

DEPARTMENT OF STATE  
BUREAU FOR INTERNATIONAL OPERATIONS  
Washington, D.C. 20523

PROJECT PAPER

Proposal and Recommendations  
For the Review of the  
Development Loan Committee

THAILAND - Sericulture/Settlements

AID-DLC/P-2168

UNCLASSIFIED

DEPARTMENT OF STATE  
AGENCY FOR INTERNATIONAL DEVELOPMENT  
WASHINGTON, D.C. 20523

UNCLASSIFIED

AID-DLC/P-2168

June 4, 1976

MEMORANDUM FOR THE DEVELOPMENT LOAN COMMITTEE

SUBJECT: THAILAND - Sericulture/Settlements

Attached for your review are the recommendations for authorization of a loan to the Government of Thailand ("Borrower") of not to exceed Two Million Six Hundred Thousand Dollars (\$2,600,000) to finance the foreign exchange and certain local currency costs of goods and services necessary to assist the Borrower to raise the incomes of participating farm families by establishing the use of modern sericulture technology and supporting infrastructure in certain settlements in Northeast Thailand.

No meeting has been scheduled for consideration by the Development Loan Staff Committee; however, your concurrence or objection is requested by close of business on Friday, June 11, 1976. If you are a voting member a poll sheet has been enclosed for your response.

Development Loan Committee  
Office of Development Program  
Review

Attachments:

Summary and Recommendations  
Project Analysis  
Annexes A-R

UNCLASSIFIED

**SERICULTURE/SETTLEMENTS LOAN PP**

**TABLE OF CONTENTS**

	<b><u>Page</u></b>
Abbreviations and Equivalents	1
Map of Thailand	ii
Typical Layout of Land Settlement Area	iii
<b>Part I Summary and Recommendations</b>	
<b>A. Face Sheet Data &amp; Summary Costs</b>	
<b>B. Recommendations</b>	2
<b>C. Description of the Project</b>	3
<b>D. Summary Findings</b>	5
1. Technical	
2. Economic	
3. Financial	
4. Social	
5. Readiness for Implementation	
6. Statutory Criteria	
7. Mission Director's 611(e) Certification	
<b>E. Project Issues</b>	8
1. a. Korat Center	
b. Economic Feasibility	
c. Farmer Profitability	
d. Beneficiaries	
e. Replicability	
f. Credit	
g. Managerial Performance	
✓ h. Role of Cooperatives	
i. Land Titling and Tenure	
j. Loan Financing of Reeling Plants	
k. Additional Comments	
1) Grant Component	
2) Local Cost Financing	
3) Vehicle Procurement	
4) Five-Year Disbursement Period	
5) Logical Framework	
6) Analysis of Environment Impact	
7) Role of Women	

	<u>Page</u>
2. Other issues	10
a. Appropriateness of AID Involvement	
b. Farmer Production Scale	
c. BAAC Interest Rate and Use of Reflows	
Part II Project Background and Detailed Description	12
A. Background	12
1. Why a Sericulture Project	
2. Land Settlements	
3. Description of Project Settlements	
4. Land Tenure and Titling	
5. PWD Sericulture Efforts Underway	
6. National Silk Strategy	
B. Detailed Description	18
1. Goal Statement	18
2. Project Purpose	19
3. End of Project Status	20
4. Assumptions	21
5. Planned Outputs	21
a. Central Rearing Houses	
b. Central Mulberry Plantations	
c. Cooperatives	
d. Farmer Rearing Houses	
e. Farmer Mulberry Plantations	
f. Settlement Roads	
g. Sericulture Officers and Extension Agents	
6. Project Inputs	26
a. Farmer Training	
b. Other Training	
(1) Extension Officer Training	
(2) Settlement Supervisors Training	
(3) Foreign Training	
c. Supply of Silkworm Eggs	
d. Credit Requirement for Farmer Rearing Houses	
e. Technical Assistance	
f. Other Inputs	
7. Other Donor Assistance to Related Projects	28
a. Japanese Bilateral	
b. The Federal Republic of Germany	
c. Mekong Committee	
d. IBRD	
e. Government of New Zealand, Netherlands, and Israel	
f. The Government of New Zealand (to BAAC)	
g. Private	

