minimum and maximum water discharge rate from the watersheds.

To meet the Project goal, it is important that the RTG and people of the watersheds maintain a long term commitment to watershed development and that this commitment is backed by the necessary resources. In view of substantial benefits of this commitment as well as the severe costs that could result to the country without such a commitment, it is reasonable to assume that the people's desires and RTG resources will be maintained at appropriate levels to meet the Project goal.

(b) Project Purpose

The purpose of the Project is to establish a self-sustaining upward trend in real income and access to socio-economic services for the rural households of Mae Chaem, with emphasis on the landless poor, by methods whereby (1) the people are their own planners to the extent possible, (2) the trend toward environmental deterioration in the watershed is reversed (3) replication in other watersheds is demonstrated as practical.

The Project Purpose reflects the development strategy of the Project in dealing with the problems of Mae Chaem discussed in Part I: The Project will attack the problems of poverty and environmental deterioration by providing the rural poor with the means (i.e. productive land and inputs) to overcome their poverty, and these means, furnished in an equitable way along with proper extension support and infrastructure development, will result in a self-sustaining economic growth process and

steadily improving environmental conditions within the watershed.

(c) End of Project Status

There are several conditions that should exist in Mae Chaem by the end of the Project to indicate that the Purpose has been achieved. Perhaps the most important indicator is that the watershed will achieve rice self-sufficiency and that the majority of currently land deficient (below rice subsistence production level) farmers will be producing all their own rice on their own land. Further, there should be a rising trend in yields and total output of cash crops, marketed on attractive terms for the target group. These conditions should provide an essential basis for economic growth. They will show that marginal farmers at least have assured their future subsistence needs and may therefore begin to supplement their existence with cash cropping, thus further improving their condition. Practically all of the Project outputs will contribute to these purpose indicators.

Other important indicators include the capability of the rural people of the watershed to read simple directions and respond to basic health needs. Functional literacy is required for citizenship and will enable beneficiaries to further participate in the economic mainstream of the country. Sensitivity to health needs will indicate an improving access to social services and will be an important step toward an improved quality of life. Both of these conditions will be facilitated by the non-formal education work of the Interface Teams, and follow-on activities by the Department of Non-Formal Education and Ministry of Public Health should continue the process started by the teams.

An indicator that the people in the target group are broadly involved in improving their condition will be the existence of socio-economic organizations such as farmer's groups, rice banks, and adult education groups that are being run by the beneficiaries themselves. This condition is linked directly to the work of the interface teams and the availability of essential agricultural and social services under the Project.

The reversal of the trend toward environmental deterioration currently threatening the watershed will be shown by a steady decrease in sediment runoff from the watershed, decrease in the variability of water discharged from the Mae Chaem river, and measurable increase in the ground cover in the watershed. These conditions will reflect the success of erosion control and fire control efforts as well as the decreased dependence on destructive swiddening activities within the watershed.

(d) Purpose Assumptions

Several important assumptions must be made in order to achieve the Project Purpose. It is well known that RTG agencies have often relied on highly centralized management to carry out local development.

This Project as well as most of the other AID sponsored projects recently initiated will require a commitment to local management and involvement of the beneficiaries in the decision process. It must be assumed that RTG agencies will commit themselves to "bottom up" development required under this Project, and recent Government policy directives indicate that this assumption is valid. Similarly, the assumption that the hill peoples will be responsive to participatory development is supported by recent pilot efforts in the highlands and elsewhere by the UN and other donors (e.g. the UNFDAC Project).

Implicit in the Project design is the premise that rice self-sufficiciency rather than cash cropping or non-agricultural activities is the most appropriate way to assure a basis for economic growth with equity. This assumption is based on surveys of the target group's felt needs and is supported by USAID's assessment of the alternatives leading to the simplest and least risky means for rural households to better their conditions.

Finally, in order to achieve the Project Purpose it is assumed that security will be adequate for minimum levels of maintenance to project inputs (facilities, infrastructure and equipment). The security is discussed in the Issues section of this PP. USAID has concluded that security should be adequate for carrying out the Project. USAID is making every effort to assure that adequate funds are being budgetted and steps are being taken to provide for needed maintenance of Project components, but in the end the RTG's own perception of the importance of maintenance for long term benefits should assure that minimum requirements are met.

(e) Outputs

There will be several categories of outputs provided through this Project. These may generally be considered as: (1) development of additional flood irrigated and non-flood irrigated cropland (as well as improving the potential of some existing cropland), (2) establishment of important agricultural and social service support programs, (3) establishment of key environmental protection/enhancement measures. The package of outputs categorized above and detailed below is designed to provide the minimum essential set of conditions sufficient to achieve the Project Purpose.

(1) Cropland and Irrigation Facilities

This component of the project for which the Department of Land Development provides the primary technical support, aims to help solve land problems in Mae Chaem as directly as possible by expanding the amount of agricultural land. This can be done by solving the major problems now facing land expansion in Mae Chaem: (1) delineating and developing additional suitable land for agriculture, with the cooperation of the Royal Forest Department; and (2) providing additional irrigation

resources so land that would otherwise be of much less value for agriculture can be developed, particularly for additional irrigated wet-rice paddies. Improved and expanded irrigation will also be of value in intensifying agricultural land use, allowing better wet-season yields through better water control and increasing the amount of water available to fields during the cool and dry seasons.

The DLD Landuse Planning Map shows that there is a significant amount of land in Mae Chaem available for development. DLD plans to develop 3,520 H. of land during the Project period: all 1,280 Ha. of flood irrigated land and 2,240 Ha. of non-irrigated cropland. Land development practices will include: (1) level and dyke or bench-terrace and dyke land with the potential for flood irrigated annual cropland; (2) bench-terrace, or introduce alternative soil conservation structures on land with the potential of non-irrigated annual cropland; and (3) orchard-terrace land with potential for perennial cropland.

The Project will finance about 102 small scale waterworks in order to increase water supplies available to existing flood irrigated land as well as provide additional flood irrigated and non-flood irrigated cropland (upland fields) to the people of Mae Chaem. The waterworks component will include the rehabilitation and improvement of about 35 ex sting diversion weirs in order to make them more durable and to improve tneir service area where possible (existing weirs are bamboo and wash out frequently), construction of about 62 new weirs at suitable sites and 5 small water impoundment projects. Each waterwork includes the necessary channeling to bring the water to the fields.

The land to be developed represents nearly all the potentially flood-irrigable land in the watershed below a 12½ degree slope that can be developed economically, but is less than half of the potential non-flood irrigated field area, thus allowing for further expansion in the future. The development of the proposed amount of cropland should be sufficient to provide most, if not all, of the land-short households with enough land to produce subsistence rice and begin to participate in the cashcrop market. It should provide the potential for rice self-sufficiency in the Mae Chaem and be a crucial element in the Project's strategy to establish a self-sustaining development process in the watershed.

In order to ensure adequate land security for farmers who receive new land developed under the Project, the Royal Forest Department will provide land use certificates to all who meet RTG/AID agreed beneficiaries criteria and who settle and work the land. The land allocation system and beneficiaries criteria will ensure that AID/RTG equity concerns are met. Details of the criteria and system of allocation will be agreed upon as a condition precedent to disbursement. Care will be taken that these arrangements will be directed at meeting a major concern of the Project -- that the truly poor inhabitants of the watershed receive a fair share of the benefits.

(2) Support Programs

Several major elements are essential to support the cropland components and ensure (a) coordination and management of project elements, (b) technical support (i.e. training/extension/research), and (c) agricultural credit/production inputs.

- Coordination and Management (Operations Unit and IF Teams)

The Project will establish a Project Operations Unit (POU) and 55 Interface Teams* of three persons each to provide the major project coordination and management functions in the watershed. (The organization and operation of these components are described in Part IV). The purpose of the POU is to ensure adequate and objective management coverage of the many project elements, and the IF Teams will perform a vital liaison role between RTG agencies and the villagers. The interface teams are especially necessary to ensure that the interested but landless/ sub-subsistence villagers in particular understand, participate in and benefit from the Project. The teams will also directly provide literacy training and rudimentary health services, establish informal farmer groups among interested beneficiaries, and facilitate equitable distribution of project-developed resources.

Interface teams help villagers organize themselves to develop their villages. They will assure effective communications from/to the villagers. Their role is to facilitate, educate, spread information, and to explain views of each side to the other. They are a key and essential element in project strategy. Their goal is to "work themselves out of a job" in Mae Chaem. For example, each team would play a key role in helping villagers to set up a workable rice bank in the village in such a way that the rice bank would keep functioning successfully after the withdrawal of the team. Another example is with respect to cash credit. Interface Teams explain the credit program to villagers. They could provide forms and help the villagers fill out the forms. They can tell the villagers where to go to submit the forms and all the procedures involved. Without this kind of in-the-village assistance, participation would be much less. They do not take any active role in any particular government function involved in the project and thus do not overlap the duties of any particular government agency. Rather they assist the various line agencies in whatever way they can to make line agency tasks easier and more successful.

The IF is a major project innovation for Thailand, although similar ideas are being promoted in other developing countries.

*AID/Washington suggested that a different less esoteric name be applied to these teams. We have retained the term "Interface" for the purpose of the Project Paper since it is well-understood by the RTG agencies that have participated in PP design and review. A simpler label will be selected in the Thai language and local dialects in introducing these teams to the target population.

The intention is to create an effective "receivership" for development services among remote rural populations that are unaccustomed to government service agencies and are distrustful on the basis of their limited experience with such efforts.

Although the number of teams may seem high, this number is needed to provide a team contact intensity of about one day per week in each village area. In view of the extremely important role of the teams this coverage is considered a key requirement of the Project, especially until the Project is well underway in each geographical area. IF teams will be phased out in the final years of the Project.

Besides the POU and IF teams, a Project Committee structure will be established to help coordinate the Project; this is described in Part IV. Moreover, informal farmer groups, encouraged by IF teams, will provide an organizational structure among the beneficiaries and help provide a feedback mechanism for farmer's felt needs during project implementation. These groups should also help to replace the IF teams' liaison function with RTG line agencies after IF teams are phased out of the Project.

- Training Program

The Project will construct and furnish a training--cum--meeting center in Mae Chaem at a minimum cost ($67,000). The Center will be a shared, multi-purpose facility which will carry out a training and information sharing program to train farmers and facilitate coordination among RTG agencies participating in the Project. For administrative efficiency reasons, the center will be under the administrative control of the Department of Agriculture, as it will be located adjacent to their research facility. Functionally it will be a common facility shared by all participating agencies. A program to introduce farmer groups to new agricultural methods and varieties will be carried out at the center through short courses supplementing extension efforts of the Department of Agricultural Extension (DOAE). Periodic courses for DOAE agents and IF teams will also be run at the Center to refresh earlier training courses and update staff on agricultural research activities. Planning and coordination seminars will be organized at the Center for supervisors of participating agencies so that coordination among all agencies is maximized.

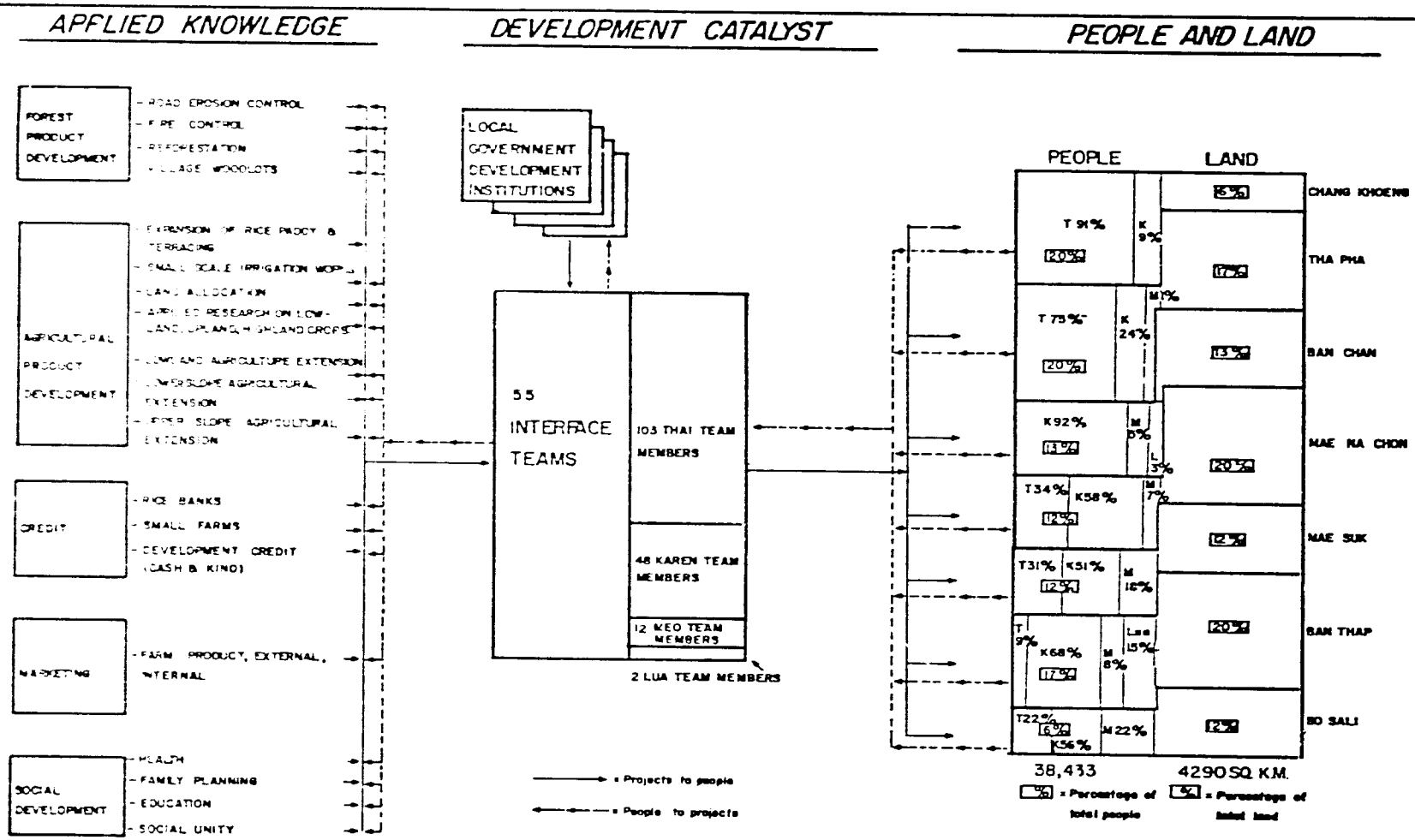
This Project component will generally support all others. Until the Center can be constructed, training activities will be carried out in Chiang Mai or under temporary arrangements in Mae Chaem. The critical initial training for IF teams, however, will be done throughout the Project by the Department of Teacher Education in Chiang Mai.

- Extension Program

The Project will provide for 15 DOAE extension agents and 5 agronomist supervisors in the Mae Chaem. This number will provide a coverage of roughly one agent for every 400 households in the watershed.

FIGURE II.2

MAE CHAEM RESOURCE DEVELOPMENT MODEL



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Such coverage is substantially better than ratios in most other areas of Thailand, and with the 5-6 agents already in place plus extension activity support from IF Teams, this number should be adequate. As IF teams are phased-out, many of their members will be absorbed by DOAE, as well as by other departments, and funded by the Project for the first two years, thus ensuring a continuation of a reasonable coverage.

Agents will be crucial for providing technical support to the farmers on newly developed land and linking-up farmers with research activities that will be carried out by the Department of Agriculture. As farmers are able to devote land to cash cropping, extension support will be particularly important to address cropping variety practice and pest control issues. IF team members will work closely with the agents and help identify problems as they arise for extension agent attention. The extension model developed under the Project will be important to guide the way for future replication in other watersheds.

The RTG will provide all salary and support costs for the extension agents as well as facilities at five local Forest Department sites in order to decentralize the agents out of Mae Chaem town. Grant funds will provide equipment and vehicle support for the agents. Initial training for the agents will be provided under the World Bank/AID Agricultural Extension Project.

- Research Program

As noted in this PP's Background Section, one of the two ways to address the low productivity of land in Mae Chaem is to intensify and improve cropping and cultivation practices. One of the Projects outputs will accordingly be an Agricultural Research station to help ensure that cropping and cultivation practices extended to the farmers under the extension component are appropriate to the watershed's ecological conditions and the farmer's needs and management capabilities. Since much research has already been done on possible crops and production systems the major effort of the program initially will be to assemble existing research results and adapt them for application in Mae Chaem. Applied research will also be carried out under the Project to fill in knowledge gaps.

The Project will finance a cooperative research, extension and plant production facility in the watershed which will be run by the Department of Agriculture in coordination with the RFD and DOAE. This facility will serve as an operations base for applied research to be conducted on experimental plots at representative locations around the watershed. Grant funds will be used to construct facilities and supply machinery and equipment for the Center, plus furnish essential supplies and materials. The RTG will finance major infrastructure and operating costs as well as staff the facility.

In addition to the above research, $100,000 has been set aside from the grant to finance outside research (i.e. extra project

agency) for topics that are seen as directly contributing to achievement of Project objectives within the LOP.

- Credit Arrangements

Lack of credit and/or high interest rates in Mae Chaem are systematically connected with continuing poverty in Mae Chaem. As the farmer runs out of rice, typically 4 to 5 months prior to harvest, he must either borrow rice (or cash) or find labor opportunities paid in rice (or in cash to buy rice). This situation is difficult because labor opportunities are few, or else they conflict with his farming schedule (RFD, for example needs labor most in the growing season). Usually he must borrow rice at high interest rates, and when he pays back at harvest his rice supply is greatly diminished, restarting the cycle. With affordable credit, however, poor farmers could better pay off debts and could invest in cash-cropping, field construction and improvement. The credit portion of the project, then, is a most important component.

The Project will establish 55 rice banks-cum-credit facilities, one in each of the areas served by an Interface Team. The system will provide for basic consumption and production credit needs of project beneficiaries and enable them to meet food and input needs during the critical first years of the Project when many of them will be exchanging swidden agriculture for irrigated agriculture practices. These banks will also help break the poverty cycle by providing rice-deficient families a low-cost alternative to interest rates of 100 percent or more currently charged by rice lenders in the villages.

Each bank is planned to be capitalized at an average of about $25,000 which is considered adequate to fulfill consumption needs and allow for important production credit needs of the 3-4 villages each bank will serve. Loans and repayments will be made in either cash or kind. Capitalization will be provided by the Bank of Agriculture and Agricultural Cooperatives (BAAC) and the AID Grant at a planned 80-20 ratio. (A token membership fee will also be required from the farmers to instill a sense of responsibility). BAAC will provide a credit manager in Mae Chaem and four extension training agents who will work with IF teams and help set up local bank credit committees and managers. BAAC will also provide credit training to IF teams prior to each team's mobilization and participate in regular in-service training sessions for teams after they are in the field.

USAID's anticipated input will include $250,000 which will provide twenty percent of the rice bank systems capitalization. An additional amount of $195,000 will be provided for constructing 55 rice bank facilities. Per diem/housing support for credit personnel will also be provided.

- Marketing Provisions

The project will promote increased production of cash crops already grown in the watershed, e.g., garlic, shallots, soybean,

peanuts, etc., for which marketing channels already exist. Access to Mae Chaem will be vastly improved as a result of (non-project) road- building and road improvement from CY 1980-82. With better market access, every expectation exists that the market structure in Mae Chaem will expand naturally to keep pace with the increased trade and no major market interventions are planned for at this stage. This judgment was supported by the market analyst on the PP design team. Should unforeseen marketing problems occur, the project will be able to deal with them in a number of ways. The first means available to the project would be direct loans to merchants. Such loans might encourage new, innovative businesses that would have a direct benefit to the poor (such as a livestock feed batching plant). They could also be used as incentives to correct market deficiencies in the existing structure, for example to encourage competition among traders if a monopsony condition should develop. Rice credit program infrastructure (transport, warehouses, etc.) could readily be expanded, at little or no project-sponsored cost to assist in marketing problems in a "cooperatives" manner, should this be necessary for the realization of further cash-cropping potential in Mae Chaem. The warehouses could be used to assemble and store cash-crops until sufficient outlets could be found, external to the local Mae Chaem market, at a time of year when the most favorable prices existed.

While the marketing prospects for cash-crops in Mae Chaem are important for the longer-term income potential of the watershed population and contribute significantly to the project's economic returns, nevertheless subsistence, locally consumed crops will provide the most immediate and significant benefits to the poor of Mae Chaem. It is a central focus of the project that has an important economic as well as social justification.

(3) Environmental Protection/Enhancement

The Project will support a program of non-agricultural fire control in the forests, provide a road rehabilitation and erosion control component, and support an experimental village woodlots component. Each of these components is needed to ensure that environmental degradation trends are reversed for the long term benefit of the watershed's inhabitants and downstream areas.

- Fire Control

A crucial task of the Project will be to control forest fires so that large areas of the forest floor do not burn every season. Uncontrolled fires in Mae Chaem destroy large quantities of tree seedlings every year, prevent the build-up of surface soil structure and inhibit the growth of adult trees. When the forest floor has been burnt clean, the rains wash much of the topsoil away and cause water sedimentation and erosion problems. The inhabitants of the watershed are largely responsible for the many fires each year when they carry out swiddening and related land clearing activities.

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The fire control component will consist of support for eight RFD fire crews of 15 members each. Crews will be trained by RFD and equipped under the Project with necessary fire prevention equipment. (Note: These crews will also perform a road maintenance function during the rainy season - see below). Crews will be supported in their fire control work through IF team liaison efforts with the populace. The teams will stress the importance of restricting fires around the watershed. The Project will also support fire control through some of its other components, for example, by providing agricultural land that will reduce the need for swiddening and for other land clearing activities. The woodlot program discussed below will also give the people an interest in protecting their own and should contribute to their sense of responsibility for protecting the forest in general.