	<u>Page</u>
<b>Part III Project Analyses</b>	<b>31</b>
<b>A. Technical Analysis with Environmental Assessment</b>	
1. Sericulture Technology: The Process	
2. The Traditional Method	
3. Economic and Market Aspects of Traditional Production	
4. Modern Technology	
5. Implications of Higher Quality	
6. Environmental Assessment	
<b>B. Social Soundness Analysis</b>	<b>36</b>
1. Farmer Response	
2. PWD Settlements	
3. Requirements for Acceptance	
4. Spread Effects	
5. Role of Women	
6. Farmer Participation in Design	
7. Farmer Selection Criteria	
8. Settlement Social Services	
<b>C. Financial Analysis and Plan</b>	<b>41</b>
1. Production/Revenue Relationships	
2. Total Demand	
3. Sales Price Expectations	
4. Farmer income	
5. Cooperative Finances	
<b>D. Economic Analysis</b>	<b>50</b>
<b>Part IV Implementation Arrangements</b>	<b>54</b>
<b>A. Functions and Capabilities of Implementing Agencies</b>	
1. Public Welfare Department (PWD) of the Ministry of Interior	
2. Sericulture Division of the Ministry of Agriculture and Agricultural Cooperatives	
3. Bank for Agriculture and Agricultural Cooperatives	

	<u>Page</u>
4. Cooperatives	
5. AID	
B. Implementation Plan	61
C. Evaluation Plan	62
D. Condition, Covenants and Negotiating Status	64
1. Conditions Precedent to Disbursement	
2. Covenants	
3. Negotiating Status	

Royal Thai Government - Abbreviations

BAAC	-	Bank for Agriculture and Agricultural Cooperatives
DOA	-	Department of Agriculture (MOAC)
DOAE	-	Department of Agricultural Extension (MOAC)
DTEC	-	Department of Technical and Economic Cooperation (Prime Minister Office)
MOAC	-	Ministry of Agriculture and Cooperatives
MOF	-	Ministry of Finance
MOI	-	Ministry of Interior
NEB	-	National Environment Board
NESDB	-	National Economic and Social Development Board
NSO	-	National Statistical Office
PWD	-	Public Welfare Department (MOI)
RTG	-	Royal Thai Government

Currency Equivalents

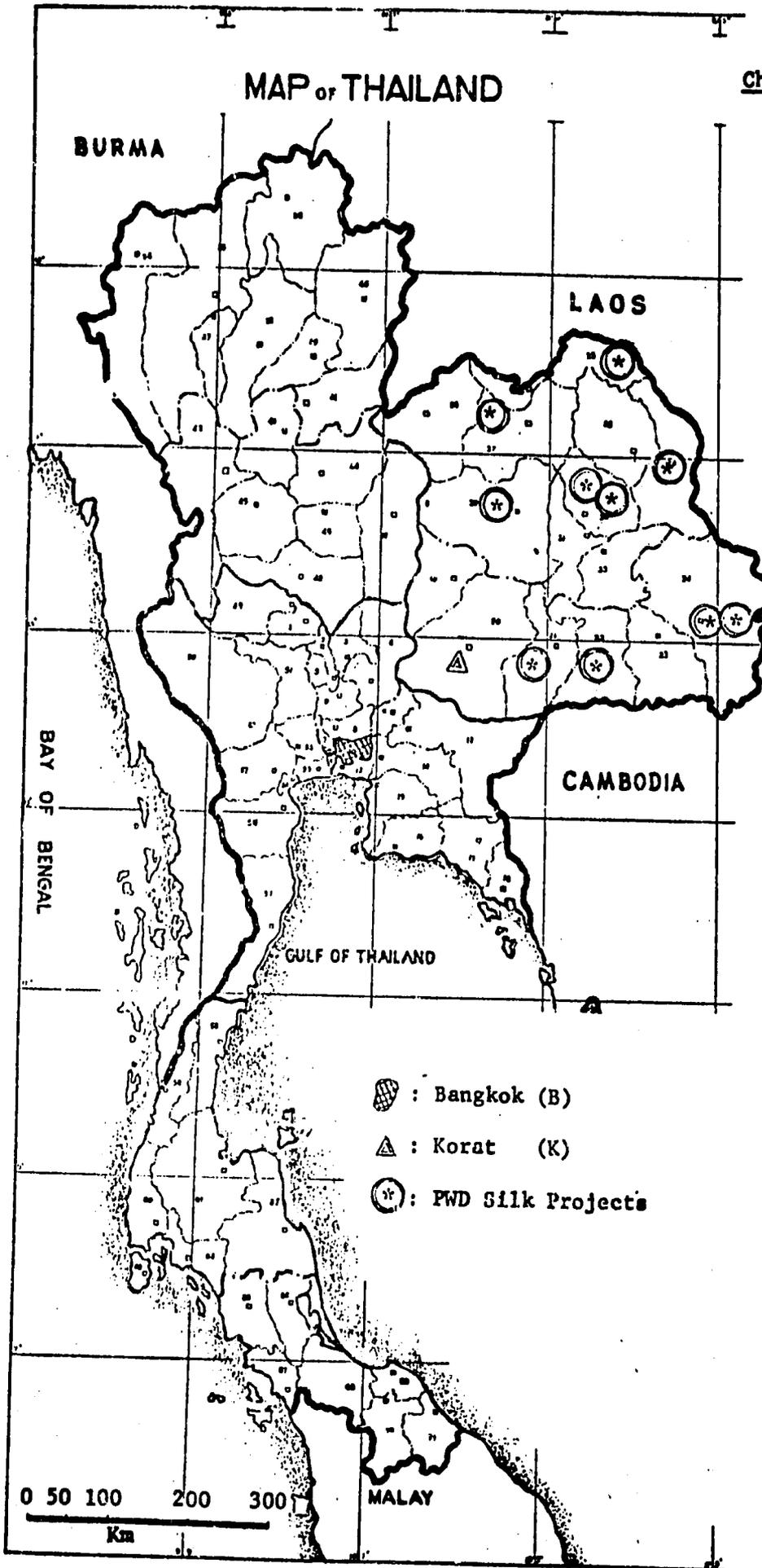
U.S.\$	1.00	=	Baht	20.00
Baht	1.00	=	U.S.	0.05

Area Equivalents

1 rai	=	0.16 hectare (40 x 40 meters)
		0.40 acre
1 hectare (ha.)	=	6.25 rai
		2.47 acres
1 acre	=	2.5 rai