- Road Erosion Control

Since roads are the primary source of erosion in the Mae Chaem watershed, but are perceived both by the local people and by planners as essential for the communication and transportation required for development, procedures must be instituted to minimize their adverse environmental impact. All road-constructing agencies need to observe road construction and maintenance standards designed to reduce the excessive erosion rates currently observable. Therefore, rather than construct more new roads, this project will assist in the rehabilitation of approximately 100 km. of existing road previously constructed by RFD, CAO or villagers themselves. (RFD plans to construct 300 KM of new roads for forest management (i.e., outside the project) during the Project, but these will be constructed to environmentally sound standards). The rehabilitation work will be done by contract. RFD will be responsible for (a) inspecting roads already constructed in the Mae Chaem watershed, locating erosion problems, and reporting the location, type, and severity of the erosion (b) surveying, designing and preparing specifications for roads to be rehabilitated by contractors (c) coordinating and supervising the rehabilitation work (d) recruiting, training, equiping (primarily hand tools) and supervising road maintenance crews which will make frequent patrols of the roads during the rainy season, performing preventive maintenance on road drainage courses. The maintenance crew, as noted above, will work on fire protection in the dry season and on road maintenance in dry and rainy seasons.

- Woodlots

The woodlots component will be primarily a pilot effort to test villager's needs and receptivity to a village woodlot program to determine economic feasibility and to experiment with various tree species in the area. A program covering about 750 rai (120 hectares) is planned for the life of the Project.

III. Feasibility Analyses

The detailed social, economic, environmental and technical analyses have been incorporated in a supplemental "Analysis Annex" that addresses these factors in interaction. In order to conform to AID Project Paper format, however, factors most relevant to each analysis have been disaggregated and summarized in this Section and in Annex D.

A. Technical Analysis

All of the activities in the project are deemed technically feasible with budgets and techniques described. In general, activities apply simple techniques involving local resources and manpower, by local people, with assistance and/or supervision of the technical governmental agencies involved in the project. Manpower requirements analysis reveals that sufficient manpower is available in Mae Chaem to complete the various activities on schedule.

- Construction Activities

Principal technical analysis was done in the areas of land waterworks improvement, environmental restoration and maintenance, and cropping research and extension. Manpower requirements and other interactive factors were also analyzed for the project as a whole and found to be compatible. DLD surveyed the watershed in early 1980 and produced a detailed land use map. The map indicates that sufficient potential land and water resources do indeed exist in Mae Chaem to make their development worthwhile: about 4,280 hectares of flood irrigated cropland plus 2,240 ha. of non-flood irrigated fields have been designated for development. Whereas most of this land lies within forest reserve area, the Royal Forest Department (RFD) has formally agreed that this land would be made available for cultivation, and would not be included in the RFD's regular program of reforestation. Existing RFD regulations permit issuance of a land-use certificate for 50 years, renewable. The land may not be sold, but use rights may be passed on to heirs. The certificate can be used as collateral to obtain loans.

Water and land development will be supervised by DLD, using local manpower and local resources (rocks, sand and gravel) as much as possible. Waterworks are predominantly weir construction and weir repair, plus canals. The average weir is 2.5 meters high, of reinforced concrete and 15 meters wide - an improvement on the bamboo log crib type widely used in the area for centuries. Total labor requirements for the land and water components are about 1,300 workers per year, or 1 from every 5½ families, well within labor resource availabilities.

Equipment to be used for construction/rehabilitation of weirs will be light units, such as concrete mixers, small dozers, and compaction equipment. It is expected that the existing network of laterite roads, forestry roads and trails will provide reasonable access to most sites for such equipment. The work is small in nature and will be primarily done by hand labor. However, access to some sites may prove difficult; therefore, only those sites which will allow access without "building roads" will be considered for project funding. Where access can be obtained by off-season crossing of agricultural lands, construction will be scheduled accordingly.

Most of the construction materials (boulders, gravel and sand) can be easily secured within a reasonable haul distance. Securing experienced and competent local contractors for the construction will not be a problem. There are many qualified contractors with their own equipment that have extensive experience in constructing infrastructure for several RTG agencies.

With the completion of some links now under construction or budgeted by RTG agencies, access by roads in Mae Chaem will be considered adequate to meet Project needs. Roughly 86% of the total population are now within 5 km. of a road-mining and timber tracks excluded). The highway department and RFD are continuing to construct roads every year to improve access (300 km. are planned by RFD alone during the Project's life).

Design and construction monitoring will be the prime responsibility of the Department of Land Development. The DLD has demonstrated its competence to provide adequate engineering services many times and during 1980 will construct 325 water impoundments, 150 done through force account and 175 by contract. The engineering division has 15 civil engineers, 3 mechanical engineers and 30 other technicians plus 100 mechanics. To carry out this Project, DLD will establish several field task forces to be responsible for design and construction supervision (approximately one team for 25 water sites). Each team will be comprised of 1 technical agriculturist, 1-2 civil engineer technicians, 2 extension workers and one temporary employee. DLD will use standard specifications contained in its "Construction Specifications for Small Scale Water Resources Development" and O&M will be carried out by the villagers after a short "hands on" training course to familiarize them with these simple techniques. DLD is technically qualified to fulfill its engineering responsibilities and will give priority consideration to the Mae Chaem Project.

Cost estimates for land and water improvement were based on average anticipated site conditions and reflect most construction experience in the Mae Chaem Watershed. It is proposed that the ARD, RID or Khon Kaen University standard drawings and ARD construction specifications for weir projects be used. For pond construction, ARD's small reservoir or DLD's "farm pond" drawing standards will be used. Such drawings have been recently applied to the Village Fishponds Development Project construction. Detailed engineering plans and cost estimates will be required by USAID before funding is committed for these activities (see Annex D for sample plans and specifications).

- Environmental Work

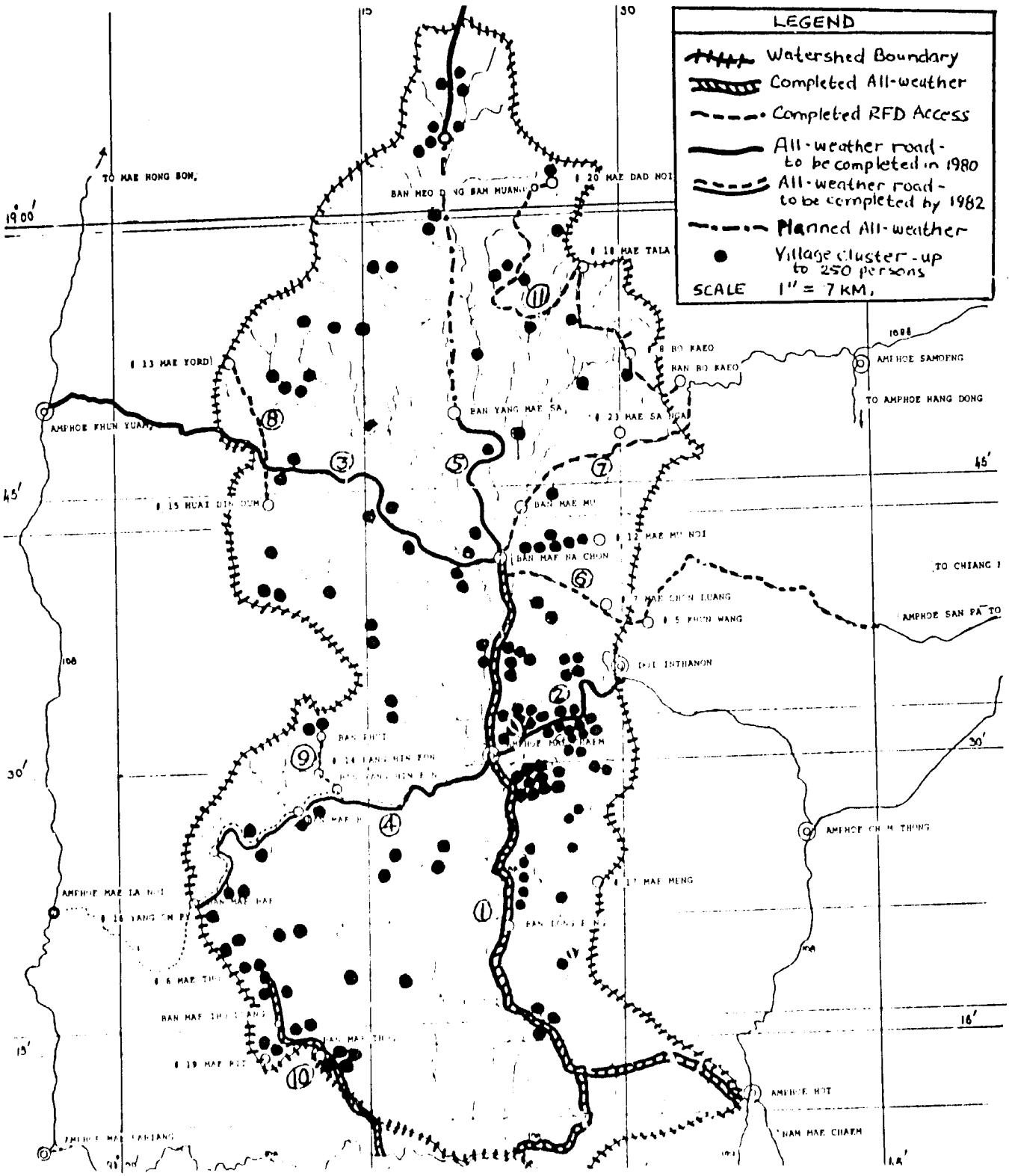
Environmental restoration and maintenance involves road rehabilitation and erosion control, fire control, and village woodlots. Techniques for most of these activities are well established. Road erosion control, for example, is to be performed by pick and shovel crews in the wet season each year. During the dry season these same teams act as fire controllers. The estimated cost for rehabilitation of 100 km. of roads to

4/3/84

FIGURE III.1

ROAD ACCESS IN MAE CHAEM WATERSHED

Total population of Mae Chaem living within 5 km. of a road (mining and timber tracks excluded) about 85%. The map below shows the current road network.



put them in a condition where they are environmentally stable and can be maintained by a combination of hand and machine effort is $14,850 per kilometer. This is the best estimate of the project cost of rehabilitation of the system without a complete reconnaissance, however, prior to rehabilitation of any road segment a complete traverse and study by a qualified engineer will be made. This will be used to prepare a prescription of work and firm cost estimates. All rehabilitation work will be done by contract under RFD supervision. RFD has two engineers in the engineering section of the Watershed Management Division, and these will be available to the Project. However, in order to assure that the road work is adequately carried out and is not pre-empted by RFD's regular construction program, the Project will contract one civil engineer experienced in rural road design and supervision to work with two RFD technicains on a full-time basis while the roads are being designed and rehabilitated.

It should be noted that the primary function of the roads component is to meet environmental concerns of the Project and not to improve road standards to facilitate a larger volume of traffic. There is no question that much of the rehabilitation work will improve the condition of the roads as a means of transport. However, no attempt is being made to address the typical concerns of road projects such as laid out in FAA Section 611. Such an expense is neither necessary nor practical for the type of spot improvements expected under the project.

- Credit

The rice bank principle is fairly simple and has been demonstrated to be feasible in the highlands. Two rice banks (Ban Pang Pa Kar and Ban Dong Dam) in Chiangmai Province were visited by design team members and studied in some detail. The first was established in 1971 and the second in 1976 and both continue to operate successfully. Similar systems will be installed in Mae Chaem, and with BAAC assistance and close monitoring by IF teams, the rice banks are considered feasible and should meet basic needs of the Project's beneficiaries. They appear to be the simplest and most reliable method of providing rice-short people with rice and other essential credit at reasonable prices. Scheduling of rice bank/credit interventions is critical. They will not be introduced in any area until there has been time for an adequate educational process, facilitated by IF teams. Scheduling will also be closely related to implementation of land development activities so that expanded production will contribute to repayment capability.

- Social Services

Because the Project aims at the minimum essential items concerning land usage that must be accomplished to make a significant impact in Mae Chaem and because of the management problems of a multi-agency project, it was deliberately decided not to fund either health or education interventions as major components of the project. However, problems of health, family planning, and basic skills development will be addressed in two ways in Mae Chaem. First, under the project itself the Interface Team program will provide some needed and essential items in both areas. Interface teams will teach rudimentary health care, nutrition, sanitation,

literacy, arithmetic, etc. They will also initiate very small costs, local village activities, such as use of village medical kits. The predominant health and education improvements, however, will be provided by RTG social service agencies, outside the scope of the project, through the extension of the regular service programs of these agencies into the Mae Chaem. The Project Operations unit will foster these linkages, and IF teams will help prepare villagers for participation in such programs. Some improvements foreseen include: (1) sending trainees to the nurse practitioner training program, (2) midwife training in the Primary Health Care Training Program, (3) training of Karen nurses in McCormick hospital family planning program, (4) special malaria control programs in newly opened irrigation areas, (5) additional malaria "identification and treatment" centers, (6) initiation of non-formal education programs for minoirty groups, etc.

An illustration of the approach to be followed is non-formal education. The Ministry of Education, Department of Non-Formal Education, conducts functional literacy courses in some hill areas which could be applicable to Mae Chaem. The program focuses not only on assisting villagers to acquire literacy skills in their own language and phase into the Thai language, but also conveys specific skills and information relevant to development. Teachers are selected locally and employed on a daily hire basis. The Director General of Non-Formal Education has formally expressed his willingness to support similar activities in the Mae Chaem once the project has been initiated and upon receipt of a request for such assistance from the responsible RTG officials.

B. Social Analysis Concerns (See Annex E for Full Social Soundness Analysis)

About 40,000 people composed of primarily two ethnic groups (Skaw Karen 57% and North Thai 45%) live in the Mae Chaem watershed. As stated, three quarters of this population have incomes that class them below the World Bank defined "absolute" poverty line. A description of these groups which comprise the major beneficiaries of the Project is contained in Annex D.

The Project was carefully designed to ensure that the watershed's poorest inhabitants will particularly benefit from the Project. Thus, land will be allocated to land-short inhabitants preferentially, and land tenure/security concerns have been addressed by providing for land certification in perpetuity. An important felt need of many of the poor hilltribe people is the desire for citizenship, and the Project indirectly addresses this through education assistance (basic literacy and skills) and through land certification procedures that satisfy basic requirements for citizenship. A socio-economic survey of the residents of Phase I tambons has been carried out by a Kasetsart University team, and its findings will be used to "fine-tune project interventions to the needs and potential of the people. The project will fund similar surveys of Phase II and III populations before proceeding with development in these areas.

- in each area, initial activity (during the dry season) will be directed towards establishing interface team relationships with the villagers acquainting villagers with their opportunities and range of services, benefits under the project, and selection by the villagers of land and water resource development activities in which they wish to participate in the next dry season,

- project-financed activities are scheduled carefully to assure the availability of village labor as required for the land and water development sub-projects,

- project credit mechanisms will be phased-in in accordance with enhanced repayment capacity associated with land and water development and crop promotion activities,

- the project will not directly attempt to change traditional patterns of secondary-forest swiddening among the Karen, which would be resented. Instead it will offer alternative resources and patterns of agriculture which are expected to be sufficiently attractive to bring about voluntary abandonment of swidden cultivation.

- Interface Teams

The innovative "Interface Team" concept has been build into the Project to ensure close contact with the beneficiaries to promote effective beneficiary participation, and help to establish a self-sustaining pattern of social and economic progress.

Interface Teams will be recruited from outside the bureaucracy to insure they have no particular ties to any one government agency nor any predisposition, prior to training, as to what their role should be. In the project they will be assigned to a "neutral" agency (NADC), for the same reasons, and their eventual employment by various government agencies will be determined solely on their performance as Interface Team members, not by any pre-recruitment process, formal or informal. Neutrality among the various agencies and ability to work equally for all is thus maximized by external recruitment and project management processes. Interface Teams members will have sufficient educational attainment that they can deal successfully with both RTG officials and villagers and will be creditable to both. Sufficient education is also necessary to insure the team members can provide a level of expertise and assistance that will benefit both villagers and officials, to understand the problems involved at different levels of sophistication, and to provide inadependently well-conceived advice to both villagers and officials. For example, they must understand the larger issues such as watershed conservation, its needs and relationship to the resource base and the society, but also be able to translate these issues into practical terms at the local level. For these reasons Interface Team members will be university or college level graduates, from a variety of disciplinary backgrounds, especially agriculture and education.

Each Team will be composed of three persons, including people of both sexes and at least one member of the ethnic minority group which that team will work with. The size of the team is small enough to be flexible as they move around their area yet large enough to support each

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other (e.g., should one get sick, one can stay with him, another go for help, should one go for supplies, two can still carry on the work, etc.). To add more people to a team would not be cost-effective, whereas to reduce the number to one or two would be inadvisable for remote area work and would create problems in loneliness and flexibility. Three is also a minimum social grouping number for a culturally appropriate Thai "group". The ethnic and sex mix of each team is, of course, necessary in order to be most effective in dealing with the various villagers. In the minority groups, it is often not appropriate for Thai men to deal directly or frequently with local women, whereas the cultural and language expertise of the minority group team member will be of invaluable aid to the entire team in acceptance and communication.

The number of teams required (55) has been carefully selected to cover the watershed in such a manner that each team can spend at least one day a week in each village location. Because most villages in the watershed (unlike most of rural Thailand) are small and remote, this many teams are needed. One day a week is considered minimal in order to accomplish their tasks. A not incidental benefit to this number of teams is that each team will be assigned to an average of 130 households, thus allowing the personal kind of interaction necessary to accomplish the kind of tasks Interface Team must handle.

- Role of Women

The role of women in the project has been carefully considered. Interface Teams will include women members (the aim is one per team). In many cases women minority group members will also be included on the teams. Among the beneficiaries, it is expected that women will benefit as much as men in the Project. Interface teams will be trained in encouraging women's participation. To the maximum extent possible, health training, literacy training, etc., will be given both men and women, and women will be encouraged to suggest additional training topics to Interface Teams.

In the project's primary, emphasis on land and water improvements, the entire household benefits, and in many cases, women will benefit relatively more than men. For example, the primary swidden task assigned to Karen women is weeding. The provision of wet-rice fields will reduce the amount of time women must devote to weeding in favor of other less arduous labor. The increased availability of rice will benefit women as consumers at least equally with men, since in a rice-scarce situation, it is often females who are most deprived. In cash-cropping, however, Interface Teams should either encourage joint (i.e. household) cash-cropping or else separate plots for women, since it has been the practice among swiddeners for men to cash-crop more than women, and to control the profits themselves. In general, however, the burdens and benefits are reasonably shared and, given the above considerations, should benefit women on an equitable basis.

C. Economic Analysis Summary

The benefit-cost ratio and internal rate of return for the entire project are estimated at 1.30 and 16%, respectively. The computations,

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including various assumptions, are shown in Annex F. They take into consideration the cost of such elements as road rehabilitation, erosion control, village woodlots, and interface team activity, but do not attribute any economic benefits to these activities, since they are non-quantifiable. Assumptions on land use and productivity increases were made on the conservative side, as illustrated below:

1 - For wet-rice fields,

- annual yield increase of 6% for rice production
- land utilization will increase from the current 85% to 100% by the end of the project
- second-cropping will increase from the current 30% of wet-rice land to 45%
- yield increases for cash-crops will increase by 10% with irrigation, 30% through the combined effects of irrigation, land development, and extension

2 - For upland fields,

- 50% of developed land will be devoted to cash-crops
- yields for cash-crops will increase from ½ lowland crop yields, as currently achieved, to 2/3 of lowland yields by the end of the project.

Given the modest nature of these assumptions, sensitivity tests were not applied. However, in Table F-2 (Annex), we assumed a worst-case scenario whereby cash-cropping in Mae Chaem did not increase at all during the life of the project (highly unlikely). Still incorporating the costs of project inputs which have no associated quantifiable benefits, the internal rate of return of the project was still 8% deriving benefit from increased rice cultivation alone. In Table F-7 we calculated the internal rate of return for costs and benefits associated only with irrigation works, assuming no increase in cash-crops, with a favorable result of 16%. Overall these calculations provide a solid basis for confidence that the project is economically feasible.

D. Environmental Analysis Summary
(Note: No full-scale EA is required, per Ste 073081)

The two components of the project which will most directly affect the environment are the agricultural land and water improvements and environmental restoration and maintenance. The use of pesticides in the agricultural extension portion of the project is not foreseen. Before any pesticides for controlled experiments are ordered or used in the project, all relevant AID procedures will be followed.

Both the land/water component and the environmental component of the project were specifically designed to have positive environmental effects. Land development for example, will emphasize the building of various forms of terraces, including bunded terraces, on land suitable for these purposes. Terraces provide level land on which water can be absorbed and erosion and run-off minimized, thereby contributing to the water-regulating and storing functions of the watershed. Additionally, agricultural land reduces interception loss and evapotraspiration. The key concern with the land development portion of the project is that terraces and other land conservation structures be well- built and maintained. The procedures established for DLD supervision and RFD inspection and approval will insure that this is indeed the case.

The environmental component of the project was designed to restore, improve and preserve vital watershed functions, to minimize road erosion and to rebuild forest cover and biomass in the partially denuded Dry Dipterocarp Forests which cover a significant portion of the Mae Chaem watershed and have suffered the most from burning and other causes of biomass reduction and soil exposure.

Although all elements of the project were designed to be environmentally positive (not just neutral), it was inevitable that some dangers would exist on the negative side of the balance sheet. For the land and water development component, the principal danger is increased malarial infestation in lower upland areas as a result of increased water-works and flooded fields. The project will counter this effect (and help reduce malaria which is already problematical in some of these areas) by coordinating closely with the RTG Malaria Division regional office in Chiangmai to assure adequate coverage in Mae Chaem.

In the environmental component, the principal danger is from fires. Since these forests are the driest in North Thailand, some danger may exist of crown fires if litter and forest floor species build up so that ground fires can climb to the canopy. The project intends to address this danger through the fire control component.