# MAP OF THAILAND

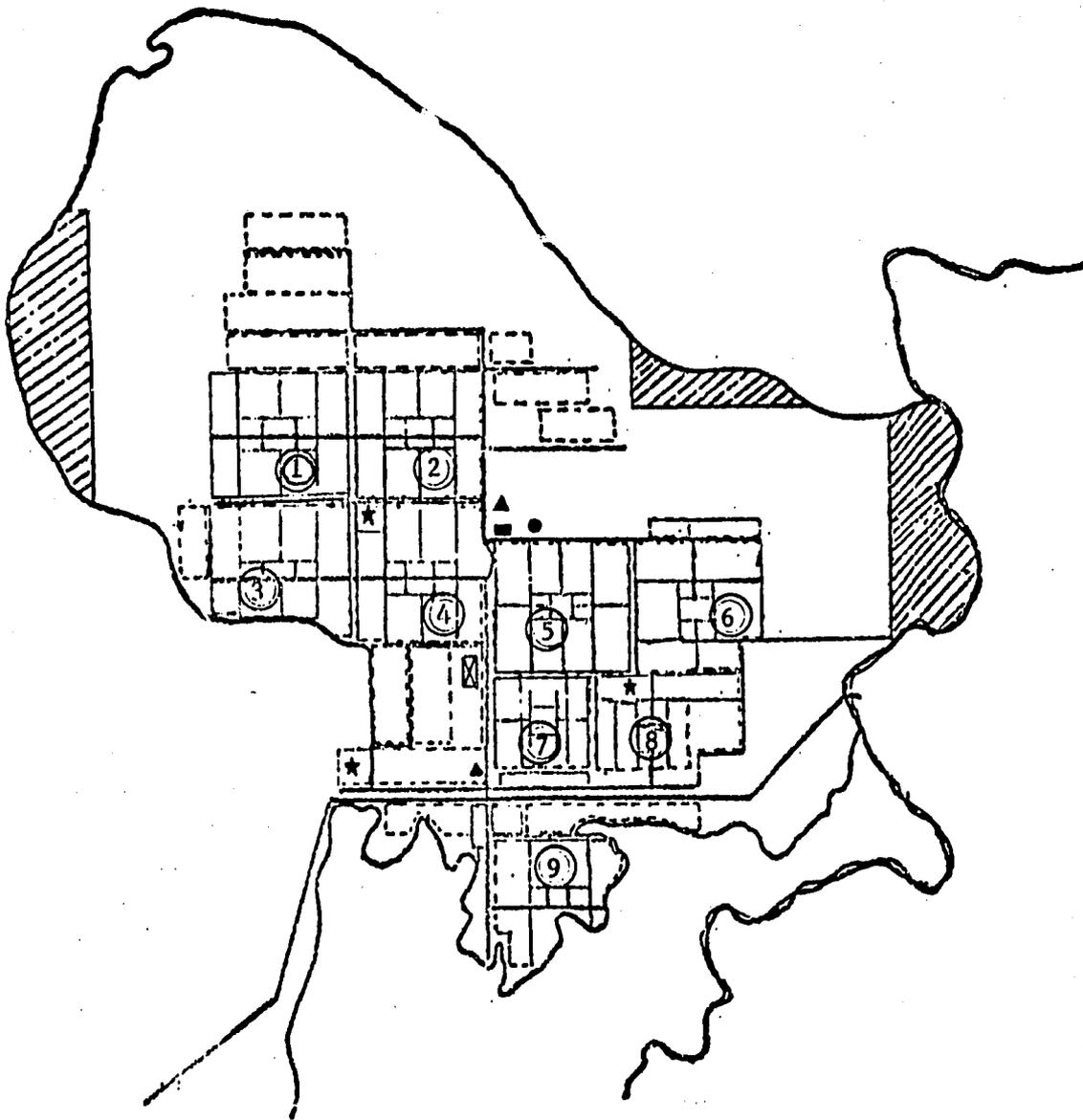
## Changwats (Provinces)



- 1 Chai-Nat
- 2 Singh-buri
- 3 Lopburi
- 4 Sara-buri
- 5 Ang-thong
- 6 Ayuthya
- 7 Nonthaburi
- 8 Pathum-thani
- 9 Thonburi
- 10 Phra-nakhorn : (B)
- 11 Nakhornayok
- 12 Prachinburi
- 13 Samutprakan
- 14 Cha-choengsao
- 15 Cholburi
- 16 Rayong
- 17 Chant-buri
- 18 Trat
- 19 Chayaphum
- 20 Nakhornratsima : (K)
- 21 Buriram
- 22 Surin
- 23 Srisaket
- 24 Ubonratthani
- 25 Nong-kai
- 26 Loei
- 27 Udonthani
- 28 Sakonnakhorn
- 29 Nakhornphanom
- 30 Khon-kaen
- 31 Mahasarakham
- 32 Kalasin
- 33 Roi-et
- 34 Mae-hongsorn
- 35 Chiangmai
- 36 Chiangrai
- 37 Lamphun
- 38 Lampang
- 39 Phrae
- 40 Nan
- 41 Uttaradit
- 42 Tak
- 43 Sukhothai
- 44 Phitsnulok
- 45 Kamphaengphet
- 46 Phichit
- 47 Phetchbun
- 48 Nakhornsawan
- 49 Uthai-thani
- 50 Kanchanaburi
- 51 Suphanburi
- 52 Ratburi
- 53 Nakhornpathom
- 54 Samutsongkhram
- 55 Samutsakhorn
- 56 Phetburi
- 57 Prachuap-khirikhan
- 58 Chumphorn
- 59 Ranong
- 60 Phang-nga
- 61 Surat-thani
- 62 Nakhornrithamrat
- 63 Phuket
- 64 Krabi
- 65 Trang
- 66 Phatalung
- 67 Satun
- 68 Song-khla
- 69 Pattani
- 70 Yala
- 71 Nara-thawat

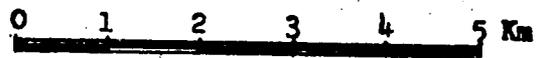
 : Bangkok (B)  
 : Korat (K)  
 : PWD Silk Projects

0 50 100 200 300  
Km



Legerd

- Admin. Building
- ▲ Health Unit
- Coop. Hdqt.
- ★ School
- ◎ Village No.
- ⊠ Market



Scale 1:80,000

AGENCY FOR INTERNATIONAL DEVELOPMENT <b>PROJECT PAPER FACESHEET</b> TO BE COMPLETED BY ORIGINATING OFFICE		1. TRANSACTION CODE ("X" appropriate box) <input checked="" type="checkbox"/> Original <input type="checkbox"/> Change <input type="checkbox"/> Add <input type="checkbox"/> Delete	PP DOCUMENT CODE 3
2. COUNTRY/ENTITY <b>THAILAND</b>		3. DOCUMENT REVISION NUMBER	
4. PROJECT NUMBER <b>493-0271</b>	5. BUREAU a. Symbol <b>EA</b> b. Code <b>02</b>	6. ESTIMATED FY OF PROJECT COMPLETION FY <b>81</b>	
7. PROJECT TITLE - SHORT (stay within brackets) <input type="checkbox"/> Sericulture/Settlements <input type="checkbox"/>		8. ESTIMATED FY OF AUTHORIZATION/OBLIGATION a. INITIAL <sup>mo. yr.</sup> <b>6 76</b> b. FINAL FY <b>677</b>	

a. FUNDING SOURCE	9. ESTIMATED TOTAL COST (\$000 or equivalent, \$1 = )			FIRST YEAR FY <b>76</b>			ALL YEARS		
	b. FX	c. L/C	d. Total	e. FX	f. L/C	g. Total	e. FX	f. L/C	g. Total
AID APPROPRIATED TOTAL	150	2,450	2,600	150	2,450	2,600			
* (Grant)	( )	( )	( )	( )	( )	( )			
(Loan)	( 150 )	( 2,450 )	( 2,600 )	( 150 )	( 2,450 )	( 2,600 )			
Other 1. _____									
U.S. _____									
HOST GOVERNMENT		100	100					3,442	3,442
OTHER DONOR(S)									
TOTALS	150	2,550	2,700	150	5,892	6,042			

a. Approp-riation (Alpha Code)	b. Primary Purpose Code	c. Primary Tech. Code	10. ESTIMATED COSTS/AID APPROPRIATED FUNDS (\$000)									
			FY <b>76</b>		FY <b>77</b>		FY <b>78</b>		ALL YEARS			
			d. Grant	e. Loan	f. Grant	g. Loan	h. Grant	i. Loan	j. Grant	k. Loan		
FN	157	079	-	2,600	-	-	-	-	-	-	-	2,600
TOTALS			-	2,600	-	-	-	-	-	-	-	2,600
11. ESTIMATED EXPENDITURES			-	-	-	935	-	678				

12. PROJECT PURPOSE(S) (stay within brackets)  Check if different from PID/PRP

To establish modern sericulture technology among 1,500 farm families in Northeastern Thailand.

\* 1/ The Program Development and Support Project (493-0275) will provide up to \$100,000 in grant funds for evaluation and third country training associated with this project.

13. WERE CHANGES MADE IN BLOCKS 12, 13, 14, or 15 OF THE PID FACESHEET? IF YES, ATTACH CHANGED PID FACESHEET.

Yes     No

14. ORIGINATING OFFICE CLEARANCE Signature: <b>Roger Ernst</b> Title: <b>Director, USOM/Thailand</b>		15. Date Received in AID/W, or For AID/W Documents, Date of Distribution Date Signed: <b>03/26/76</b> Date Received: <b>04/01/76</b>
--	--	--

Part I Summary and Recommendations

- A. Face sheet data and Summary costs (See preceding page)
- B. Recommendations:

Authorization of a loan to the Royal Thai Government in an amount not to exceed \$2.6 million for the proposed Sericulture/Settlements project. Proposed Loan Terms are 40 years, 10 year grace period with 2% interest rate during grace period and 3% thereafter. 1/

---

1/ The program Development and Support project (Number 493-0275) will provide up to \$100,000 in grant funds for evaluation and third country training associated with this project.