Finally, ecosystemic effects of introducing non-indigenous species in pilot woodlots have not yet been studied. Any adverse impacts of such introduction will be minimized since non-indigenous specific experimentation in woodlots will be small-scale (research purposes) and isolated from surrounding natural forest.

Environmental effects of the Project will be further examined during regularly scheduled evaluations.

E. Conclusion

Analyses of all major Project components (summarized above, and further detailed in Annexes) indicate that the Project is sound as designed and should provide important benefits to the target group and the watershed environment at acceptable costs, with no substantial negative social or environmental effects.

F. Financial Plan

1. Introduction

The life of project budget is summarized in Table III.B.1. Fifty-four per cent of project costs will be borne by the RTG, while the grant will provide the remaining forty-six per cent of the total, thus easily meeting the requirement of FAA Section 110(a). Approximately thirty-five per cent of all project resources flow directly to beneficiaries in the form of land and water development, credit and IF team presence. Project resources which have an indirect impact on beneficiaries, such as equipment and commodities, construction, technical assistance and recurrent operational costs, account for an additional fifty per cent of the budget. About fifteen per cent of the budget is devoted specifically to watershed protection activities.

As can be seen from the Summary Budget and Annex E, AID will finance all foreign exchange requirements of the Project (about 10 per cent of the total), most of the evaluation costs, costs for the non-governmental project staff (operations unit and IF teams), a portion of rice bank costs and of other costs. USAID's strategy is to use grant funds to their best advantage by funding all foreign exchange costs and by strongly supporting many innovative concepts that are relatively high risk, while the RTG funds a larger portion of the more standardized lower-risks items such as staff support and construction activities. A small portion of the RTG contribution, less than four per cent of their input, represents an offset for identifiable RTG taxes. USAID is convinced that all RTG agencies have done their utmost to absorb a maximum share of project costs within foreseeable budget allocations, and that the U.S. grant resources at the proposed levels are a minimum essential requirement to allow this project to proceed in accordance with the beneficiaries-oriented approach outlined in this PP.

2. Financial Phasing

Table III.B.2. lays out the AID grant phasing. The project operational column covers one-time costs for common project elements which must be incurred regardless of project life and phasing considerations. These items, such as office and training facilities and staff housing, are attributable to the entire Project and cannot be reasonably disaggregated for each phase. The incremental costs in the next three columns cover those items which are required for the discrete phases of project operations, each phase being five years in duration. Viewed in this way, the project will require an initial grant of $4.4 million to provide for one-time costs as well as Phase I operations. In year two an additional grant of $2.9 million will be required for Phase II, which will extend from FY 1982 to FY 1986. Phase III, beginning in FY 1983 and extending through the end of the project in 1987 will require a final grant of $2.7 million.

Project funds will not be used to undertake operations in areas designated for later phasing-in of project resources; this provision will be made a covenant of the Grant Agreement. An exception is the recruitment and training of IF teams who must be ready to move into the

field as a phase begins.

3. Total Funding Levels

While the budget required to achieve project purpose is significantly higher than was estimated at the PID stage, it has been reduced from recent tentative planning levels to the point where further reductions would create serious questions as to whether the project could be effectively implemented. A major effort was made to reduce all costs to their minimum and eliminate questionable items. The number and type of activities and organizational entities receiving substantial support through the grant have been reduced to include only those whose direct involvement is required to achieve project purpose. In all feasible ways, the design provides for sharing of facilities and equipment in ways which encourage coordinated activity as well as reduce costs, e.g. common offices, training facility etc.

The cost per beneficiary is relatively high -- $250 for AID funding and $545 for overall project funding. If watershed maintenance activities, including road rehabilitation primarily for environmental reasons) were excluded from the calculation the cost ratio would drop to $213 for AID funding. All of the other costs provide direct benefit to the target population and are considered necessary to alter the current situation of unrelenting poverty, especially the rather high cost ($37 per beneficiary) of the interface system. Part of the high cost is attributable to remoteness, difficult terrain, dispersed population, etc., but the real justification for this level of investment is the complexity of the problem and the need to provide a range of complementary facilities and services to overcome inertia.

4. Funding of Components

Detailed budget tables for all components have been forwarded to ASIA/PD as separate, supporting material.

(a) Equipment and Commodities

Equipment and commodities to be procured under the Project include forty-four vehicles, thirty-three motorcycles, equipment for the research station, small fire control equipment, required materials for land development work, materials necessary for water works construction, office and training equipment, basic medicines, materials for basic literacy training, and other essential materials for project operations. Combined procurement from grant and RTG funds under this category amounts to seven per cent of the entire project budget. Vehicle procurement amounts to only three per cent of the total budget.

(b) Technical Assistance

Expatriate technical assistance will be provided for eight and one-half person years and accounts for less than four and one-half per cent of the the budget. Long-term technical assistance consists of one general rural development advisor for five years and a training advisor for three years. In addition, six months of short-term consultancy is

TABLE III. B. 1

SUMMARY BUDGET

LIFE OF PROJECT

$'000

FUNCTIONS	AID GRANT		RTG		TOTALS
	FX	LC	DTEC	Imple-menting Agencies	
1. Equipment and Commodities	773	168	262	228	1,431
2. Expatriate Technical Assistance	602		258		860
3. Project Operations Unit Recurrent Costs		845			845
4. IF Teams		1,188			1,188
5. RTG Staff Support (including POL)		231	700	1,965	2,896
6. Construction Costs:					
a. Project Administration		173	30		203
b. Rice Banks		192			192
c. Land Development		482	245	481	1,208
d. Water Resources		1,100		1,100	2,200
e. Road Rehabilitation		509	297	743	1,549
f. Research Station		141		774	915
g. Training Center		57			57
h. Extension		75		75	150
7. Watershed Maintenance Activities					
a. Fire Prevention		279		200	479
b. Woodlots		92		18	110
8. Credit		250		1,000	1,250
9. Evaluation/REsearch	70	200	30		300
Sub-total	1,445	5,982	1,822	6,584	15,833
Contingency (12½%)	180	748	228	919	2,075
Inflation (10% annually)	280	1,390	365	1,100	3,135
Totals (Rounded)	1,900	8,100	2,400	8,600	21,000

TABLE III. B. 2
AID GRANT PHASING
$'000

Function	Project Op. Cost (Common Ele.)	Phase I Incre. Costs	Phase II Incre. Costs	Phase III Incre. Costs	TOTAL
1. Equipment/Commodities	484	98	272	87	941
2. Expatriate Tech. Assistance		588	7	7	602
3. Project Operations Unit		266	50	55	371
Recurrent Cost		314	80	80	474
4. IF Teams		325	420	443	1,188
5. RTG Staff Support		31	150	50	231
6. Construction Costs					
a. Project Administration	173				173
b. Rice Banks		45	70	77	192
c. Land Development		147	165	170	482
d. Water Resources		343	360	397	1,100
e. Road Rehabilitation		176	167	166	509
f. Research Station	141				141
g. Training Center	57				57
7. Watershed Maintenance Activities					
a. Fire Prevention		90	108	81	279
b. Woodlots		46	46		92
8. Credit		60	90	100	250
9. Evaluation		100	90	80	270
Sub-total	855	2,629	2,075	1,793	7,352
Contingency (12½%)	105	325	260	225	915
Inflation (10% Annually)		500	550	620	1,670
Totals (Rounded)	1,000	3,400	2,900	2,700	10,000

TABLE III.B.3

ANNUAL FINANCIAL SUMMARY - AID GRANT

$000

Function	1981	1982	1983	1984	1985	1986	1987	Totals
1. Equipment/Commodities	582	272	39	24	24			941
2. Expatriate Technical Assistance	147	147	154	70	70	7	7	602
3. Project Operations Unit	45	49	55	57	60	55	50	371
Recurrent Costs	48	60	61	68	77	80	80	474
4. IF Teams	99	227	383	300	179			1,188
5. RTG Staff Support	23			25	62	79	42	231
6. Construction Costs								
a. Project Administration	173							173
b. Rice Banks		45	70	77				192
c. Land Development	94	97	97	98	96			482
d. Water Resources	168	280	303	209	136			1,096
e. Road Rehabilitation	176	167	166					509
f. Research Station	141							141
g. Training Center	57							57
7. Watershed Maintenance Activities								
a. Fire Prevention	18	45	72	72	72			279
b. Woodlots		46	46					92
8. Credit		60	90	100				250
9. Evaluation		40	50	50	30	30	70	270
Sub-total	1,771	1,535	1,586	1,150	806	251	249	7,348
Contingency (12½%)	221	192	198	145	100	32	31	919
Inflation (10% Annually)	-	150	380	410	360	140	230	1,670
TOTALS (Rounded)	2,000	1,900	2,200	1,700	1,300	400	500	10,000

provided for. Costs are based on a rate of $100,000 per year for long-term assistance and $10,000 per month for short-term assistance. Details on the nature and type of technical assistance required may be found in Part IV A - Management and Implementation Arrangements.

(c) Operations Unit

The budget for the Project Operations Unit recurrent costs covers salary support for four key professional staff, including the field manager, and a small supporting staff, as well as all operational costs for the Unit during the life of the Project. Operational costs include per diem, POL, maintenance and buildings and equipment, supplies and utilities. When combined, salaries and operational costs account for just over four per cent of the budget.

(d) IF Teams

A total of 55 interface (IF) teams will be trained and phased into geographical coverage areas of the Project, consistent with project operations. Each team will be made up of three persons for a total personnel strength of 155 at the peak of project operations in year three. Budgetary support for this critical component will cover salaries, housing and hardship allowance, per diem, travel, severance pay and field supervision and will account for six per cent of the Project budget.

(e) RTG Staff Support

The RTG staff support budget provides for the temporary hire training, and support of technical and supervisory personnel required by collaborating agencies of the RTG to carry out project activities. It further provides per diem and travel funds for essential RTG officials working on the project for a limited period. All costs associated with the operation and maintenance of the thirty-five project vehicles and 33 motorcycles which are under the direct control of collaborating agencies are included within this budget category as well. A maximum of two years of initial salary support for up to 55 former IF team members who the RTG hires permanently will also be provided under this category. Total RTG staff support accounts for approximately 15 per cent of the budget.

(f) Construction

Almost 80 per cent of all construction costs to be incurred will have a direct impact on beneficiaries. Included in this calculation are the development of 20,750 rai of land, construction of 102 water works, construction of 55 rice bank support warehouses and the rehabilitation of 100 kms. of road. The remaining 20 per cent of the construction budget is for essential project facilities, including offices, housing for full-time personnel, the research station and a small training center. Construction costs account for just under one-third of the total budget. More than half of these costs will be financed with RTG resources.

(g) Watershed Maintenance

The major portion of the fire prevention budget is devoted to the employment of eight crews who will also serve as a road maintenance work force in the rainy season. Equipment and personnel to support this operation are provided for in other budget categories already discussed in this section. Woodlots are funded by the Grant on a demonstration basis only, for a total area coverage of 750 rai. Together, these items account for three per cent of the budget.

(h) Credit

The credit fund has been designed to provide commodities for the initial stocking of the fifty-five rice banks and cash. This fund will constitute a portion of the $1.25 million to be administered by the BAAC through a credit manager attached to the Project Operations Unit, and will serve as a type of "insurance" for the BAAC in the case of defaults.

(i) Evaluation/Research

The evaluation budget provides funds for construction monitoring, special technical reviews required for possible adjustments in project operations as well as regular overall evaluations. Detailed discussion of the evaluation system can be found in Part IV C, Management and Implementation Arrangements. In addition, about $100,000 has been designated for project-specific research topics. Approximately one and half per cent of the budget is specifically earmarked for evaluation/research.

PART IV IMPLEMENTATION PLAN AND ARRANGEMENTS

A. Management and Implementation

1. Introduction

It is apparent from the relatively large number of project interventions and participating agencies proposed in Part II of this PP, that a careful phasing of components and an effective coordination mechanism are needed to help assure project success. Further, certain characteristics of the RTG implementing agencies (highly centralized administration, staff and skill shortages, compartmentalization, few hill tribe personnel on staffs), and characteristics of the Project location (few RTG agencies or personnel currently are operating in Mae Chaem because of its relatively remote location) require special attention and measures to ameliorate their constraining influence during Project implementation.

The Project's management system is designed to address the constraining factors listed above. It is characterized by a well-staffed and decentralized Project management unit, called a Project Operations Unit, that is not identified with any particular department within the MOAC, but that has adequate "influence" to get things done through its direct association with the Office of the Under-Secretary (MOAC) through the Northern Agricultural Development Center. Adequate coordination with the participating departments of the RTG is further assured, however, through a hierarchy of interdepartmental committees extending from Bangkok (the HAD Committee) through Province and District Committees and down to the village council level. Close contact with the beneficiaries is facilitated by utilizing the innovative "IF Team" arrangement that has been described elsewhere and that will be further clarified below.

2. Project Organization

Figure IV.1 and IV.2 diagram the management structure of the Project. A hierarchy of committees will provide administrative oversight for the project in terms of policy guidance, coordination and operations. This committee structure will also be the channel for a system of decentralized authority over project financial resources. Linkage between committees will be achieved, as the chairman at each level serves on the committee at the next level, e.g. it is anticipated that the Nai Amphur (district officer) of Mae Chaem will serve as Chairman of the Implementation Committee (district level) and as secretary of the Coordination Committee (provincial level).

a. National Level

Project operations will be based on general policy guidelines established by the Highland Area Development Committee (HAD) at the national level. This committee, chaired by the Under-Secretary, Ministry of Agriculture and Cooperatives, will:

(1) consider and recommend necessary changes in government policy which might be needed to facilitate project implementation;

(2) coordinate with other committees at the national or ministerial level which are concerned with development in the North;

(3) monitor the objectives of collaborating departments and ministries for work in the watershed in order to ensure congruence of plans; and

(4) review budget requirements as reflected in the integrated budget proposal from the field.

b. Provincial Level

At the provincial level a coordinating committee chaired by the Governor of Chiangmai will ensure that operations of the project as a whole and each of its components are consistent with policy guidelines, project objectives, and budget allocations.

c. District Level

The Project Implementation Committee at the amphur (district) level, chaired by the Nai Amphur, will deal with operational issues which arise between the various organizational units in the field. The Committee will review the integrated budget request which will be prepared annually by the Project Operations Unit and forward this request, together with recommendations, to the chairman of HAD committee, through the channels depicted in diagram IV.1.

d. Northern Agricultural Development Center

The Committee system described above will have a major policy/planning/and coordination function, but the Project supervision/monitoring function for the RTG will be the responsibility of the Northern Agricultural Development Center (NADC) in Chiangmai. This office, which consists of professionals from various agricultural specialities, has the MOAC's mandate for managing integrated development projects in the Northern Region. Due to the area specific focus of the Mae Chaem Project, however, a field operations unit, described immediately below, is being formed to manage the Project in Mae Chaem as an extension of the NADC.

e. Project Operations Unit (POU)

The POU will be the nerve center of the Project. It will be staffed by a field manager who will be a career civil servant, three contracted division chiefs, and representatives of the key collaborating departments. The POU will have a small administrative section as well as two operational divisions:

(1) IF Team management; and
(2) credit management.

Division chiefs, except for the credit manager who will be appointed by the BAAC, will be recruited and contracted by DTEC and be directly

FIGURE IV.1

Operations and Policy Diagram

Mae Chaem Watershed Development Project

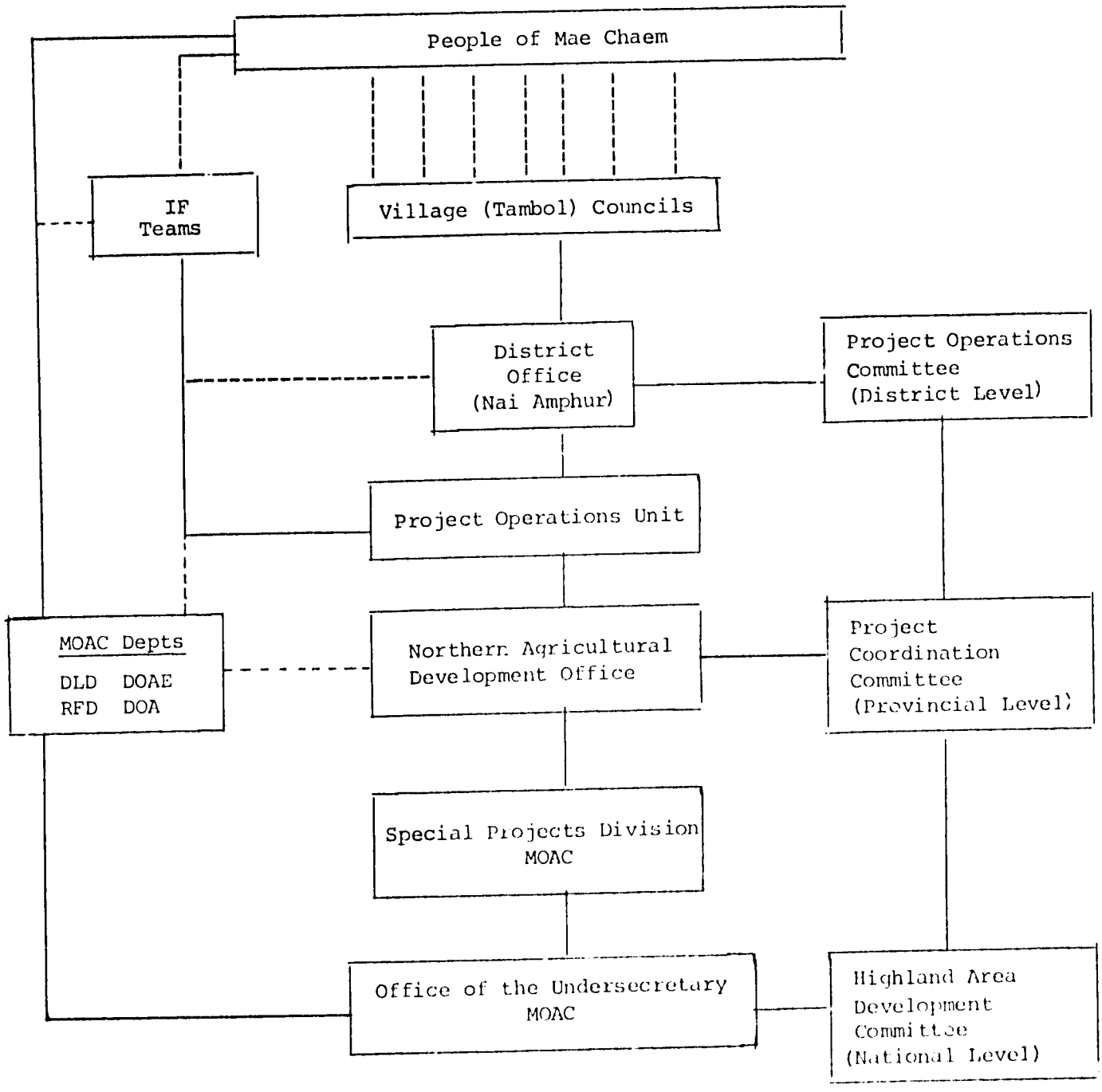
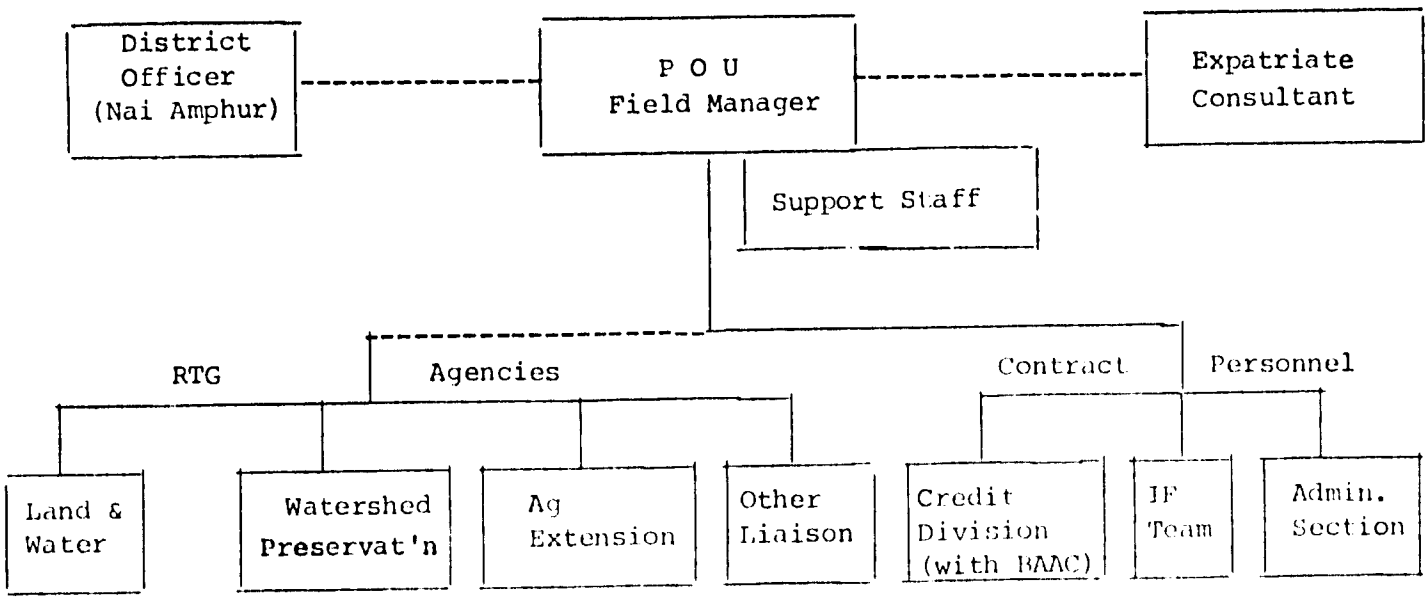


FIGURE IV.2

Project Operations Unit (POU)

Mae Chaem Watershed Development Project



responsible to the field manager who represents the Under-Secretary of MOAC through the NADC. In addition to direct supervision of IF teams and necessary supporting staff, the POU will be responsible for monitoring and coordinating all project operations in the watershed. This will include preparation and regular adjustment of the operational plan for project activities. Progress toward achievement of project and sub-project objectives will be recorded regularly against target benchmarks. Collectively this data will provide a management information system, the major components of which will be continually updated and displayed in the operations room at headquarters in Mae Chaem. The staff will further have responsibility for preparation of an annual integrated budget which will be developed as a collaborative effort with all agencies involved in project operations.