C. Description of the Project

The project will introduce a relatively modern sericulture technology to a total of 1500 farm families representing about 10,000 people in 10 self-help land settlement areas of Northeast Thailand over a five year period. Compared to the traditional sericulture practice, the modern technology results in higher productivity and a higher quality product (silk cocoons) which in turn will yield higher cash incomes for participating families.

Project activities will be carried out under the management of the Public Welfare Department (PWD) <sup>1/</sup> of the Ministry of Interior with technical support from the Sericulture Division of the Ministry of Agriculture and Agricultural Cooperatives (MOAC). Credit facilities will be provided by the Bank for Agriculture and Agricultural Cooperatives (BAAC).

The project design envisions that:

- PWD will select 300 farmers each year for participation in the project and will provide central "young" silk worm rearing houses and equipment and a central mulberry plantation at each settlement for farmer use on a cooperative basis.
- Sericulture Division of MOAC will train participating farmers and PWD supervisors and extension workers in the modern sericulture technology. (This involves an expansion of the farmer training center at Surin). MOAC will also supply most of the hybrid silk worm eggs for the project.
- Each participating farmer will establish 4 rai of mulberry plantation (improved variety) and will construct and equip an "old" silk worm rearing house on his farm.
- The cooperative in each settlement area will provide facilities and equipment for cocoon processing and marketing.
- BAAC will provide the necessary credit to farmers and cooperatives.

1/ The word "welfare" in PWD's title should not be misconstrued. PWD's policies and procedures are based on self help concepts not the doling out of relief.

AID loan funds will be used for farmer and coop credit through the BAAC (up to \$1.3 million) and to reimburse PWD (also up to \$1.3 million) for the establishment of central mulberry plantations, the construction and equipping of central young silkworm rearing houses, the settlement road improvement program, farmer training costs, and management consulting services. AID grant funds up to \$100,000 will be used for evaluation and for third country training. Thus out of the total project cost of \$6,142,000 including provision for inflation and contingency, AID will finance only about 44%. The balance of project costs will be financed by the RTG budget (\$1,975,500) and by BAAC (\$1,466,500).

The following table summarizes the flow of funds by action agent and source:

	<u>\$ Thousand</u>
BAAC (for credit to farmers & coops)	2,766.5
AID Loan Funds	(1,300.0)
Other Sources	(1,466.5)
PWD (for facilities, training, salaries, vehicles, road improvement)	3,049.5
AID Loan Funds	(1,300.0)
AID Grant Funds	(    7.0)
RTG Budget	(1,742.5)
MOAC (for training center expansion - RTG Budget)	233.0
Kasetsart University and Others (for evaluation - AID Grant)	93.0
	<hr/>
Total (including 20% for inflation and contingency)	6,142.0

#### D Summary Findings

Having considered and weighed all available information and evidence, we have concluded that the proposed Sericulture Project is feasible and that the achievement of project purpose and goal is likely.

Managerially the project involves three main units-PWD, MOAC-BAAC and this is more complicated than a 'single agency' project, for example Extension Department or PWD alone.

The project, however, builds on an existing PWD capability. While the project deals with a specific technology, the introduction of modern sericulture techniques, the managerial and organizational concepts and relationships involved in the undertakings of the project will be applicable on a much broader scale. The execution of this project will demonstrate project design and management techniques that will enable Thai officials to undertake the transfer of other, different technologies to disadvantaged groups.

This is a pilot project and a unique element of its design which balances the aforementioned complexity is its built-in flexibility on many levels. The project is divided into incremental units spread both in time and location. If success and acceptance are even greater than anticipated, the project can be accelerated by bringing incremental units on line faster than planned. Shifts can be made between settlement areas if warranted. Lagging acceptance occasioned by a breakdown in the world silk market, natural disaster, or otherwise will not mean totally wasted resources since for each situation there is a retrenchment or fallback position. Financial arrangements are adjustable to changes in project pace. Even on the individual farmer level, the loan repayment provisions which are keyed to farmer output provide both an incentive and a protection against disaster.

1. Technical - The project involves a shift from traditional sericulture practice to a more modern, higher productivity and higher quality practice. The modern technology is more sophisticated and sensitive to outside inputs and events but not unduly so; and has been successfully practiced by farmers and by commercial, plantation-type enterprises in Thailand. The necessary knowledge and expertise is available in Thailand and the critical participating agencies have the demonstrated capacity to deal repetitively with the technology and problems associated with it.

2. Economic - Direct and measurable benefits from this project will be increased employment and higher annual incomes for participating farm families. The economic analysis indicates that the internal rate of return to the Thai economy is about 10% after allocating costs and benefits outside the project. While low, we believe that acceptance of this rate of return is appropriate, considering the limited productivity of the land available to the target group and the social benefits mentioned below.

3. Financial - The project costs have been drawn up in detail, carefully analyzed and are firm outside figures. In any event, overruns would be the borrowers account. The budget planning is complete and the scale of the project does not require substantial increases in the budgets of the implementing RTG agencies; they will have sufficient resources to meet their projected commitments under the project. Total project expenditures are about \$2.0 million the first year due to "start-up" costs about \$1.0 million each during the next 4 years.

We estimate that the project will enable participating farm families to increase their annual cash income by about \$290. (Even during the period of debt service they will have a positive cash flow of about \$80 annually.) These figures compare with typical Northeast Thai rural family cash income of about \$430. This is greater than the income level that would be expected from a similar investment of land and labor in alternative crops such as kenaf, cassava or corn. The internal rate of return to the farm family is estimated to be about 22.7%.

4. Social - Experience has demonstrated that Northeastern Thai farmers will shift to new or different crops despite a degree of risk if financial incentives are perceived. The primary stimulus is money; social customs are not likely to be an impediment.

The principal participants in this project at the farm level are women. Women are also involved in influential roles in the project design and administration and at the extension level.

An important feature of the project is the use of cooperatives which will strengthen farmers economic leverage (especially in the marketing of cocoons) and widen their experience with and capacity for group action.

The project and project benefits are aimed directly at poorer families farming unirrigated upland in the poorest region of Thailand. The difference between the return to participating families and the internal rate of return to the Thai economy should be viewed as evidence of a strong commitment of the RTG to the redistribution of income. The subsidies are high but the replicability should not be seriously impaired because a large element of the subsidy is institutionalized knowledge which is transferable.

5. Readiness for Implementation - PWD has selected a fulltime project manager for this project, and has worked out, on a definitive basis, the implementation requirements on a time-phased cost and expected output basis. (See Part IV, Implementation Planning.) PWD has already begun some activities and made initial expenditures necessary for the successful implementation of the project, e.g., establishment of central mulberry plantations. On an experimental basis, over 200 farmers in several settlements have been trained and are already producing cocoons. Budget requests for FY 1977 of all RTG agencies involved take account of the needs of this project and Cabinet approval in principle for seeking AID support has been secured. A formal request for AID assistance is expected in April. The project clearly is ready for implementation.

6. Statutory Criteria - The project meets all applicable statutory criteria. See Annex J.

7. Mission Director's 611 (e) Certification - The required certification is contained in Annex K.

E. Project Issues:

1. The following are comments on issues identified in the PRP approval cable, STATE 045568, a copy of which is attached as Annex A.

a. Korat Center (PRP cable, para 3) - The requested study of the Korat Center was performed by the Nathan Associates team and a report on the Center is included in its report, Annex O. The Korat Center is undertaking to transfer egg production responsibilities to 4 centers which will enable it to concentrate on continuing adaptive research in support of the project. USOM concludes that the egg supply for the project is reasonably well assured and that in any event alternate sources of supply are available. See Part IV. A.

b. Economic Feasibility (PRP cable, para 4) - USOM expectations concerning world market prices for warp silk are contained in Part III.C. of this PP. Sensitivity of rates of return to reduced output value (e.g., those resulting from price shifts) are stated in the appropriate sections. No differentiation is made between returns with subsidized and non-subsidized credit as the credit is being furnished at standard BAAC rates. Farmer returns are above non-subsidized levels. The capacity of the market to absorb warp silk yarn<sup>1/</sup> production implicit in the project is discussed in Part III. C. The weft yarn<sup>2/</sup> produced as a by-product of this project (from defective cocoons) is less than 5% of the traditional weft supply and thus will have minimum, if any, negative impact on weft prices. Actually the diversion of farmers away from traditional weft production (to produce warp) could decrease weft supply and increase weft prices. Market forces will put these elements in balance.

c. Farmer Profitability (PRP cable, para 5) - Part III. C. provides information on financial returns to the farmer, including sensitivity analysis. The returns are sufficient to induce farmer acceptance.

d. Beneficiaries (PRP cable, para 6) - Special arrangements for credit, discussed in Part IV. A. and elsewhere, will assure credit availability to poorer farmers, and include a risk minimizing feature. Heterogenous mix of farmers will be fostered by agreed selection procedures. See Part III. B. Cooperative marketing arrangements will eliminate middle-men and give farmers a stronger hand vis-a-vis reeling plant owners. This is also discussed in Part III. B.