The entire staff of the POU will function in two complementary, but different roles: (1) to facilitate and coordinate the activities of technical, departmental operations and (2) to support, supervise and ensure the effectiveness of those project inputs directly under the Units control, most importantly the IF teams. In this context, the relationship of the field manager to the Nai Amphur is particularly critical. While a specific operational and procedural division of responsibility between the Nai Amphur as Chairman of the Project Operations Committee and the field manager as head of the POU can and should be done only in the field, the following general role distinctions can be made:

Nai Amphoe	Field Manager
- provide operational recommendations and guidance.	- report to the operations committee regularly.
- serve as liaison for the project with tambol councils.	- react to tambol council requirements through Nai Amphoe.
- facilitate resolution of issues which arise among the various agencies and interest groups involved in the project.	- coordinate project specific activities and supervise and provide support for IF teams and Unit staff.
- provide linkage with the Coordinating Committee at the provincial level.	- provide linkage with project funding agencies.
- provide leadership for the initial review of the annual integrated budget for all project operations.	- coordinate the preparation of the annual integrated budget.

f. IF Team Management

Interface teams will be carefully trained and assigned at a very intensive level of contact for a limited period of time (3 years). Teams will operate at an average ratio of 1 team member to 44 households

(one team to 130 households), with fewer households per team in remote areas, more in less remote, larger villages. This intensity is necessary to allow the remote teams to visit a village at least one day a week. Management of the IF teams will be done by a Team Manager at the POU and a supervisor in each phased area.

g. Expatriate Technical Assistance

Expatriate technical assistance levels have been kept to a minimum. Two long-term positions are necessary. The requirement for expatriate technical assistance stems from 1) the innovative nature of several project components and 2) the complexity of the management task required to carry out the project effectively.

- The general rural development advisor will work in Mae Chaem in close liaison with the field manager and Nai Amphur. He should bring long-term experience in management as well as expertise in development work to the project. This individual must have an in-depth understanding of the Northern Thai landscape - its people, its land, its potential, its limitations and most importantly the way in which all these interact. This individual will be the project's primary advisor to the RTG on the project and must be able to interact effectively at all levels. His term will be for the first five years of project life.

- The training advisor will work both at the training center of the Teacher Education Department of the Ministry of Education, which has responsibility for IF team training, and in the field assisting in the follow-up and re-design of training. This individual must be highly-skilled in experiential training, whereby training is not a separate function, but an integral and ongoing process in development. This individual's term will be for the first three years, the period of intensive training for IF teams.

These individuals will be backed up by short-term consultants in specialized areas who will be called upon as needed. During the last two years of project life, advisory assistance will be limited to short-term consultancies.

3. Role of Participating Agencies

a. Office of the Under-Secretary, MOAC

The Under-Secretary of State, MOAC, chairs the Highland Area Development Committee, coordinates the application of RTG policy to implementation, and provides top-level management supervision to the project. Other entities within the Under-Secretary's Office with responsibility for the project are the Project Division, which will coordinate the preparation of unified budget requests, monitor project progress, and report such progress to the Under-Secretary; and the Northern Agricultural Development Center, which will supervise the

work of the Project Operations Unit and its associated Interface Teams.

b. Office of the Narcotics Control Board (ONCB), Office of the Prime Minister

ONCB will continue to provide the Secretariat of the HAD Committee, and participate in project monitoring and evaluation, particular the relationship between project activities and opium-poppy cultivation in Mae Chaem.

c. Department of Land Development, (DLD)

DLD will carry out the following project activities:

- selection of land within the watershed to be allocated for agricultural development, on basis of DLD maps and discussions with IF teams and villagers;
- selection of project sites for waterworks and land development, in close cooperation with IF teams and villages;
- design waterworks and supervise construction by private contractors;
- provide supervision and technical assistance to villagers in on-farm water management, land development, and use of appropriate soil conservation practices.

d. Royal Forest Department (RFD)

RFD will carry out the following project activities:

- agreement to allocation of additional agricultural land;
- issuance of land use certificates;
- road rehabilitation and maintenance;
- fire control and enrichment plantings in forest reserve not to be allocated for agricultural development;
- pilot village woodlot sub-project. (In addition, outside the scope of the project, RFD plans to build an additional 300 km. of roads - to acceptable environmental standard.)

e. Department of Agricultural Extension (DOAE)

DOAE will:

- provide extension advice to watershed farmers in more

intensive use of wet-rice land and non-irrigated upland plots; one agent per 400 households;

- provide guidance and in-service training to IF teams on agricultural matters;

- establish demonstration plots on or adjacent to farmers fields.

- together with DOA, provide training for farmers in improved cultivation practices in the project training facility in Mae Chaem.

f. Department of Agriculture (DOA)

- operate the newly-established research, extension, and plant production facility and meeting-training center;

- conduct applied research on experimental plots throughout the watershed;

- cooperate with DOAE in providing training to farmers.

g. Bank for Agriculture and Agricultural Cooperatives (BAAC)

The BAAC will supervise credit operations in the watershed:

- management of rice banks;

- provision of cash credit, as appropriate;

- training of IF teams in assessing villager credit needs and preparing requests.

h. Department of Teacher Education, Ministry of Education (DTE)

DTE will conduct pre-service training programs for IF teams and evaluate the effectiveness of this training through observation of IF team performance.

i. Department of Technical and Economic Cooperation (DTEC)

DTEC will coordinate disbursement of funds for grant-financed activities, initially drawing on its own counterpart fund for advances to participating agencies. DTEC will also manage procurement of all grant-financed goods and services. Finally, DTEC will also contribute to monitoring and evaluation of the Project.

4. Implementation Plan

Agreement executed	- 8/80
Field Manager assigned and expatriate consultant contracted	- 10/80
IF Team and POU staff recruited and training begins	- 11/80
Initial CPs met	- 12/80
Phase I field operations initiated	- 1/81
Phase I construction initiated	- 10/81
Phase I evaluation completed	- 2/82
Phase II field operations initiated	- 3/82
Phase II construction begins	- 10/82
Phase I/II evaluation completed	- 2/83
Phase III initiated	- 3/83
Project completed	- 9/87

b. Phasing of Project Implementation

The Project will be implemented in overlapping phases, in three different tambon groupings. Reasons for conducting the project by phasing are many. First, because the project aims to reach the majority of the population of the watershed., simultaneous conduct of intensive parts of the project would be unmanageable. For example, building over a hundred waterworks at once would exceed the capability of DLD inputs to the project. By phasing, however, the process becomes manageable on this scale.

Secondly, phasing allows assessment and evaluation before activities are expanded into other areas. It does not allow total evaluation prior to expansion, since the phases overlap each other at one year intervals. Without overlap, it would be far too long before benefits reached later areas of the watershed. Nevertheless, partial evaluation of, for example, IF Team acceptance can take place, before introducing IF Teams to other areas, and all activities will have precedents occurring before the same activity occurs in another areas. This will be a most useful feature in allowing the project to build on its own experience.

Thirdly, phasing allows more "difficult" areas to be developed later in the project life, after experience has been accumulated and problems have been worked out, and after better infrastructure (and

security) is available in these areas.

The phasing of core development activities of the project is shown in Table IV.4.

Tambons Tha Pha and Chang Khoeng were chosen as the first phase area for development early in the Project design process. They contain 16% of the Karen population of the watershed, 3% of the Hmong, and 72% of the Thai. The choice of these two tambons as the area to begin the project was made for a number of pragmatic reasons and all concerned, including the people of Mae Chaem, were notified of this decision. First, this area has the best infrastructure and is the closest to the amphur town, where the project will be headquartered. Second, it is the area that is most secure. Third, it contains 40% of the watershed population, although hill tribe residents are proportionately under represented. The ease of access, more reliable security conditions, and therefore lower degree difficulty allow the project to "begin small" while learning as much as possible in the first phase, before expanding in scale and area. Also, during the two years, road infrastructure in the watershed will significantly improve, allowing easier access to Phase II/III areas. The primary drawback of selecting this area first is that, unless detailed on-the-ground planning shows otherwise, only 300 rai (48 ha.) of new flood irrigated fields will be added. The primary emphasis will thus be disproportionately placed on upland fields and improved irrigation to existing fields. Despite this drawback, there will be sufficient work on all project components in this area that the project methodology can be rigorously tested and if necessary modified, before expanding in scope and area in latter phases.

Tambons Ban Thap and Ban Chan were selected for Phase II development for the reasons cited below. In addition, these tambons contain a high percentage of the Karen and Hmong populations, thereby correcting the bias of Phase I.

(i) Limited land potential in Ban Thap suggests it should be in an early phase so that there will be as much time as possible to do whatever can be done, particularly to emphasize intensification through extension efforts.

(ii) Ban Chan should be in an early phase, so that the larger amount of water and wet-rice land potential can be developed to provide benefits as soon as possible.

(iii) Ban Chan should be "paired" (in the same phase) with areas of less demanding construction/physical works so as not to overtax the implementation agency (DLD). If paired with Ban Thap, it will be easiest to equitably manage allocation for impoverished Ban Thap households who may wish to relocate to wet-rice land in Ban Chan.

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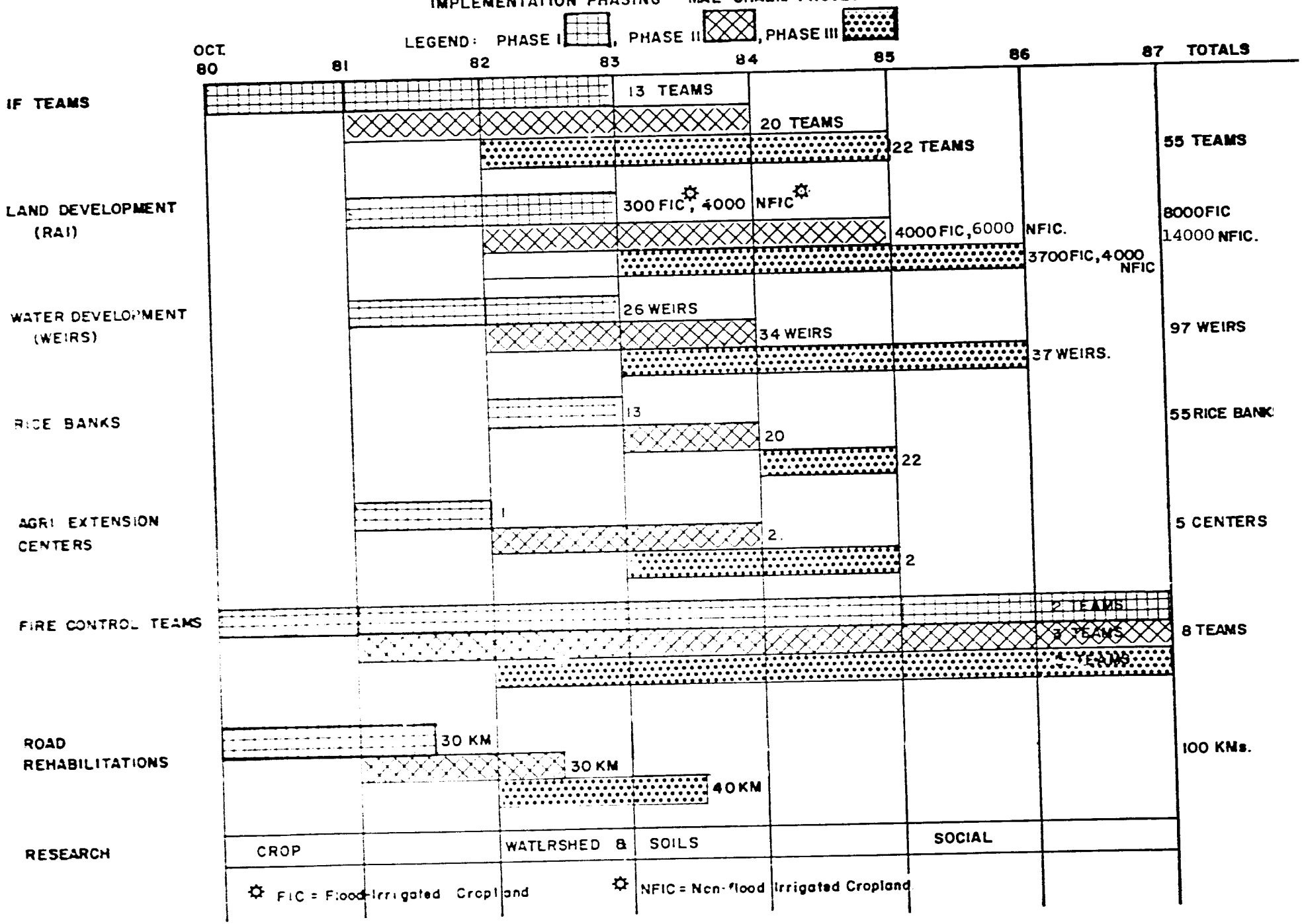
TABLE IV.1

IMPLEMENTATION PHASING — MAE CHAEM PROJECT



c. Activity Sequence in each Phase

i. First Year

Table 5 shows the activity sequence, on the ground, for each phase of the project. Sequence begins with the introduction of the Interface Teams. Prior to this, tambon and village leaders will have been thoroughly briefed (by project and amphur staff) on what is to occur and these leaders can assist and look after IF teams during the first weeks of the sequence. The sequence should start somewhere around the beginning of the cool/dry season (December or January) in order to allow enough time for essential things to occur before labor will be tied up by the growing season beginning in May-June.

During the first dry season Interface Teams begin their separate activities in the villages (non-formal education, literacy training, training in health and sanitation, etc.). At the same time Interface Teams assist village committees in going over the details of the land and water development proposals. Project beneficiary guidance (to help the poor and landless) is explained and stressed and village allocation planning takes place. Interface Teams assist in working out any problems with the land and water development plans. This planning takes place concurrently at village, tambon and phase-area (2-3 tambon) level.

Also during the first dry season Interface Teams assist village committees in self-help project planning to be funded by the project. Villagers choose their own projects for the season, within budgetary guidelines. Village committees then submit their proposals through tambon to amphur authorities. Aside from stimulating village organization and creating good feeling, these little projects have the effect of keeping the poor employed within the village so they can participate in planning the larger land and water benefits.

Also during the first dry season, RFD conducts road rehabilitation throughout the phase area, in preparation for their erosion control activities to begin in the wet season.

Finally, during the first dry season DAE builds demonstration terraces in villages where wet-season techniques will be demonstrated during the wet season. During the growing season all on-going activities continue as much as possible, but slowed down by communications problems and the fact that villagers are busy in their fields. The pay for the self-help projects will help villagers get through the crucial rice-short months from July to November, but if real shortages occur the project should make some kind of assistance provision for rice support, the mechanism for which should be worked out on the ground. Direct loan (but not rice bank, loan from project to individual), to be worked off during next dry season labor, is preferable to gift.

By harvest time, all construction plans in the phase area have been finalized and construction of waterworks begins immediately after harvest employing local labor. Terrace construction also begins. All necessary material to begin this work should have been assembled at tambon storage points during the previous dry season. Arrangements should also have been made during the year for all additional inputs needed to arrive at the construction sites on time.

ii. Second Year

Construction of land and water improvements takes place throughout the dry season using local labor. Dry season village self-help projects can also take place this second year, but care must be taken that their labor requirements do not interfere with the needed labor inputs for the land and water improvements.

Demonstration of dry season cropping is conducted on the DAE demonstration village terraces. These demonstrations continue, dry season and wet season, throughout the phase and beyond the life of the project, but the number of terraces used is reduced after a project phase is completed.

In the second year, rice banks are established in the dry season, in anticipation of rice shortfalls during the growing season, but based on villager ability to pay back after harvest with the expanded land and water resources (see II.E above). Cash credit also becomes available as an alternative, especially for those who will grow cash-crops instead of rice during the growing season.

During the second year, RFD begins non-agricultural fire control in the dry season. At the beginning of the wet season road erosion control program resumes, and pilot woodlot and Dry Dipterocarp Forest enrichment plantings are begun. Interface Teams separate activities (education services and health, etc.) continue throughout the second year. DAE pays special attention to the rice crop during the growing season to help protect against crop failure (which could undermine the rice bank program as well as having other disastrous effects).

iii. Third Year

During the third year, and subsequent years, all programs continue until they reach logical termination or take-off points. For example, land and water construction continue until the plans are completed, fire and erosion control phase over the regular RTG budget, Interface Teams phase out as regular extension services expand, rice banks become self-sustaining, etc.

B. Financial and Procurement Arrangements

The Grantee will be represented by the RTG's Department of Technical and Economic Cooperation (DTEC). DTEC will provide financial control

of the Grant by financing eligible local costs directly through an advance of counterpart funds and then requesting reimbursement of actual costs up to agreed maximum amounts from AID.

A unified budget process will be used to request funds from the Bureau of the Budget (BOB) to support project activities by the various participating departments of the MOAC. The Projects Division of the Office of the Under-Secretary will prepare this unified budget, relying on the Northern Agricultural Development Center, the Project Operations Unit, and field representatives of the line departments for inputs. The budget flow will involve allocations from the BOB and DTEC (advance on AID funds) to Departmental head offices in Bangkok, then to departmental accounts in the provinces, to be drawn upon by project-level representatives of the departments and the POU.

DTEC will directly procure and contract for all local services as well as offshore goods and services through its procurement unit unless (1) AID determines that it is practical and possible to substitute U.S. excess property, or (2) the implementing agencies, AID and DTEC determine that in certain instances the implementing agencies may be better situated to tender directly for certain equipment needs. No need for direct AID contracting is foreseen. AID is to establish direct letters of commitment for all foreign exchange commodities and will use a direct payment mechanism for foreign exchange services.

The procurement process will be expedited as much as possible by certain pre-implementation actions. The candidate for the long term advisory position has already been contacted to ascertain interest. Specifications for equipment needs are already being developed. Possible candidates for the Project Operations Unit will be contacted as soon as the Project has been authorized so that their interest and availability dates may be determined and contracting arrangements discussed with DTEC. Recruitment and training plans for interface team members should be completed before the Agreement is signed so that these efforts can begin as soon as possible after the field manager of the POU has been assigned.

C. USAID Monitoring Provisions

One USDH Rural Development Officer and one FSN Assistant Project Officer will devote one-third to one-half of their time to monitoring the Mae Chaem Project and helping to establish effective RTG/POU management. They will be assisted in monitoring implementation progress by a USAID Project Committee, on which will be represented the Mission's behavioral science advisor (who was a major contributor to the project design), economist, a generalist project officer, engineer, and financial analyst. The two USAID rural development officers will visit the project site a minimum of two times per month in the early implementation period, once per month thereafter.

In addition to this overall monitoring program, a critical factor will be the monitoring of construction activities. It is planned that this monitoring will be carried out by a local, independent engineering firm,

for this and other USAID Projects. The firm will furnish USAID with monitoring and completion reports on each item of construction - e.g. water works - with a unit cost above $50,000. The firm will also be available to report on other engineering aspects of the Project on a spot check basis as determined by USAID. USAID engineers will be responsible in all cases for final acceptance and certification. (Note: IN the event arrangements to contract for a local firm cannot be concluded to backstop USAID engineers by early 1981, an engineer will be hired to supplement the POU and will be financed out of this Projects contingency fund.

D. Evaluation

All aspects of monitoring, including special reports and the Project's ongoing management information system will provide material for periodic evaluation. In addition, however, we plan to bring in independent experts to assist in in-depth reviews of all aspects of the project at given points in time.

The 3-phased implementation approach permits and requires appropriately timed evaluation reviews. The ability to move from phase 1 to phase 2 will in fact depend on the results of an early evaluation. Certain important project elements are to be considered in this evaluation. Criteria for measuring the progress of phase I and readiness to proceed with Phase II will include:

1. INSTITUTIONAL

   - Project Operations Unit key staffing completed and functioning efficiently.

   - Evidence of effective coordination among key agencies participating in the project.

   - Approved implementation and financial plan for Phase II.

   - Budgets approved for operations of all participating agencies in Phase II area.

2. PROCESS

   - Interface teams in place in phase I area; not less than 75%. Further, evidence of IF team effectiveness such as degree of acceptance by villagers, existence of village-approved land and water development plans.

   - Timely initiation of and acceptable progress on land and water development projects in Phase I area, particularly including necessary labor input by villagers.

   - Phase I activities proceeding with no more than minimum level of conflict, among Phase I residents, between residents and government agencies, and among government agencies.

- Evidence of continuing cooperation among MOAC agencies in making additional land available for cultivation and processing land use certificates in a timely manner.

- Security conditions in Phase II area permit initiation of Project activities.

This internal evaluation must take place prior to the begining of Phase II activities in the dry season (October-May) of 1981/82. Given this requirement, and considering the need to permit a sufficient period of project implementation to provide a basis for judgment, the evaluation will be done in Janaury/February 1982. This tight scheduling assumes that necessary pre-implementation activities of Phase II, will be built into Phase I, such as the hiring and training of Phase II interface teams.

An in-depth evaluation with external participation (US and Thai) will take place in January/February 1983. This pre-Phase III review will be able to consider both the technical aspects of phase I construction activities which will have been completed, and the social aspects of ongoing interface team activities.

The next evaluation will also be in-depth with outside expertise and is scheduled for early FY 84. This evaluation will consider the completion of phase I in all its activities.

A final end of project special evaluation is scheduled for 1987.

E. Conditions Precedent, Covenants, Waivers, Negotiating Status

The following CP's and covenants are anticipated for the Agreement. As a result of intensive negotiation with the RTG for several months, all componenets have been collaboratively developed. There is agreement on all substantive elements and no significant delay is expected for executing a Project Agreement after the Project is authorized.

1. Initial Conditions Precedent to Disbursement

(Note: These CPs would apply to all Project elements except for the long term expatriate advisors and local Project field staff, including recruitment costs and training costs for Project field staff).

(a) Establishment of Provincial and district RTG Project Committees.

(b) Detailed Implementation and Financial Plan for Phase I and general plans for Phase II and III.

(c) Field Manager assigned.

(d) Evidence that RTG has taken appropriate steps to: (1) establish a system of land allocation based in principle on mutually agreed upon beneficiaries criteria, (2) allow local issuance of long-term land-use permits in the Mae Chaem Watershed in accordance with MOAC regulations, (3) establish a plan for the timely issuance of permits.

2. Condition Precedent for Commencing Construction Activities

Prior to the commencement of any construction activities for which reimbursement will be sought, the Government shall furnish to AID in form and substance satisfactory to AID detailed plans and firm cost estimates of the construction to be carried out.

3. Special Covenants

(a) The Parties agree to carefully monitor the status of the Project, and if security or other constraints to proper implementation make it likely that the Project will not achieve its purpose and/or cause substantial risk to Project personnel, the Parties may agree to terminate or suspend Project activities at any time.

(b) The Grantee covenants to assure that funds reserved for Phase I of the Project will not be used for any activities within designated Phase II or Phase III areas of the Mae Chaem Watershed.

(c) The Grantee will assure that farmers obtaining land under the Project agree not to cultivate opium on that land and the Grantee will further assure that such agreement is monitored for compliance.

4. Waivers

Waivers are needed for procurement of non-U.S. motor vehicles and certain third country services as follows:

(a) Twelve one-ton right-hand drive pick-up trucks are needed to support and transport personnel and material throughout the Project area. Requirement of right hand drive plus importance of adequate supply of spare parts and serviceability preclude procurement of U.S. vehicles. (Note: inappropriateness of U.S. vehicles for remote areas of Thailand has already been established for Hill Area Education Project, Non-Formal Vocational Education Project and Off-Farm Employment Project among others). Probable source of vehicles: local or Japan. Total expected cost: $144,000. Waivers requested: 636I and source/origin to Code 935.

(b) Thirty-three light motorcycles (125 cc or less) are needed to give mobility to RTG personnel from participating agencies in the Project area. Light motorcycles are needed for economy and to insure parts standardization, since virtually all motorcycles owned by RTG agencies are 125 cc or less. U.S. motorcycles are unsuitable since they are too large and spare parts/servicing capability are not available in rural North Thailand.

Probable Source of Vehicles:		Thailand
Total expected cost	:	$41,250
Waiver needed	:	636I

(c) Fifteen quarter-ton right hand, four wheel drive jeep vehicles are needed to transport interface team members and other RTG agency personnel to and from remote field sites within the Project are. As in the case of the Hill Area Education Project, only American Motors Corp. jeep vehicles can be used in rural areas of the North because of the lack of spare parts and servicing available for any other U.S. utility vehicle (see Bangkok 79, 49240 and Bangkok 00404 for detailed justification for proprietary procurement of jeeps).

Probable Source of Jeeps:		U.S.
Total Expected Cost	:	$180,000
Waiver Request	:	Proprietary Procurement

(d) A predominant capability and source-origin waiver to Code 935 is requested for the long term (5 years) advisor who will be stationed in the Project area. It is proposed that the advisor will be Mr. Grahame Keen, a New Zealander who has been instrumental in developing this Project's approach and who has participated in its inception and development. Mr. Keene is considered the foremost expert on land use in North Thailand and no other consultant has the combination of expertise, experience and knowledge of the Project that makes Mr. Keen uniquely qualified to advise the RTG on all aspects of the Project.

Probable Source of Expertise:		New Zealand
Total Expected Cost to Grant:		$350,000
Waiver Request	:	Source/Origin to Code 935 and waiver of competitive requirements.

79/80

MAE CHAEM WATERSHED DEVELOPMENT PROJECT

PROJECT NO. 493-0294

LIST OF ANNEXES

ANNEX	SUBJECT
A.	PID approval cable and Feasibility review cable
B.	Logical Framework Matrix
C.	Grantee Application for Assistance (to be submitted separately)
D.	Technical Analysis - Back-up Material
	1 - Technical Agriculture
	2 - Engineering/Construction
	3 - Road Access within the Watershed
E.	Social Soundness Analysis, with Tables
F.	Economic Returns Analysis
G.	Draft Project Authorization

8/82

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DEPARTMENT OF STATE

TELEGRAM

ANNEX A-1

AMERICAN EMBASSY BANGKOK PROJ: 493-294

UNCLASSIFIED
Classification

STATE 73081
RECD: 24MAR79. 20

NNNNVV MJA712MJA708EHK060 L
RR RUMJQB
DE RUEHC #3081 0831250
ZNR UUUUU ZZH
R 240012Z MAR 79
FM SECSTATE WASHDC
TO AMEMBASSY BANGKOK 4529
BT
UNCLAS STATE 073081

AIDAC

E.O. 12065 N/A

TAGS:

DISTRIBUTION

ACT	INFO
D	✓
	✓
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	✓
✓	
	✓

ACTION TO:
DUE DATE: 4-2-79
ACTION TAKEN:
INITIAL:
DATE :

Date Received
26 MAR 1979
08:30

SUBJECT: HIGHLAND AREA DEVELOPMENT RDVISED PID (493-0294)

1. THE ASIA PROJECT ADVISORY COMMITTEE (APAC) MET TO CONSIDER THE SUBJECT PID ON MARCH 13, 1979. DISCUSSION REFLECTED A GENERAL CONCERN THAT PID IS PROPOSING A BROAD, COMPREHENSIVE PROJECT FOR WHICH IT WILL BE DIFFICULT TO MEET THE GOALS AND PROJECT PURPOSE WITH FUNDING WHICH HAS BEEN PROPOSED AND WITHIN PROPOSED TIME FRAME. IN ADDITION, SPECIFIC CONCERNS WERE EXPRESSED REGARDING CULTURAL IMPEDIMENTS TO PROJECT IMPLEMENTATION, RTG INSTITUTIONAL ARRANGEMENTS FOR DELIVERING SERVICES TO THE HILLTRIBE AREA, AND THE PROBABLE EFFECT OF CURRENT LAND TENURE PATTERNS UPON PROJECT SUCCESS.

2. THE APAC APPROVED THE PID FOR PROJECT DEVELOPMENT SUBJECT TO CONSIDERATION OR RESOLUTION DURING THE DESIGN PROCESS OF THE FOLLOWING ISSUES:

(A) PROJECT PURPOSE. IN VIEW OF THE COMPLEXITY OF THE PROPOSED PROJECT AND THE RELATIVELY SHORT TIME FRAME, THE PP SHOULD CLEARLY SET FORTH GOALS AND PURPOSE HE PP SHOULD CLEARLY SET FORTH GOALS AND PURPOSE

USAID AND THE RTG EXPECT TO ACHIEVE IN FIVE YEARS.

....(B) CONCERNING THE AMBITIOUSNESS AND APPARENT COMPLEXITY OF THE PROPOSED ACTIVITIES, THE PP WOULD BENEFIT FROM A DISCUSSION OF THE EXTENT TO WHICH ACTIVITIES ARE IN FACT SUPPORTING AND BUILDING UPON ON-GOING EFFORTS BY USDA, THE UN, AUSTRALIAN AID AND SO ON. PP ANALYSES SHOULD ESTABLISH FEASIBILITY OF PROPOSED APPROACH WITHIN BOTH BUDGET AND TIME FRAME.

....(C) MARKETING. BECAUSE THE ABSENCE OF AN ADEQUATE MARKETING STRATEGY HAS APPARENTLY BEEN A SERIOUS LIMITING FACTOR IN EARLIER HILL AREA CROP SUBSTITUTION AND AGRICULTURE PROJECTS, PARTICULAR ATTENTION SHOULD BE DEVOTED TO THE ISSUE OF MARKETING OF INCREASED AGRICULTURAL OUTPUT.

ANNEX A-2

DEPARTMENT OF STATE

TELEGRAM

AMERICAN EMBASSY BANGKOK PROJ 493-294

ACTION USAID-5

AMB	X
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UNCLASSIFIED
Classification

STATE 328520

Dec 21 10 48 PH '79

PRIORITY

NNNNVV MJA391ESC501
PP RUMJQB
DE RUEHC #8520 /3551403
ZNR UUUUU ZZH
P 211325Z DEC 79
FM SECSTATE WASHDC
TO AMEMBASSY BANGKOK PRIORITY 2856-2857
BT
UNCLAS STATE 328520

DISTRIBUTION: ACTI | D | EXO | O/FN | O/PPD | O/CST | O/HHD | O/ED | O/N | O/HMT | T&S | EMB | C&R

AIDAC

E.O. 12065: N/A

TAGS:

SUBJECT: MAE CHAEM WATERSHED DEVELOPMENT (493-0294)

1. FOLLOWING THE DECEMBER 12, 1979 FEASIBILITY REVIEW OF THE PROPOSED PROJECT, AA/ASIA APPROVED FURTHER DESIGN WORK LEADING TO A PROJECT PAPER (PP) TO BE SUBMITTED TO AID/W FOR APPROVAL AND AUTHORIZATION. THE PP SHOULD REFLECT THE FOLLOWING DESIGN CONSIDERATIONS:

...(A) THE PP SHOULD BE SIMPLIFIED, HIGHLIGHTING THE RANGE OF POSSIBLE ACTIVITIES TO BE UNDERTAKEN IN MAE CHAEM VILLAGES, AS WELL AS PROPOSED IMPLEMENTING/MONITORING ARRANGEMENTS.

...(B) IN VIEW OF THE RANGE OF PROPOSED ACTIVITIES AND PROPOSED GEOGRAPHICAL SCOPE, THE PACD SHOULD ALLOW FOR A FIVE YEAR IMPLEMENTATION PERIOD.

...(C) PROJECT DESIGN SHOULD ASSUME AUTHORIZATION OF THE FULL AMOUNT OF PROPOSED FUNDING, INCLUDING A PARTIAL FIRST YEAR OBLIGATION, WITH SUBSEQUENT OBLIGATIONS SUBJECT TO THE AVAILABILITY OF FUNDING AND SATISFACTION OF CONDITIONS FOR PROJECT GEOGRAPHIC EXPANSION WHICH ARE SPELLED OUT IN THE GRANT AGREEMENT.

...(D) THE PROJECT SHOULD INCLUDE A REALISTIC, GEOGRAPHICALLY PHASED IMPLEMENTATION PLAN AND SET FORTH BENCHMARKS OR CRITERIA AGAINST WHICH IMPLEMENTATION WILL BE EVALUATED TO PERMIT MEASUREMENT OF PROJECT ACHIEVEMENT AGAINST TARGETS WHICH ARE CLEARLY SET FORTH IN ADVANCE. PROPOSED MONITORING ARRANGEMENT SHOULD FACILITATE SUCH EVALUATIONS. AMONG OTHER THINGS, DETERMINANTS OF CASH INCOME SHOULD BE MONITORED IN VIEW OF THE PROPOSED PROJECT PURPOSE. THESE BENCHMARKS SHOULD ALSO BE REFLECTED IN THE CONDITIONS, (C) ABOVE, FOR FUNDING OF TRANCHES SUBSEQUENT TO THE FIRST YEAR.

...(E) WITH REGARD TO PROJECT IMPLEMENTATION, THE PP SHOULD RESOLVE ISSUES WHICH HAVE BEEN RAISED REGARDING THE NATURE (U.S. CONTRACTORS VS. THIRD COUNTRY NATIONALS) AND

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LOCATION (MAE CHAEM VS. CHIANG MAI) OF LONG-TERM ADVISORS. IT SHOULD ALSO SPECIFY PROPOSED CONTRACTING ARRANGEMENTS. WITH REGARD TO PLANNED INTERFACE TEAMS, IT IS REQUESTED THAT USAID CHOOSE AN ALTERNATIVE NAME, FOR INSTANCE AMPHUR DEVELOPMENT TEAMS.

...(F) THE PP SHOULD SPECIFY MONITORING ARRANGEMENTS WHICH WILL ASSURE THAT ANY FUTURE CHANGES IN OPIUM CULTIVATION IN THE REGION ARE IDENTIFIED IMMEDIATELY BOTH AS TO LOCATION AND FACTORS GIVING RISE TO SUCH CHANGES.

...(G) THE PROJECT SHOULD SPECIFICALLY INCLUDE PROVISIONS WHICH WILL PERMIT USAID AND THE RTG TO SUSPEND OR TERMINATE THE PROJECT, OR TO DEFER EXPANSION, IN THE EVENT SECURITY OR OTHER CONDITIONS SO INDICATE.

2. TO SUMMARIZE THE FEASIBILITY REVIEW ATTENDED BY USAID REPRESENTATIVES, ONE MEMBER OF THE DESIGN TEAM, AND OUTSIDE OBSERVERS, AS WELL AS REPRESENTATIVES OF CONCERNED AID/W OFFICES, THE FOLLOWING SPECIFIC ISSUES WERE DISCUSSED:

...(A) ACCESS AND LOGISTICAL SUPPORT. IT WAS INDICATED THAT 85 PERCENT OF THE POPULATION OF THE WATERSHED LIVES WITHIN 5 KMS OF ALL-WEATHER ROADS AT THE PRESENT TIME. THE REMAINDER OF THE POPULATION CAN BE EXPECTED TO CONTINUE TO UTILIZE THE NETWORK OF TRAILS AND LESSER ROADS WHICH CRISSCROSSES THE AREA. PROJECT COMPONENTS MOST LIKELY TO BE AFFECTED BY INSUFFICIENT ACCESS, SUCH AS IRRIGATION AND CASH-CROP TRANSPORT, WILL PROBABLY NOT TAKE PLACE IN THE REMOTER VILLAGES UNTIL LATE IN THE COURSE OF PROJECT IMPLEMENTATION, IF AT ALL.

...(B) GEOGRAPHICAL SCOPE AND FUNCTIONAL COMPLEXITY. WITH REGARD TO THE FUNCTIONAL COMPLEXITY OF THE PROPOSED PROJECT IT WAS ARGUED THAT IT IS NOT POSSIBLE TO REDUCE FURTHER PROPOSED ACTIVITIES WITHOUT NEGATIVELY AFFECTING THE PROJECT PURPOSE OF INCOME GENERATION. FURTHERMORE, BECAUSE THE WATERSHED IS A SOCIO-NATURAL UNIT, THE PROJECT SHOULD BE PLANNED TO INCLUDE ENTIRE WATERSHED. HOWEVER, PLANNED PHASING OF IMPLEMENTATION WILL ENABLE AREDUCTION IN GEOGRAPHICAL SCOPE, IF IT DOES NOT PROVE POSSIBLE TO DELIVER A FULL ARRAY OF SERVICES THROUGHOUT THE AREA.

...(C) RTG LEADERSHIP/COMMITMENT. UNLIKE SOME EARLIER NON-AID PROJECTS WITHIN THE AREA, THIS PROJECT WILL BE IMPLEMENTED BY THE RTG AND WILL RESULT IN A COORDINATED DELIVERY OF SERVICES UNDER THE AEGIS OF THE MINISTRY OF AGRICULTURE. USAID FEELS THAT AS A RESULT OF THE LENGTHY AND CAREFUL PROJECT DESIGN PROCESS, GENUINE COMMITMENT ON THE PART OF THE RTG HAS DEVELOPED. THE MISSION SEES THESO-CALLED INTERFACE TEAMS AS A VALUABLE DEVICE FOR ACHIEVING COORDINATED IMPLEMENTATION AT THE LOCAL LEVEL.

...(D) SECURITY. IN THE MISSION'S VIEW, THE SECURITY SITUATION IN MAE CHAEM IS NOT SERIOUS ENOUGH AT THE PRESENT TIME TO WARRANT CURTAILING PROJECT DEVELOPMENT OR PLANNED IMPLEMENTATION. HOWEVER, THE DECISION TO PHASE IMPLEMENTATION WILL PRESENT A SERIES OF OPPORTUNITIES PERIODICALLY TO REVIEW THE SECURITY SITUATION AND OTHER ISSUES AND TO MODIFY OR CURTAIL THE PROJECT, IF NECESSARY. FURTHERMORE, THE DECISION TO RESTRICT THE NUMBER OF EXPATRIATE ADVISORS

WILL REDUCE THE RISK OF USG EXPOSURE. IN ORDER TO REDUCE THE RISK EVEN FURTHER, USAID IS EXPLORING HIRING A THIRD COUNTRY NATIONAL AS THE FIELD ADVISOR LOCATED IN MAE CHAEM, WITH THE SECOND LONG-TERM ADVISOR LOCATED IN CHIANG MAI.

...(E) LAND TENURE AND CITIZENSHIP. THE RTG IS WORKING WITH USAID TO DEVELOP A PROCEDURE FOR ASSURING THE LAND TENURE OF FARMERS WITHIN THE PROJECT AREA IN ORDER TO PROVIDE SUFFICIENT INCENTIVES FOR THEM TO ADOPT PROJECT INNOVATIONS, BUT THE PROJECT WILL NOT DIRECTLY AFFECT THE PROVISION OF CITIZENSHIP TO AREA RESIDENTS. NOR IS LACK OF CITIZENSHIP EXPECTED TO DETER RESIDENTS FROM FULL PARTICIPATION IN THE PROJECT. HOWEVER, BY REGULARIZING LAND TENURE, THE PROJECT WILL INDIRECTLY ASSIST RESIDENTS TO SECURE CITIZENSHIP BY PROVIDING THEM WITH REQUIRED PROOF OF RESIDENCY WHICH IS A PRE-REQUISITE TO APPLYING FOR THAI CITIZENSHIP. VANCE
BT

Annex B

8/7/80

AID 1020-24 (7-71) SUPPLEMENT I

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

INSTRUCTION: THIS IS AN OPTIONAL FORM WHICH CAN BE USED AS AN AID TO ORGANIZING DATA FOR THE PAR REPORT. IT NEED NOT BE RETAINED OR SUBMITTED.

Life of Project: From FY 80 to FY 87
Total U.S. Funding: $ 10 MILLION
Date Prepared: MAY 1980

Project Title & Number: MAE CHAEM WATERSHED DEVELOPMENT (493-0294)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Program or Sector Goal: The broader objective to which this project contributes: (A-1) To raise the quality of life of the occupants of watersheds in North Thailand in ways which support increasing environmental stability and which are self-sustaining.	**Measures of Goal Achievement: (A-2)** 1. Continuing increase in areas cultivated and productivity of land in specified uses. 2. Increase in cash earnings by agricultural households from cash cropping. 3. Population functionally literate in areas of vital concern to daily living. 4. Population knowledgable about primary causes and preventive measures associated with basic health problems. 5. Population generally participating in local planning and decision making. 6. Stable/decreasing rates of runoff and sediment yield in specified test areas. 7. Stable/increasing annual rates of forest growth per unit area. 8. Decreased range of water discharge rates from sub-watersheds in North Thailand (Max-Min.)	**(A-3)** The use of maps physical surveys of soil, water and vegetation, records of agricultural production and socio-economic surveys, before during and at end of project.	**Assumptions for achieving goal targets: (A-4)** 1. People actively desire improved living standards, greater economic security and improved health and educational opportunities. 2. They are willing to participate in program which they believe will lead to these objectives. 3. The physical resources to increase production are available for people's use in North Thailand. 4. The Royal Thai Government will agree to and maintain a commitment to the development of the remote watersheds of North Thailand.
Project Purpose: (B-1) To establish a self-sustaining upward trend in the real income and access to socio-economic services for the rural households of Mae Chaem, with emphasis upon the landless poor, by methods whereby: 1) the people are their own planners; 2) environmental deterioration trend is reversed and 3) Replication in other watersheds is demonstrated as practical.	**Conditions that will indicate purpose has been achieved: End of project status. (B-2)** 1. Subsistence rice self sufficiency for the watershed. 2. Majority of currently landshort households legally utilizing sufficient land to produce subsistence rice and begin cash cropping. 3. Ability to read simple directions among target group. 4. Beneficiaries able to relate basic health problems to their causes and with capacity to take preventive measures. 5. Traditional as well as innovative (e.g. rice banks, adult education groups, etc.) socio-economic organizations institutionalized and in the hands of the local people, with broad participation by the poor sections of the community. 6. Fall in runoff and sediment yield over life of project recorded by test plots. 7. Natural vegetation ground cover steadily increasing. 8. Decreased maximum and increased minimum water discharge at mouth of Mae Chaem river. 9. Existence of RTG plans to replicate project.	**(B-3)** 1. Comparison of "end of Project" production records with data provided by current socio-economic survey by Kasetsart University and with other participating agencies and with other USAID funded independent studies conducted throughout the Project life. 2. Information recorded by IF teams throughout the Project life. 3. Comparison of hydrological and biomass yield data recorded throughout the project life.	**Assumptions for achieving purpose: (B-4)** 1. The RTG agencies participating in the Mae Chaem Project will do so with full commitment to the methods of participatory planning and development from the bottom up. 2. Similar commitment will be obtained from the great majority of the local people through the use of these methods. 3. It is assumed that rice subsistence is the essential base for increasing the economic viability of the great majority of households in the watershed. 4. Security conditions will not impede the effective implementation of the Project. 5. RTG will budget adequate funds for maintaining existing and planned infrastructure during and after the Project in Mae Chaem.
Outputs: (C-1) 1. Flood irrigated land developed and allocated. 2. Non-flood irrigated land (upland fields) developed and allocated. 3. Project operations unit established. 4. Interface teams recruited, trained and operational. 5. Farmer Organization. 6. Training Program established. 7. Extension Program established. 8. Agricultural Research Program established. 9. Agricultural credit and Rice Bank system established. 10. Establishment of fire control teams and program. 11. Village woodlots established. 12. Road rehabilitation program. 13. Irrigation Systems	**Magnitude of Outputs: (C-2)** 1. 1200 hectares 2. 2300 hectares 3. One unit 4. 55 teams 5. One per settlement 6. Operational Training Center 7. 15 Agents and supervisors equipped and in place. 8. 1 Center operating. 9. BAAC and rice bank facility. 10. 8 teams equipped and operating. 11. 120 hectares. 12. 100 km rehabilitated. 13. 102 irrigation works in place	**(C-3)** -Reports of applied research findings. -Reports of farmer training courses held. -Registration of farmer organizations. -Interface team work reports. -BAAC credit transaction records in Mae Chaem Field Office. -RFD records of Land Use Permit issue to farming households. -RFD records of forestry planted, fire prevention and erosion control measures taken. -DLD maps and records of land developed for agriculture.	**Assumptions for achieving outputs: (C-4)** Applied research will lead to improved systems of crop and animal production. Systematic fire control will lead to a more productive and soil protective forest cover on non-agricultural land. The local people will cooperate to protect and improve the physical and social environment as well as in enterprises leading directly to higher production. Adequate amounts of suitable land will be made available for the required expansion of agricultural activity.
Inputs: (D-1) 1. Land. 2. Commodities/equipment/vehicles. 3. Irrigation systems. 4. Land conservation structure. 5. Training. 6. Salaries. 7. Personnel. 8. Technical Assistance. 9. Village labor. 10. Construction training center, research facilities, staff housing, rice bank/credit facilities. 11. Tree seedlings. 12. Rehabilitation/maintenance of roads. 13. Evaluation/monitoring.	**Implementation Target (Type and Quantity) (D-2)** See Financial Plan of PP	**(D-3)** Landuse planning maps of the appropriate implementing agencies of RTG completed and accepted. RTG agency programs prepared and submitted. IF team selection and training models prepared and submitted. Formal notification from BAAC of intent to participate in the Project at field level.	**Assumptions for providing inputs: (D-4)** The coordinating role of the Nai Amphoe will be accepted by all implementing agencies in Mae Chaem and by their parent bodies elsewhere. RFD will agree to issue landuse permits and conduct an appropriate reforestation and fire control program. DLD will agree to conduct land and water use development programs. TRD will agree to develop training model and train IF teams. DOA will agree to conduct applied agricultural research for Mae Chaem farmers. DOAE will agree to conduct agriculture extension and training. All agencies will agree to cooperate fully with each other and with the IF team of the Project. Labour will be available to develop land and water resources using a labour intensive approach.

ANNEX C

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DEPARTMENT OF TECHNICAL AND ECONOMIC COOPERATION
Krung Kasem Road, Bangkok, Thailand
Cable: DTEC.
TEL. 817555

No. 1803(1)/14363 July 10 , B.E. 2523

Mr. Robert S. Queener
Acting Director
USAID/Thailand

Dear Mr. Queener,

Subject : Mae Chaem Watershed Development Project

We are pleased to inform you that the Highland Area Development Committee (HAD) has reviewed the project paper of the subject project and has agreed in principle.

Regarding road construction and rehabilitation, the HAD committee has decided that fund provided under this project will be utilized for the construction of new road while the RFD will provide fund under RTG regular budget to cover the cost of road rehabilitation.

We, therefore, request that a grant of $ 10 million be provided by USAID to support the implementation of this project.

Thank you for your kind cooperation.

Yours sincerely,

Apilas Osatanonda
Director-General

USAID Sub-Division
DEC-I
Tel. 2810966, 2813963

ANNEX D-I

TECHNICAL AGRICULTURE - FEASIBILITY OF INCREASED YIELDS

The technical feasibility of increasing agricultural production through expansion of land areas under cultivation is certainly a reasonable proposition. However there is also no doubt that the economic and social viability of the whole project is profoundly enhanced if major improvements can be made in productivity on an economically and environmentally stable basis.

It is perhaps a truism to repeat the ancient maxim of agricultural circles that to increase productivity at the bottom of the yield scale by 100% is usually less technologically challenging and cheaper than to increase it by 10% at the top. There is no doubt that most farmers are at or near the bottom of the scale of productivity in Mae Chaem. Basic reasons for this are fairly obvious:

- a generally unreliable irrigation water supply.
- the conservatism which is the basis of survival for the isolated poor.
- the lack of communication, both physical and human. Roads are just now coming to Mae Chaem; the development of community is somewhat inhibited between ethnic groups by a tendency towards residential and cultural separateness.
- endemic landlessness.
- an almost total absence of any effective extension services for the great majority.

There are no doubt other constraints but those identified are certainly paramount and they are the main concerns of this project. Irrigation is being improved under the project. RFD and others are now in the process of providing access to markets and to other people. This project is funding a program of road rehabilitation. The Interface Teams will provide an intensive process of non-formal education over three years in each phased area. It is planned to develop more than 3,000 Ha. of agricultural land.

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These Project components provide a reasonable basis on which to expect very significant increases in productivity in Mae Chaem. They are all essential components, integrated and providing mutual support, i.e., there is no missing link. Although more fully addressed in other parts of this project, it must be emphasized that an important part, indeed the main issue in the technical feasibility of increasing productivity as distinct from production in Mae Chaem and like areas is this very point: Land and water, access to resources and markets, people motivated, capable and confident, all are needed. It is no test of real technical feasibility for researchers to show that it is feasible to grow certain crops for food or sale. What must be shown is that these can be grown by farmers and that it is economically sensible for them to do so. In the real world, technical analysis and economic analysis are strongly interdependent.

Irrigated Cropland - Subsistence Rice

As refered to in the Project Proposal (1979) "average yields of threshed rice from irrigated fields in land cropped just once in the wet season are about 180 tang/Ha." (1.8 metric tons). At this level, inputs through flooding and the agricultural system itself have been proved to be sufficient to maintain a closed system. However, there is a strong positive correlation between an increased rice-yield and the growing of cash crops following the rice in the dry season. Over a wide range of samples through ten or more years of surveys these increases have been found to be from at least 30% to almost 100%. We should note that for whatever reason, yet to be researched, one may confidently expect a substantial increment of increased rice-yield to follow an increased cultivation of cash crops.

By the end of Project better husbandry, above all a reliable water supply must be expected to double existing rice yields because at present they are sufficiently low to make this easily attainable. Many farmers in Chiangmai Province harvest up to 4.5 metric tons per Ha. Very simple improvements will suffice to achieve the first doubling, leaving the next one to be achieved (if ever) by high producing strains, artificial fertilizers (should these remain economically viable) and so on.

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Irrigated Cropland - Cash-cropping

The socio-economic survey of Mae Chaem funded by NCU and conducted by Kasetsart University shows that the following cash crops are grown and marketed in Mae Chaem at present. They are presented below in order of stated farmer preference: soybean. garlic, shallots, sesame, peanut and tobacco.

These are representative of not less than 80% or more of all cash crops grown in the Northern Region of Thailand. Tobacco is at the bottom of the list in Mae Chaem, obviously because of difficulties in transporting it to the one curing station yet in the district. In more developed parts of the region it is by far the most popular crop to grow, largely becuase in terms of cash it is cost-free to the farmer. He provides land, water and labor. The tobacco companies provide all other inputs including seedlings.

However, the significance of these crops is that they are already grown in the Mae Chaem by the small number of farmers with a reliable water supply; market outlets exist for them on a regularly understood basis and they will of course command prices at which other farmers are willing to grow them. Again, what is missing is a reliable water supply, land to grow them on, and in the case of the very poor, especially the ethnic minorities, a continuous program of non-formal education and agricultural extension, to provide the confidence, motivation and knowledge needed.

One could sum up the technical feasibility issue of cash cropping on irrigated cropland by saying that these crops will grow and can be sold, because if farmers have the motivation, skill and a reliable water supply they do grow and sell them. If the Project provides more land, reliable water, non-formal education and agricultural extension then this process can certainly be expanded. It is technically feasible.

Rainfed Terraces - Subsistence Rice

This land type includes all that to be developed for what are called in Thailand upland crops, a term normally used to describe non-flooded crops or "dry-cropping". Terracing for the cultivation of upland or "dry-field rice" has considerable advantages over the sloping hillside rice swiddens now used with such poor results. These advantages

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are: (1) easier cultivation including if desired, deep cultivation because of the flat surface or the presence of soil retention devices; (2) improved water retention; (3) less subject to erosion of soil.

Experimental work done over the last 10 years to identify higher yielding, disease resistant varieties of upland rice has very positive indications. Results vary for the same species because of variations in micro-climatic and soil conditions typical of hill and mountain landscapes, but overall (there have been a great number) they leave no doubt that there is available a range of heavy yielding varieties which would under field conditions produce yields almost matching those possible under flood irrigation. There is also strong evidence that in almost all cases of the 200 + varieties tested, the rice produces more at lower elevations (1,000 metres or less). Every hill-farmer knows this, and most of the land mapped by DLD on the L.U. Planning maps for upland terracing is within this range.

Rainfed Terraces - Cash Crops

For cash cropping, except in cases where some sprinkler or trickle irrigation could be supplied, the choice for growing cash crops on rainfed terraces lies between growing them in the wet-season instead of rice or using an early maturing variety of rice, and a fairly quick growing cash crop (say an 80 day variety of soybean) to exploit the residual ground moisture after the rice. Trials to test the effectiveness of this latter approach have still to be carried out by the DOA research support teams for the project. It is a promising approach but it could not yet be called technically feasible. For the single crop wet season approach there is no doubt. Farmers in North Thailand including Mae Chaem already grow the same crops in the wet season on the hill-slopes, terraced or unterraced that they grow as dry season crops in the irrigated cropland. Thus we are in no real doubt of the technical feasibility of growing any of these crops, and of greater importance neither are some farmers.

Besides the apparent beneficial consequences from the results of agricultural research to be carried out under this Project, it will be the first time ever to attempt to systematically assemble and adapt research results related to the upper slope swidden and savannas for application under the various representative specific ecological conditions and management levels. In the process, repetition as

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well as omission of certain important aspects of the problems formed in previous studies can be detected and new or insufficiently investigated problems identified for investigation. This step in compiling past as well as on-going research is particularly important since unless the policy recommendations previously made by researchers are tried and adopted, further research may represent only additional expenses with little or no marginal benefits.

To the extent, however, that the Department of Agriculture (DA) would cooperative with DOAE in developing a presentation of research results in a form readily usable by extension agents and the IF teams, examples of failure in applying research results to real world problems are as important as examples of success. It will be especially useful if the causes of failure can be identified so that precautions can be taken. Successful cases, on the other hand, provide a firm base for further development of concepts and methodologies in achieving such success in the future, at lesser costs or at a faster pace.

Extension Services

The cropping research and agricultural extension service component of this Project is of particular importance because the promotion of permanent field agriculture will have a beneficial effect on forest regeneration on lands presently in swidden systems. Increases in production through land expansion will be increasingly more difficult in the future when less additional good agricultural land will be available and the forests themselves more needed. Higher yield and sustainability thus will have to be obtained through appropriate conservation works, improved seed, fertilizers, land preparation, and improved cultivation practices. Intensive land utilization, still lacking on the average in Mae Chaem watershed, can be achieved through a good extension system.

Extension services are primarily the responsibility of DOAE, with the assistance of the IF teams. Regular DOAE services are administered by the province extension officer and his assistants. Extension agents are assigned to give advice and information to farmers, to collect statistics on crop and economic status of farm families, disease and pest control, credit applications, produce marketing, seed

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multiplication, promotion of farmers associations and rural youth groups. The extension agents are usually distributed at about 1 per 3,000 farm families. The fact that non-extension activities normally occupy more than 80% of the extension agent's time indicates the extremely limited services they can provide. The problem is further enhanced by their lack of transportation.

Such inadequacy of extension service puts a serious constraint on agricultural development. At present, there is also little coordination between extension workers and the different agricultural research stations on the one hand and little interaction with the farmers on the other. Consequently, most findings which could prove useful to farmers remain unknown to them. Therefore, there is clearly a need to increase the number of extension workers and to make it possible for them to devote more of their time on extension related activities. No less important is the need to establish good linkages and channels of communication with farmers, as well with their own administering offices in order to learn and understand the real need of the farmers, convey it back to the appropriate office and to finally implement the necessary action leading to satisfying such need.

Given the limited changes that can take place within the present institutional framework, the Northern Agricultural Land Development (NALD) project resorts to employing "mobile units" to contact villagers and build mutual understanding. In Mae Chaem, increased extension coverage will be handled in two ways. The (World Bank funded) Agricultural Extension Outreach Program will raise the number of extension agents to about 20, while at the same time, particularly in the more remote areas, TF teams will play a similar role to NALD units, with an even more specific function of assisting in the planning process as well as encouraging villagers to utilize their land more intensively in preference to shifting cultivation. At the same time DA research facilities in the area and close cooperation between DA and DAE will mean more rapid and responsive action to assist in solving local problems.

Information on the NALD project undertaken by DLD indicates, as a result of extension service, an ever decreasing trend of arable land left uncultivated in most of its project areas under its agricultural development scheme between 1972-1978.

Percentage of Agricultural Land Left Uncultivated

	Mae Sa	Nam Kaen	Na Pang	Ta Nao
1972	14.5	-	-	-
1973	5.5	14.2	14.9	1.3
1974	3.0	24.2	10.1	23.5
1975	3.1	25.6	12.2	47.8
1976	1.4	15.2	11.0	40.4
1977	1.0	5.5	4.2	52.8
1978	1.0	4.6	4.0	39.7

With the exception of Ta Nao, all other locations experienced a decline in uncultivated land. The reason for a higher percentage of arable land left uncultivated in Ta Nao was, reportedly, lack of labor and/or lack of land preparation machinery. Yield per unit of land in all locations registered an increase on the average. The percentage of land under second cropping compared to total land also increased.

Increased land use under crop production will lead to a larger share of income from agricultural product, with less dependence on irregular sources such as non-agricultural work (See Table 18). With a more stable source of income from agricultural products, fewer people are expected to out-migrate, permanently or seasonally, for non-farm employment.

The research and extension program outlined above does not, for the reasons discussed, tie the implementing agencies (DA and DAE) into doing predetermined actions that could be analyzed here. Instead it commits the agencies to a process which is likely to yield the best results under the circumstances and at the same time should provide an information base that will be a real advantage to many other types of research and extension efforts which DA and DAE are customarily involved in. At best then, such an effort would have appreciable effects for the farmers of Mae Chaem and possibly also provide Thailand with one of the world's first thoroughly informed approaches toward extension efforts aimed at swidden agriculture. Since this cannot be confidently predicted in any detailed way, however, much less quantified, a more realistic appraisal here would be to assess what extension efforts in Mae Chaem could do if they simply took the approach of using known techniques within the watershed's population to try to narrow the gap between the best farmers practices and those of the worst.

Differences exist, within the same type of farming and for the same crops, between the results achieved by the most dilligent and successful farmer in an area and the least successful, usually poorest farmers. Some of these differences are accounted for by fairly intractable factors (from a purely extension point of view) such as soil quality, farm size, income level, etc. Nevertheless, many of these differences may also be attributed to differential knowledge and practices of the farmers themselves, and it is in this area that enlightened extension can make the most expeditious impact. Techniques for doing this basic type of extension are being used by the Thai-Australian Highland Agricultural Project (Hoare 1980). For example, TAHAP sponsors the visits of better farmers to areas where their advice is sought. Farmers are cooperative and the advice effective. Within a single village, Hoare found yields varying from 38 kg./ha to 1,650 kg./ha for swidden rice. Within the same village, the best farmer was able to obtain yields over twice as high as the average farmer. Differences also exist, although not as spectacularly over many seasons, showing that there are indeed knowledge and practices existent in farming communities that, if investigated and taught to others, could significantly increase yields. Given the sizeable differences among farmers, an average yield increase of 30% (over a 5 year period) would not be an extravagent expected outcome of an ambitious extension effort based solely on the investigation and propagation of local knowledge and practices. Institutional knowledge and practices to be desired and extended to farmers in Mae Chaem could be expected to add further increments to extension success.

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SUPPLEMENT
ANNEX D-I

Land Development Procedures

During the first year in each phase area detailed land planning takes place. IF Teams take copies of the land use planning maps to their areas and discuss with villagers, village committees and tambon councils. Detailed socio-economic data is provided to the IF Teams to be used as a guide for assessing selection of the specific location of land to be developed so that it matches as well as possible the needs of the poor (because in many tambons not all the potential upland field land will be developed, thus choices may exist as to which land, where, etc.). IF Teams and villagers review the land use planning maps. IF teams, tambon councils and village committees work out who will participate in the land development labor and how much land (amount) each family will get (but not the individual field boundaries). If any conflicts exist as to villagers perceptions of what land can be developed where, IF Teams can contact the Project Operations Unit. The Unit notifies DLD who sends a specialist to the village area to check the possibilities. This specialist and the villagers agree on a final plan for that area. The completed and/or revised land use planning maps are collected at tambon level and reviewed by the tambon council and IF Team at tambon center. The final tambon plan proposed is then forwarded to the Project Operations Unit. DLD in the meantime has coordinated the water development plan and now finalizes it. RFD then inspects the plans for watershed protection feasibility. If changes are necessary these are conveyed to and discussed with the village committees and tambon councils in the areas concerned. DLD and RFD approve the final plans for the phase area.

After the rainy season ends, construction and work begin. DLD manages the land development crews for each land area (crews made up of those who will get the land). Crews will want to work as they know how much land each participating family will get, that the land will be certified, that the ฿20/day is just to defer their expenses so they can develop their own land, etc. Project should make some kind of provision to insure each family will be able to save the required ฿50/rai (perhaps by withholding it from their pay). Crews develop the land. RFD monitors and inspects to ensure that plans are being followed correctly. When each area is finished, land is allocated by lottery or some other non-biased mechanism, according to the planned amounts per family. This allocation is done in the presence of tambon and amphur officials, by the Project Operations Unit, DLD and IF Teams. Certificates are filled out and taken to Project Operations Unit Headquarters where they are collected and forwarded to RFD for approval, along with the ฿50/rai fee. RFD approves, signs certificates and forwards them to the Operations Unit which returns them to the farmers via whatever mechanism is deemed most appropriate.

ANNEX D-II

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Technical Engineering Analysis

Background

Before documenting a conceptial approach to the construction of this project the reader must be aware of the area within which construction will take place. As previously noted the area is in the North of Thailand. The Mae Chaem river basin does not present a normal pattern of construction difficulties. The topography is mountainous, and in much of the area the upper mantle of the ground formation is a relatively stable material which can withstand imposed surface water run-off. However when the upper mantle of soil is removed a decomposed granitic soil is exposed which is highly erosive and cannot with-stand water concentrations on even moderate slopes without negative effect.

Road Rehabilitation

Given this soil type which is an extremely fragile material, any construction which penetrates the protective upper mantle of soil exposing the granitic soils must be carefully planned so as to protect the watershed from environmental degradation. When constructing roads on steep hill sides the natural water run-off system is changed. Stream run-off patterns are altered and the road becomes a water concentrating facility as well as transportation facility. The surplus run-off must be considered in the design. Construction within the watershed must be designed so that either the decomposed granitic soils are not exposed, or where exposed, water run-off must be completely controlled. The Mae Chaem river basin must be treated with extreme care where existing natural protection systems are altered or environmental damage can be extreme.

This project in the Mae Chaem calls for rehabilitation of approximately 100 km. of roads which are in various stages of disrepair and in the main do not warrant being called roads. In some cases they were merely dozed in to give immediate access into side drainage in the Mae Chaem river basin. As such they serve as an access for a dry season or two before being "washed away". They are environmentally completely unacceptable and have done extensive damage to down slope areas throughout the Mae Chaem. The estimated cost for rehabilitation of these roads to put them in a condition where they can be maintained by a combination

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of hand and machine effort is $14,850 per kilometer. This is the best estimate of the project cost for rehabilitation of this 100 Km. transportation system without a complete reconnaissance of the system. The estimated figure for the total 100 Km. system will undoubtedly have to be adjusted as each road segment is individually studied and the prescription given as to how it is to be rehabilitated and thus develop an accurate cost. Not only the road surface and drainage but also slope stabilization on the down stream slope will require construction in many areas. This may include building check dikes to prevent further gullying. The estimate is considered reasonable based on a visual reconnaissance of some of the roads to be rehabilitated.

Prior to rehabilitation of any road segment a complete traverse and study by a qualified engineer will be required. From this traverse a prescription of the exact work to be accomplished on each section will be formulated and costed prior to committing money to rehabilitation on the route. All rehabilitation work will be done by contract. The responsibility for the complete survey and the design of rehabilitation will lie with RFD and their engineering staff. The review responsibility will lie with AID and each major rehabilitation effort will be approved or disapproved by an AID direct hire engineer.

As construction progresses inspections will be made by the RFD and by USAID engineers to assure that the work meets the specifications which are the controlling documents for that subproject. Certain standards could, but will not now, be required as a general control for roads throughout the whole watershed; to try to generalize the specifications or specify the road cross section without the specific field data would be meaningless. Each road segment will require a special study and specification drafting effort to assure that the controlling grades and the water control system properly matches the soil over which the road traverses and to assure that grades do not exceed 6% except where the upper mantle of the most stable soil has not been penetrated. The RFD in conjunction with DLD will select the priorities for road rehabilitation within the planned program. The need for transport access into water improvement sites will have to be considered in setting forth the road rehabilitation program.

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Water Development Projects

A maximum use of hand labor will be built into the design of 103 waterworks proposed in this project. These 103 projects have not been designed but are a reasonable estimate of the number of projects which can be justified out of the possible 126 suitable sites now identified. No indepth engineering has been accomplished on any of the proposed sites. The design of the waterworks and the study of their feasibility will be accomplished during the implementation stages of the project. This will require careful study to assure that sedimentation will not preclude a reasonable life for impoundments. The intake to the canal works must be carefully designed to assure that no unreasonable amount of sedimentation is allowed to enter the canal networks. After a project reaches a state which justifies a complete design the DLD will do a site survey and produce complete drawings and specifications which will be evaluated and approved by USAID prior to commencement of construction. The determination of whether construction will be by force account or formal contract will depend on the magnitude of the force account work then being accomplished by the DLD and their ability to take on additional work. The design and construction monitoring will be the prime responsibility of the DLD but will also be monitored by USAID direct hire professional engineers.

The estimate of the construction costs was based on average anticipated site conditions. The estimate reflects most recent experience in constructing these types of structures within the Mae Chaem river basin. The estimates are considered to be reasonable and the best cost estimate possible for that area of Thailand. They do not reflect site by site inspection but constitute the best judgement of the engineers who are familiar with that area and the most recent construction cost data. Site investigators will direct their attention to access and where access must be accomplished over existing agriculture land. The timing of the delivery to site of material must be such that it will not coincide with the growing or harvest season in the area. Planning for logistics as well as assuring technical adequacy of the designs will be a continuing effort by the RTG, the DLD and USAID. All of these efforts will be coordinated through the interface teams and through the governmental organizations that will be affected by each sub-project in the Mae Chaem.

Once specific sites have been selected for construction of irrigation works, DLD will adapt standard weir and small reservoir designs to site conditions. A number of such standarddesigns have been developed and used effectively by the Accelerated Rural Development Office (ARD), the Engineering Faculty of Khon Kaen University, and DLD itself. Attached is a standard design for a reinforced concrete weir that will be used to the maximum extent possible on irrigation works in the Mae Chaem. ARD, DLD, etc. also have standard construction specifications which will be used to assure an acceptable engineering standard on project-financed irrigation works.

Maintenance

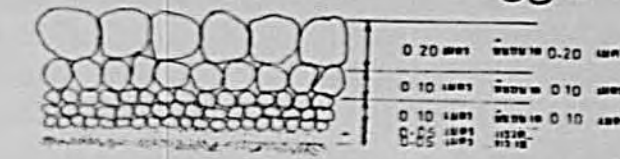
The facilities to be constructed in the Mae Chaem watershed will to the maximum extent possible be maintained through a combination of hand labor and occasional equipment effort. In the case of the diversion structures and water works, no machine maintenance will be required if those projects are properly designed.

Fire control teams will be responsible for a semi annual maintenance plan for all rehabilitated roads. One plan will provide a program for opening and where required constructing additional drainage works. Hand repair of road surface damage will be programmed. Based on the plan the teams will accomplish the work early in the dry season so that fire control activities can be programmed as the forest become dry.

The second plan will be derived from a reconnaissance on each road just prior to the rainy season to inspect each drainage structure to assure that it is open. In most cases the reconnaissance unit can simultaniously accomplish the required work. If additional manpower is required the fire prevention crews will be directed to accomplish the work prior to the rainy season.

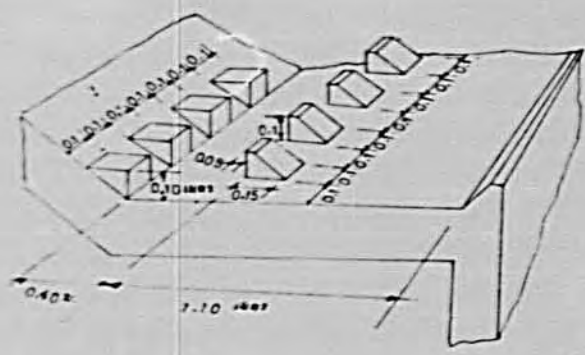
During the rainy season for the first two years after construction, the fire control teams will observe all of the rehabilitated roads during heavy rains. The drainage systems found not functioning properly will be redesigned so that corrective works can be accomplished during the following early dry season by the fire control teams.

Detail 2: Riprap on Upstream



Detail 1: Riprap on Downstream

Detail of Reinforcing Steel



Detail of Slotted Bucket

All dimensions are in meter

<	0.65	0.25	0.30	1
<	0.90	0.25	0.30	2
<	1.20	0.30	0.35	3
<	1.50	0.30	0.30	4
<	1.75	0.35	0.40	5
<	2.00	0.35	0.40	6

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พ.ศ. 2521	

Reinforced Concrete Weir

ANNEX D-III

Road Access within the Watershed - the Current and Planned Road Network

Roads within the Mae Chaem watershed have been built to two standards: rural highway standard (all weather, laterite surface) and service track (jeep roads). The roads can be classified as follows:

1. Principle roads to amphoe head quarters.
2. Security roads to sensitive areas
3. Royal Forest Department network roads
4. Mining and lumber tracks.

1. Principal Roads (all-weather)

Two roads service about 48% of the total population of the watershed, and go through the most densely populated area of the watershed.

a. Off highway 108 - Mae Chaem town road was the first route to open the Mae Chaem Valley to the outside world. (No. 1 on map).

b. Inthanon - Mae Chaem town is the latest project by the Highway Department and is the shortest route to Chiang Mai. The road will be completed in 1980. (No. 2 map).

2. Security Roads (all-weather)

a. Mae Na Chon - Khun Yuam (Mae Hong Son Province) is a service track constructed through remote areas on the West side of the watershed. Within 5 km. of each side of the road, there are located 18 Thai and hilltribe villages, 2,000 population or 5% of the total population of Mae Chaem. To be completed in 1980. (No. 3 on map).

b. Mae Chaem - Yang Hin Fon - Ban Ho-Kok Noi - Mae Hae road services 30 Thai and hilltribe villages, 3,700 population or 9% of the total population. To be completed by 1982. (No. 4 on map).

c. Mae Na Chon - Mae Sa road services 5 hilltribe villages, 663 population or 1.5% of the total population. To be completed in 1980. (No. 5 on map).

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3. RFD Network Roads and Firebrake Tracks

RFD has 11 Royal Watershed Conservation units and 2 Mae Ping watershed development units (Mae Klang Sub-unit and Mae Chaem Sub-unit) within Mae Chaem watershed boundary. RFD built service tracks (jeep roads) from the main Highway Department's rural highway to each of their units. The service tracks, in general, are constructed through rough terrain in remote areas, and may or may not have villages on the route. Within each unit area, there are firebrakes which can be developed to be all-weather service tracks that link the units together.

a. Mae Na Chon - Mae Chon Luang - Khun Wang - Amphoe San Pa Tong road is the main supply route to Mae Chon Luang and Khun Wang Royal Watershed Conservation units through Amphoe San Pa Tong. This route cannot be used during the peak month of the rainy season. The route services 7 villages, 730 population or 1.8% of total population. (No. 6).

b. Mae Na Chon - Mae Mu - Bo Kaeo - Amphoe Samoeng road is the main supply route to Mae Mu and Bo Kaeo Royal Watershed Conservation units and is the most convenient way for people in Tambon Ban Chan to go to amphoe head quarters. NADC project at Ban Mae Hae also utilizes this road as its main logistic support route to the project area. The route services 12 hilltribe villages, 982 population or 2.5% of total population. (No. 7)

c. Huai Din Dum - Mae Yord services 8 hilltribe villages, 869 population or 2.3% of total population. (No. 8).

d. Ban Yang Hin Fon - Ban Pui services 15 Thai and hilltribe villages, 1,821 population or 4.5% of total population. (No. 9).

e. Off highway 108 - Mae Tho services 14 villages, 1,863 population or 4.5% of total population. (No. 10).

f. Bo Kaeo - Mae Tala - Mae Dong Sam Muan services 11 Thai and hilltribe villages, 1,586 population or 4% of total population. (No. 11).

It is these roads primarily that will be rehabilitated under the Project (about 100 km. including some roads constructed by villagers under the Tambon Development Fund).

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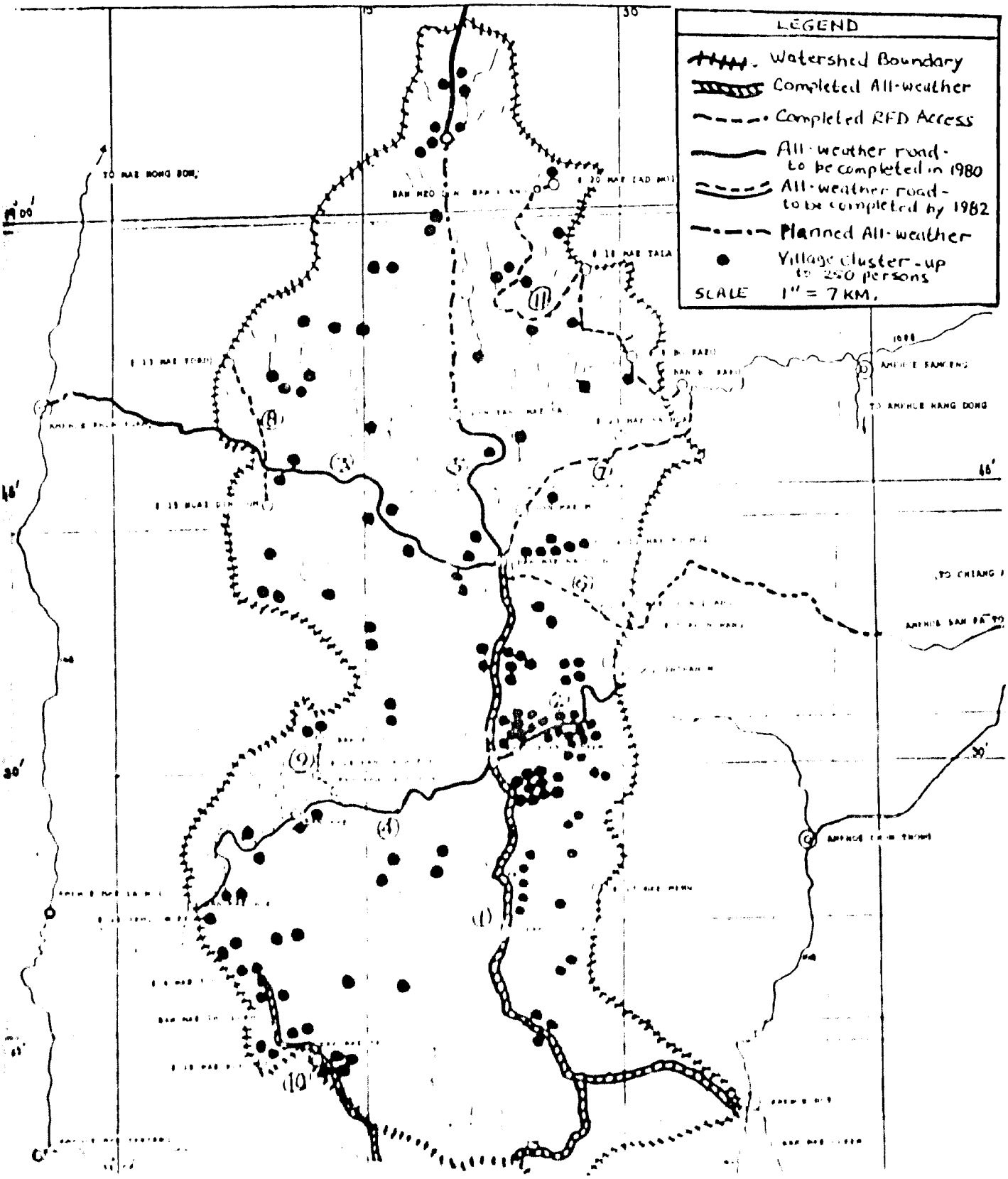
ROAD ACCESS IN MAE CHAEM WATERSHED

Total population of Mae Chaem living within 5 km. of a road (mining and timber tracks excluded) about 85%. The map below shows the current road network.



ANNEX E

SOCIAL SOUNDNESS ANALYSIS SUMMARY

Mae Chaem and the Problems of its Inhabitants

The Mae Chaem Watershed covers 4200 sq. kms., much of the western third of Chiangmai province in North Thailand. Mountains 1200-1600 meters high surround lower mountain slopes and ranges with narrow, finger valleys, through which flow the many perennial and semiperennial streams that feed the Mae Chaem River. Near the middle of the eastern side of the watershed the mountains rise even higher, to the top of Doi Inthanon, at nearly 2700 m. the highest mountain in Thailand. The Mae Chaem River flows south down the center of the watershed; the valley floor widens in places to form small alluvial plains, the largest of which is the valley where Mae Chaem town is situated, about 2/3 of the way down the watershed. The total area of valley floor, however, is extremely small compared to the other major valleys of the North. Near the bottom of the watershed the Mae Chaem river turns eastward to join the Ping River, where it contributes about 40% of the water in the Ping that reaches the Bhumibhol dam a hundred kms downstream.

There is little if any natural environment in Mae Chaem that has not been to some extent influenced by the presence of man. Some areas of Hill Evergreen Forest at altitudes above 1000 m. have been changed to grassland (Imperata cylindrica) due to previous opium cultivation and fire. Much of this land is presently being reforested in pine by the Royal Forest Department. Other types of Evergreen Forest have been converted to secondary forest by their inclusion in established swidden systems, although moisture pockets and areas along streams and ridges have been retained in mature condition. Many of the lower slopes of the watershed are covered by Dry Dipterocarp Forest on land unsuitable for agriculture; but this type of forest is the most frequently burned and is in need of enrichment. At higher altitudes this forest can be found on ridges and dry areas where it contains increasing amounts of natural pine with increasing altitude. Mixed Deciduous forest in Mae Chaem is often of poorer quality than in other watersheds and some of the better examples of this forest type probably once grew on land since converted to teak plantations.

About 40,000 people live on the watershed, the vast majority belonging to two ethnic groups: Skaw Karen (47%) and North Thai (45%). The remainder are mostly Hmong (6%) and some Lawa (2%). North Thai in Mae Chaem consider their ancestors to have been Lawa centuries ago (Calavan 1980), and Karen have been living in the watershed in many places well over a century, perhaps longer. The several thousand Hmong in Mae Chaem are relative newcomers, having arrived little by little since the Second World War from other parts of North Thailand and Burma, Laos and southern China (see Grandstaff 1976, 1979).

North Thai in Mae Chaem speak a slightly different dialect from the inhabitants of the Chiangmai valley next door. Like other North Thai they are primarily lowland wet-rice farmers, despite their possible "hilltribe" ancestry. Their customs are relatively close to those of the Central Thai although several differences exist. North Thai and Central Thai language are only partially mutually intelligible but either language can be learned by a speaker of the other with relatively little difficulty. Nevertheless, almost all North Thai in Mae Chaem can understand Central Thai, since they hear it frequently and are taught it in school. Most can also speak basic Central Thai. Virtually all North Thai in Mae Chaem are Buddhist. The villagers also have strong animist beliefs.

Karen in Mae Chaem are Skaw Karen, one of the two main types in Thailand, differing from their Pwo Karen neighbors over the mountains in Mae Sarieng. Skaw Karen dealects are highly localized but most Skaw Karen in Mae Chaem can understand each other. A significant minority of Karen in Mae Chaem are Christian (perhaps 20%), but most are animist and make animal secrifices to the spirits, a sometimes expensive requirement for the poor. Karen generally live in smaller villages than either the North Thai or the Hmong (see Table 1), and generally marry within the village or the finger valley where they live. Most also live in the same area all their lives.

Hmong in Mae Chaem are mostly Hmong Njua (Blue Meo). Their kinship system is patrilineal, like the Chinese to whom they compare themselves and unlike the Karen and North Thai who have bilateral kinship systems each with a small degree of matrifocal or matrilineal practices. Significant differences between Chinese and Hmong Patrilineality exist,

however. Hmong kinship and alliance networks are far-flung, facilitating the frequent and often distant migrations which they depended upon until recently. Hmong are also animists and their beliefs also require animal sacrifices, a principal reason for their keeping of pigs and cattle.

Hmong, Karen and North Thai languages are totally mutually unintelligible. While most Karen men can speak at least enough North Thai to get along with their neighbors, many Hmong men, and not a few women, speak several languages fairly well - often North Thai or Thai, Yunnanese, or perhaps Lahu (although Hmong don't often admit to their women's language skills). While Karen use North Thai mostly to talk to their neighbors or sahai (particular local North Thai friend), Hmong use Thai or North Thai as a trade language. In general, interactions between North Thai and Karen peoples in Mae Chaem are frequent, long-standing and even institutionalized in some respects. Relationships of each with the Hmong have improved over time, although are decidedly less relaxed. Intermarriage among all three groups is not forbidden and has occurred, although infrequently.

Most inhabitants of Mae Chaem are poor, very poor. Nearly half the population villages have been rated by survey estimates among the very poorest in Thailand, whereas the vast majority of the population would be classed as within the country's "rural poor majority." While most everyone is impoverished, Tables 1-2 indicate that the Karen are more impoverished than most. The size of the Karen population, together with their terribly impoverished conditions, makes it critical that they receive meaningful assistance soon. Size of Karen population and their degree of impoverishment are not unique to Mae Chaem, however.

Three major types of agricultural landuse have been practiced in the Mae Chaem watershed. Characteristic of the North Thai people is irrigated wet-rice cultivation, on the main valley floor and on irrigated terraces in the little finger valleys. Lawa and Karen also farm terraces with small amounts of wet-rice. For the vast majority of Karen, however, including most of those who also farm wet-rice, the characteristic form of cultivation is "rotational" or "established" secondary forest swiddening (Conklin 1957:3). In the dry season upland rice fields are cleared from forest and used for one growing season, after which the area regenerates to forest. A village generally operates a fixed swiddening territory, within which are

enough such field areas that sufficient "rotation" can occur to allow secondary forest to regenerate in preparation for the next round of cultivation. Many of these systems have been operating in the same area for long periods of time (at least a century) without significant environmental degradation although serious weeding problems contribute to falling yields or limit field sizes (due to the labor constraint). If the swidden cycle continues to shorten as more and more people are added to the system, however, regeneration also becomes a problem.

The third major type of agricultural landuse practices in Mae Chaem is primary forest or "pioneer" swiddening (Conklin 1957:3). In this system, fields are cut from as mature forest as possible and the field is then used year after year until yields become too low. The Hmong used this system decades ago when they first arrived in Mae Chaem, to swidden rice and opium. With the disappearance of mature forest, however, this method of land use has not promoted regeneration of good secondary forest and Hmong are in need of permanent fields instead. North Thai, too, have cut forest, usually near their lowland villages, and used the fields over and over (usually for cash crops such as corn) until yields have fallen. From informal interviews in dozens of villages, it emerged that the primary problem for the people of Mae Chaem is one of insufficient produce under present conditions - foremost and especially, shortage of rice needed for subsistence. Rice typically provides 75 to 90% of the dietary energy and 60 to 80% of the protein the inhabitants of the area need (Hoare et al.1980). Rice insufficiency is also central to the problems of Mae Chaem. Typically a Mae Chaem inhabitant runs out of rice each year about 5 months before harvest and must borrow rice in order to live. Interest rates are typically very high (50-60% for better-risk clients, 100% or more for many others, especially the very poor. This forces the farmer to look for intermittent wage labor whenever he can and to attempt to grow cash crops, even opium, just to subsist at minimal levels. But the necessity to borrow for subsistence, at high interest rates, means the farmer will have little or nothing to invest in cash-cropping, contributing to the poverty cycle.

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Project's Socio-Cultural Feasibility

The project is deemed socio-culturally feasible in all aspects. Components of the project all emphasize locally appropriate and desired improvements, to be accomplished through locally appropriate methodologies. For example, one of the largest components of the project, the expansion and terracing of agricultural land, emphasizes subsistence cropping land and will be done by hand labor in an intensive manner using locally practiced techniques, by the people who will get the land. Interaction between government officials and local people will be facilitated by the use of "Interface Teams" and local village committee and tambon (sub-district) council involvement. There is little or no "cultural baggage" of either the donor culture, nor indeed even the central society, due to the methodology used.

Issues of socio-cultural feasibility were identified early in the project planning process and have been addressed in the design. These include: (1) ethnic diversity and socio-cultural change and difficulties to be encountered in providing permanent land resources to members of swidden societies; (2) citizenship and land certification (assurance of tenure); (3) allocative equity (assurance of benefits to the poor); (4) interactive and communications difficulties between (central-Thai speaking) RTG authorities and local peoples; (5) labor availability; (6) local organizational capability (for self-help projects, for land development, for water management, for woodlot management).

Many of these issues are to be dealt with by the presence of the Interface Teams - indeed the presence of these teams was found to be essential to virtually every component of the project. Interface Teams will be trained in community organization, ethnic sensitivity and social change (see Calavan Report). In order to carry out the intensive work required they will be assigned at an average ratio of one (3 person) team to 130 households. As the principal contact agents of the project, they will be in the best position to assist villagers and to facilitate two-way communication between villagers and officials. Some of their socio-culturally crucial tasks will include: (1) assisting in local organization (by providing models and advice for a variety of key organizational problems, from village rice banks to woodlots, etc.); (2) identifying poverty distribution and monitoring project processes for equity; (3) furnishing assistance and data for temporaty ID card issue to non-citizens;

(3) monitoring and assisting self-help projects; (4) helping to organize land development labor force; (5) education assistance in basic needs of villagers (literacy, arithmetic, basic accounting, providing channels of information to answer villager questions on a range of topics from market conditions to project benefits, etc.).

The issue of social change associated with the provision of permanent land resources has been carefully considered. The benefits to be provided are those most desired by the people themselves as their most feasible alternative to present extreme poverty. Project methodology emphasizes equity throughout, in order to minimize socio-economic stratification and maximize the chances for continued opportunity to the poor. Two aspects are apparent: allocation and retention. Allocative equity is sequentially prior, and has been built heavily into design thus far but the process must continue during implementation in order to succeed. Basically, area distribution of benefits (by type and quantity) is to be allocated among tambons in order to reach the poor (within resource endowment and institutional capacity constraints - see below under beneficiaries discussion). Retention of benefits is to be promoted in a variety of ways, such as complementary components designed together to give the poor the best chance to succeed (credit, cash-cropping, land, etc.). Nevertheless, the project, dealing in a limited scope within a fixed time span, cannot hope to make everything right forever in Mae Chaem and retention of benefits will become a problem later if larger issues are not addressed on a continuing basis.

The project has arranged for some innovative breakthroughs on the question of land tenure/security, but was not able to address the citizenship question directly. Land is to be certified, for household agricultural use, on a one time basis, good in perpetuity with transfer to heirs, although land in forest reserve cannot be bought or sold. The detailed procedures in the certification process are being developed by RFD, however, and cannot be assessed until the information is made available. Assurance has been given, however, that the procedures will be expeditious in order to provide sufficient incentive for participation. Citizenship will be facilitated by the provision of temporary ID cards and by land certificates. After 5 years the certificates can be used as the primary piece of evidence required for citizenship.

The majority of "hilltribes" in Mae Chaem are Thai citizens, but those who are not, a significant minority, could apply to the amphoe after five years. For the vast majority of this latter group, the project will still be in place at that time and could assist in expediting the procedures.

Labor availability and the secondary effects of labor in the project were a key item of analysis. Table E7 in the Analysis Annex summarizes the results of the labor analysis. It was concluded that the intensive labor requirements of the entire project were indeed feasible for all tambons, although tambon Ban Chan (with the largest potential added wet-rice land benefits) could have a slight labor deficit if no immigration took place (discussed below), but in that case not all the wet-rice land would be developed in that area because it would not be needed. In general, with the possible exception of Ban Chan, and less so in Mae Na Chon there are no expected undesirable side effects from labor mobilization during the project, provided RFD, FIC, and the project coordinate their labor requirements by phase area of the project. In Mae Na Chon and Ban Chan, benefits available could attract outsiders to the watershed if care is not taken to offer these benefits to inhabitants of the watershed first. In general, the project can be expected to halt outmigration from Mae Chaem, possibly reverse it, and certainly allow the inhabitants to spend more (productive) time in agricultural labor pursuits.

Spread effects from this project are likely to occur in a number of ways. As an area development project, designed as a model, the primary method should be via replication. For purposes of beginning replication, enough should be known in the first few years of the project to duplicate the effort in other watersheds. Other types of spread effect vary: many of the "research and development" aspects will be available for widespread dissemination throughout North Thailand; people in neighboring watersheds can be expected to benefit from much of what is done, in the technologies applied, in buying locally produced rice (it's cheaper), in trading with Mae Chaem, etc.

Beneficiaries analysis was a central part of project design and many steps were taken to maximize equity. All ethnic groups (North Thai, Karen, Hmong) will benefit directly from the project, on a very widespread basis, and the poorer

the people the more they will benefit (Karen in most cases). Socio-economic and inter-ethnic disparities will be significantly reduced by the project. Project methodology and scale insures benefits will indeed reach the majority of the poor in the watershed and perhaps nearly all the poor will receive significant benefit. On an average basis project benefits from added flood irrigated land alone (i.e. without further intensification, without upland fields, not counting swiddens, will raise the entire watershed to an average 4.1 rai/household (4.2 rai/hh is calculated as self-sufficiency). Together with upland fields (an additional 1.9 rai/hh for the entire watershed population), this will make Mae Chaem at least self-sufficient in rice and a net exporter if desired. More important, allocation of benefits was also calculated in distributional aspects, by tambon and using several assumptions about "worst-case" distribution of present assets within tambons. The analysis showed that self-sufficiency could be obtained for nearly every individual household in the watershed, from the land benefits alone. Together with the other components of the project, development should easily reach a level of self-sustainment in Mae Chaem.

However, after adjusting project benefits to maximize equity considerations, it was noted that several unavoidable maldistributive aspects would still exist. Because of maldistribution of resource endowment, on a tambon basis, there will not be enough (project developable) good land in tambons Ban Thap and Chang Khoeng/Tha Pha for all. Approximately 500 households from these areas will either have to move to achieve benefits (e.g. in Ban Chan) or much more intensive effort must be devoted to these areas. In any case, especially in Ban Thap, the analysis shows that a qualitatively different emphasis is needed, i.e. the lack of water and potential flood-irrigated land means that in these areas development should focus on upland fields, upland rice and cash-crops, and more vigorous extension efforts. Not a few residents of Ban Thap have indicated they were more than willing to displace in order to get flood-irrigated land. The phasing of the project makes this most feasible (designed partly for that reason), and the opportunity should be provided, though forced relocation would be extremely inappropriate, indeed dangerous. Probably at least 500 households would volunteer, but relocation does not substitute for the locally intensive measures needed in these areas.

The project will demonstrate a methodology for both socio-cultural appropriateness and equity maximization. Key issues in allocative equity, for example, are discussed in detail. Both the project composition and the allocation and phasing of funds have been designed to give this methodology the best chance to succeed. However, the process cannot be completed at the design stage. Instead, the Project Operations Unit, the Interface Teams, and the various RTG agencies involved will have to carry this process forward, with detailed, on-the-ground information, in interaction with villagers, village committees and tambon councils. Village poverty censusing, local equity planning, tambon council advising, development of beneficiaries criteria at village level, intra-tambon allocation, etc. - all are extremely important to project success.

Some changes in culture and social structure can be expected as a result of the project, primarily as a result of hilltribes acquiring rights to land. Such changes are preferable to the alternatives. The acquisition of permanent fields, especially flood-irrigated land, is the overwhelming desire of the vast majority of people in the watershed, regardless of ethnic group, and is one of the main reasons the project has been designed as it has.

Despite this generally quite optimistic social assessment it needs to be reiterated that a short-term, limited-objective project such as this cannot solve all of Mae Chaem's problems, nor will this project prevent future problems from developing, although the project should, if properly implemented, make significant improvements for a vast majority of the poor. It also needs to be stressed, as has been mentioned in other parts of the Project Paper, that this will be a difficult project to manage in implementation, despite the simplicity of many of its inputs. The personnel chosen, their hard work, dedication and firm commitment to project goals and methodology will be a crucial factor in the project's social feasibility and in poverty alleviation in Mae Chaem.

Table E-1

POPULATION DISTRIBUTION IN MAE CHAEM WATERSHED

	Persons	Households	Hamlets/Villages
Tambon Chang Khoeng			
Thai	7,469	1,480	31
Karen	719	123	3
Total	8,188	1,603	34
Tambon Tha Pha			
Thai	5,580	1,129	26
Karen	2,326	376	24
Hmong	72	8	1
Total	7,978	1,513	51
Tambon Ban Thap			
Thai	527	106	7
Karen	4,560	835	52
Hmong	372	42	2
Lua	1,002	202	6
Total	6,461	1,185	67
Tambon Ban Chan			
Karen	4,605	781	34
Hmong	470	45	2
Lisu	107	12	1
Total	5,182	838	37
Tambon Mae Suk			
Thai	1,380	273	3
Karen	2,633	417	27
Hmong	811	107	4
Total	4,824	797	34
Tambon Mae Na Chon			
Thai	1,596	283	4
Karen	3,024	461	34
Hmong	185	33	2
Total	4,805	777	40

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(Table 1, continued)

	Persons	HOuseholds	Hamlets/Villages
Tambon Bo Sali			
Thai	1,500	290	5
Karen	1,000	160	10
Hmong	500	65	2
Total	3,000	515	17
Total Watershed			
Thai	18,052	3,561	76
Karen	18,867	3,153	184
Hmong	2,410	300	13
Lisu	107	12	1
Lua	1,002	202	6
Total	40,438	7,228	280

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Table E-2

APPROXIMATE PERCENT OF VERY POOR IN EACH TAMBON OF WATERSHED (CONSUMPTION SHORTAGES, NO WET-RICE LAND, AMONG POOREST IN THAILAND)

	Of Tambon		HH	Of Watershed
Ban Thap	100%	=	1,185	15%
Mae Na Chon	40%	=	310	10%
Ban Chan	30%	=	250	10%
Mae Suk	60%	=	480	5%
Tha Pha	30%	=	450	5%
Bo Sali	40%	=	205	5%
Chang Khoeng	10%	=	160	0%
			3,040	

% of very poor in whole watershed: Approx. 50%.

(figures in first column are estimates to nearest 10%)
(figures in second column are estimates to nearest 5%)

Table E-3

WET-RICE LAND SUFFICIENCY/SHORTFALL

Tambon	Existing Wet-Rice Land (rai/household)	Potential Wet-Rice Land (rai/household)	Total Wet-Rice Land (rai/household)	Amount Needed for Self-Sufficiency* (rai/household)	Average Excess (+) or Shortfall (-) (rai/household)
Ban Chan	4.5	4.7	9.2	4.6	+4.5
Mae Na Chon	4.2	2.7	6.9	4.6	+2.3
Tha Pha	3.5	0.2	3.7	4.0	-0.3
Chang Khoeng	3.6	0.0	3.6	3.8	-0.2
Bo Sali	2.1	1.4	3.5	4.4	-0.9
Mae Suk	1.9	1.1	3.0	4.5	-1.5
Ban Thap	0.8	0.1	0.9	4.1	-3.2

*Based on average household size for the area (Table 3), assuming minimal unimproved production (30 tang/rai), average adult equivalency per household = .75 x household size, and one adult equivalent requiring 30 tang of rice/year.

Table E4

TWO METHODS TO ESTIMATE POSSIBLE DISTRIBUTION OF BENEFITS TO ALLEVIATE POVERTY FOR INDIVIDUAL HOUSEHOLDS (BASED ON ATTAINING SELF-SUFFICIENCY ONLY)

	Estimated Number of Household Equivalent Without Wet-rice Land*	Wet-rice Land Needed for Subsistence** (rai)	Wet-rice Shortfall or Overage** (rai)		Upland Field*** Shortage or Overage (rai)
Method 1:					
Chang Khoeng	370	1,410	-1,410	or	-800
Tha Pha	430	1,720	-1,420	or	+7,200
Ban Chan	180	830	+3,070	and****	(+15,700)
Mae Na Chon	200	920	+1,180	and	(+ 8,400)
Mae Suk	480	2,160	-1,260	or	+ 7,180
Bo Sali	290	1,280	-580	or	+ 1,140
Ban Thap	965	3,960	-3,860	or	- 2,120
Method 2:					
Chang Khoeng	160	610	-610	or	- 1,200 rai
Tha Pha	450	1,800	-1,500	or	+ 7,000 rai
Ban Chan	250	1,150	+2,750	and****	(+15,700 rai)
Mae Na Chon	120	550	+1,550	and	(+ 8,400 rai)
Mae Suk	480	2,160	-1,260	or	+ 7,200 rai
Bo Sali	210	920	-220	or	+ 1,900 rai
Ban Thap	1,150	4,710	-4,610	or	- 3,600 rai

Method 1 assumes 10% of the population may possess 30% of the wet-rice land and in the remaining 70% no household has more than needed for self-sufficiency.

Method 2 uses poverty estimates from Table 2 and assumes all others in tambon are at least self-sufficient in land.

*The sum of households or portion of households in the tambon without wet-rice land.

**Computed using figures from tables 4A and 4C.

***Upland field requirements were based on the assumption 2 rai of upland field equivalent in productive value to 1 rai wet-rice field.

****The word and indicates subsistence needs for each household in the tambon can be met by wet-rice, with some potential wet-rice land and all potential upland land left over.

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Table E5

LAND DISTRIBUTION IN MAE CHAEM

Tambon	Area of Tambon (sq. km)	Existing Wet-Rice Land (rai)	Potential Wet-Rice Land (rai)	Potential Upland Field (rai)
Ban Chan	550	3,800	3,900	15,700
Mae Na Chon	850	3,300	2,100	8,400
Mae Suk	500	1,500	900	9,700
Bo Sali	500	1,100	700	2,300
Tha Pha	700	5,300	300	10,000
Ban Thap	850	900	100	5,600
Chang Khoeng	250	5,800	0	2,000
TOTAL	4,200	21,700	8,000	53,700

Table E6

LAND AND WATER

RECOMMENDED BENEFIT DISTRIBUTION

BY PHASE/TAMBON*

Phase/Tambon	Waterworks (# of sites)	Wet-rice Land** (rai)	Upland Field** (rai)
Phase I			
Tha Pha	19	300	4,000
Chang Khoeng	7	-	-
Phase II			
Ban Thap	4	100	5,600
Ban Chan	30	3,900	400
Phase III			
Mae Na Chon	13	2,100	-
Mae Suk	15	900	2,750
Bo Sali	9	700	1,250

*Distributed to most relieve poverty (Table 4C), based on land potential (Tables 4A + 4B), DLD yearly capability and phasing requirements.

**All distribution (within yearly totals) subject to detailed revision during implementation, based on local planning and detailed poverty distribution.

Table E7

DISTRIBUTION OF LABOR REQUIREMENTS

Year	Phase/Tambon	Labor Requirement* (persons)	Excess/Shortage** In Area And Year (persons)
FY 81	I/Tha Pha	1,040	+ 475
	I/Chang Khoeng	75	+ 1,530
	Total	1,115	+ 2,005
FY 82	I/Tha Pha	135	+ 1,515
	I/Chang Khoeng	30	+ 1,575
	II/Ban Thap	440	+ 745
	II/Ban Chon	885	- 45
	Total	1,490	+ 3,790
FY 83	II/Ban Thap	570	+ 615
	II/Ban Chon	500	+ 240
	III/Mae Na Chon	120	+ 655
	III/Mae Suk	160	+ 635
	Total	1,450	+ 2,145
FY 84	II/Ban Thp	170	+ 1,015
	II/Ban Chon	215	+ 625
	III/Mae Na Chon	360	+ 415
	III/Mae Suk	400	+ 395
	III/Bo Sali	235	+ 280
	Total	1,380	+ 2,730
FY 85	III/Mae Na Chon	345	+ 430
	III/Mae Suk	490	+ 305
	III/Bo Sali	355	+ 160
	Total	1,190	+ 895

* From Tables I and 7B, computed at 60 mandays/rai for wet-rice field, 40 man-days/rai upland field, 3,000 man-days/site waterworks. 200 man-days per year per worker, 1 worker per household.

** Does not include extra-project paid labor need in Mae Chaem (RFD, FIO, etc). These are roughly estimated at 1,000 persons per year (200 working days/year).

12/1/28

ANNEX F

ECONOMIC RETURNS ANALYSIS

Table

OVERALL BENEFIT COST COMPARISON

		(฿000)
A.	Total Cost for the whole project at 1979 prices	฿388,920
B.	Annual Benefits - quantifiable components	
	1. Waterwork development	24,355
	2. Upland development	8,318
	3. Research and extension	23,822
	4. Rice bank	1,133
	5. Credit and marketing	2,396
	6. Road rehabilitation	600
		฿60,624
C.	Total benefit at 12% discount rate	฿505,200

Based on the quantifiable components:

B/C = 1.30

IRR = 16%

D. Non-quantifiable Components with Beneficial Effects:

1. Road rehabilitation and erosion control
2. Non-agricultural fire control
3. Woodlot and enrichment plantation
4. Interface team activities
5. Outside research.

The real value of the benefit-cost ratio and the interest rate of return from this project, after taking into account all the non-quantifiable components, are expected to be significantly larger.

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BACK-UP TABLES

AND ASSUMPTIONS

Table F3

IRRIGATED PADDY LAND, PRODUCTION AND VALUE

	Pre-Project	Full Development
Land (rai)		
Total	21,711	29,876
Cultivated	18,454	29,876
Paddy Output (tang)	553,912	1,199,352
Paddy Value (฿000)	13,847	29,984

Notes:

1. Annual yield increases by 6% beginning the first year in each phase.
2. Yield in year 1 of each phase increases because of IF team and extension service.
3. Land utilization in pre-project period is 85% of total land available.
4. Farm gate price for paddy at ฿25 per tang is used in valuing output at the end of project.
5. Base year yield is 30 tang/cultivated rai.

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Table F4

SECOND CROPPING PATTERN, YIELD, PRODUCTION AND VALUE

WET-RICE FIELDS

Pre-Project

Crop	Land Use (%)	Pre-Project Area (rai)	Yield 1/ (kg/rai)	Price (per kg.)	Output ('000 kg.)	Value 5/ (฿'000)
Soybean	50	3,256	140	5	456	2,280
Garlic	10	651	750	10	488	4,880
Shallots	5	326	975	8	318	2,543
Sesame	2	130	40	12	5	60
Peanuts	20	1,303	214	5	279	1,395
Tobacco	3	195	200	24	39	936
Corn	10	651	250	2	163	325
Total	100	6,513				12,419

With Waterworks Improvement

Crop	Area 2/ (rai)	Yield 3/ (kg/rai)	Output (000 kg.)	Price	Value 5/ (฿'000)
Soybean	6,722	154	1,035	5	5,175
Garlic	1,344	825	1,109	10	11,090
Shallots	672	1,072	720	8	5,760
Sesame	269	44	12	12	144
Peanuts	2,689	235	634	5	3,170
Tobacco	403	220	89	24	2,136
Corn	1,344	275	370	2	740
Total	13,444				28,215

With Waterworks Improvement, Land Development and Extension Services

Crop	End of Project Area (rai)	Yield 4/ (kg/rai)	Output (000 kg.)	Value 5/ (฿'000)
Soybean	8,963	182	1,631	8,155
Garlic	1,793	975	17,478	17,478
Shallots	896	1,268	1,136	9,088
Sesame	358	52	19	228
Peanuts	3,585	278	997	4,985
Tobacco	538	260	140	3,360
Corn	1,793	325	583	1,166
Total	17,926			44,460

Notes: 1/ Average yield in Chiang Mai/northern region.
2/ Increase to 45% of total rice land.
3/ Increase by 10% from pre-project.
4/ Increase by 30% from pre-project.
5/ Based on 1979 prices.

Table F5

CROPPING PATTERN, YIELD, PRODUCTION AND VALUE

UNDER EXISTING SWIDDEN AND POTENTIAL UPLAND FIELD

Existing Swidden 1/						Developed Upland Field					
Land Use 2/ %	Area (rai)	Yield 3/ (kg/rai)	Output (000 kg)	Price (B/kg)	Value (000 ฿)	Land Use %	Area (rai)	Yield 4/ (kg/rai)	Output (000 kg)	Price (฿/kg)	Value (000 ฿)
-	18,300	120	2,196	1.8	3,952	50	7,000	168	1,176	1.8	2,117
55	1,815	70	127	5	635	27	3,780	122	461	5	2,305
10	330	375	124	10	1,238	5	700	653	457	10	4,570
10	330	487	161	8	1,288	5	700	850	595	8	4,760
2	66	20	1.3	12	16	1	140	35	5	12	60
10	330	107	35	5	175	5	700	186	130	5	650
3	99	100	10	24	240	2	280	174	49	24	1,176
10	330	125	41	2	82	5	700	218	153	2	306
100	3,300				7,626		14,000				15,944

1/ Estimated

2/ Items 2-8 add up to 100% (3,300 rai or 15% of swidden land per year)

3/ One half of lowland yield, except rice.

4/ Two third of lowland yield (a ratio estimated by the World Bank).

DISAGGREGATED ECONOMIC

RETURNS TO KEY PROJECT INTERVENTIONS

Table F6

WET-RICE FIELDS

BENEFIT/COST COMPARISON OF WATERWORKS DEVELOPMENT

(VALUED AT 1979 PRICES)

At End of Project		('000 Baht)
Benefits: 1.	Increase in wet-season paddy (farm-gate price is ฿25/tang).	8,559
2.	Increase in second cropping because the additional water and a better managed system of water supply will bring land utilization in dry season from 30% of rice field to 45%; yields also increase by 10% from additional water on existing land.[1/]	15,796
	Annual benefit in terms of incremental value of rice produced.	24,355
	Total benefit of waterworks at 12% discount rate per year, assuming the consequences of the project activities to remain.	202,958
Costs: 1.	Total budget for waterworks in 1979 constant price.	59,273
2.	Cost of irrigated land development. (Excluding costs of equipment and supervision which is included in the cost of upland development.)	9,600
	Total Costs	฿68,873

B/C = 2.94
IRR = 35%

1/ See Table 10.

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Table F7

Wet-Rice Fields

Revised Benefit/Cost Comparison of Waterworks Development with No Increase in cash-Crop Production

(Value at 1979 prices)

At End of Project			('000 Baht)
Benefit:	1.	Annual benefit in terms of incremental value of wet-rice	8,559
	2.	Increase in dry season rice	2,400
		Increase rice value per year	10,959
		Total benefit at 12% discount rate per year, assuming the consequences of the project activities to remain after the project duration.	91,325
Costs:	1.	Total budget for water works in 1979 constant price.	59,273
	2.	Cost of irrigated land development. (Excluding costs of equipment and supervision which is included in the cost of upland development.)	9,600
		Total Costs	฿68,873

B/C = 1.33

IRR = 16%

Table F8

UPLAND FIELDS

BENEFIT/COST COMPARISON OF LAND DEVELOPMENT (VALUED AT 1979 PRICES) 1/

Benefits:	1. Value of crops on upland fields at the end of project (000 baht).	15,944
	2. Value of crops (including rice) on swidden fields.	7,626
	Annual benefit in terms of excess value of upland crops over swidden crops.	8,318
	Total benefit of land development at 12% discount rate per year, assuming the consequences of land development to last indefinitely.	69,317
Costs:	Total budget at 1979 constant price. (Including cost for equipment and supervision).	14,360

B/C = 4.83
IRR = 58%

Notes:

1/ See detailed benefit in Table F4. The annual benefit, however, is based on a total replacement of existing swidden land. To the extent that swiddening, perhaps at a reduced magnitude, will still be practised the annual benefit from upland land development in terms of increased value of crops produced will be larger.

Table F9

SUMMARY OF BENEFIT/COST COMPARISON OF AGRICULTURAL LAND, WATER IMPROVEMENTS, RESEARCH AND EXTENSION SERVICES PROGRAMS

	'000 Baht
Benefits (output valued at 1979 prices)	
1. From irrigated paddy production	16,136
2. From second cropping	32,041
3. From upland cultivation	8,318
Annual benefit in terms of incremental value of crops produced.	56,495
Total benefit at 12% discount rate per year.	470,792
Costs (at 1979 constant prices)	
1. Water works	59,273
2. Land development	23,960
3. Research and extension	42,680
Total Costs	125,913

B/C = 374

IRR = 45%