<sup>1/</sup> "warp" is the lengthwise yarn in woven cloth.

<sup>2/</sup> "weft" is the crosswise yarn in woven cloth, i.e. the part which passes back and forth with the shuttle across the warp.

e. Replicability (PRP cable, para 7) - Replicability is discussed in Part III. B. The RTG policy is to use subsidies as little as possible. In fact the cabinet committee approval of the project stipulates that PWD is to secure recovery of costs from project beneficiaries wherever possible.

f. Credit (PRP cable, para 8) - Credit rates applying to this project are standard BAAC rates for farmers and total credit facilities at these rates available through BAAC are substantial. Thus the project can be easily replicated. Any subsidies involved in these rates are sector-wide, and this project, involving poorer farmers, is not an appropriate one in which to begin reform.

g. Managerial Performance (PRP cable, para 9) - Arrangements designed to assure adequate management and for evaluation are discussed in Part IV. Some highly appropriate foreign technical assistance is being provided by other donors (see Part II. B. 7). USOM's key role is being played now in the project design and planning stage, and will continue into the early stages of implementation. USOM's role is provided for; See Part III. B.

h. Role of Cooperatives (PRP cable, para 10) - The role of cooperatives is discussed in Part IV. B.

i. Land Titling and Tenure (PRP cable, para 11) - Farmers appear to have confidence in their land tenure and attractiveness of this project does not appear to be influenced by land tenure considerations. See Part II. A.

j. Loan Financing of Reeling Plants (PRP cable, para 12) - Reeling facilities are not part of the planned project. Required expansions of such facilities will be undertaken by private entrepreneurs. The Industrial Finance Corporation of Thailand has stated that it is prepared to participate in this activity.

k. Additional Comments (PRP cable, para 13) -

1) Grant Component - In accordance with understandings with the RTG, the limited costs of evaluation and the foreign exchange costs of third country management training are proposed to be grant financed.

2) Local Cost Financing - Financing arrangements will be through direct dollar/baht conversion as established for the Thai Seeds project. The justification for this approach is that Thailand has neither a U.S. commodity-import program nor suitable internal procedures for employing special letter of credit (SLC) arrangements. The relatively small size of the current U.S. AID program in Thailand does not justify the establishment of these special arrangements. Foreign exchange costs will be loan financed through established Letter of Commitment procedures.

3) Vehicle Procurement - The RTG will finance vehicle procurement as part of its financing for the project because only right-hand drive vehicles are suitable for use in Thailand and are not available from the U.S.

4) Five-Year Disbursement Period - The five-year disbursement period for the loan is necessary to implement the project in gradual, manageable steps.

5) Logical Framework - A logical framework is provided. See Part II. B. and Annex H.

6) Analysis of Environment Impact - An analysis of environmental impact is provided. See Part III. A. and Annex F. The possibility of adverse effects is minimal and positive benefits to the environment may be realized.

7) Role of Women - Women play a predominant role in this project. The large majority of the 1500 participants to be trained at the Surin Silk Experiment Station are expected to be women, because women traditionally care for the silkworms at the farm level. Almost all other operations associated with silk production, including reeling and weaving, are also dominated by women. Women in PWD and in USOM (the assistant project officer) have played, key roles in the project planning and will continue to play key roles in implementation. See also Part III. B.

2. Other issues and their resolutions are:

a. Appropriateness of AID Involvement - Although AID has had limited experience with sericulture projects in the past, since this particular project is specifically aimed at improving incomes and well-being of the rural poor, AID involvement is most appropriate. Technological inputs related to sericulture will come from the RTG and Japan not AID or the U.S. AID participation in the project lends discipline in project analysis, planning and implementation that will improve the capability of the RTG to undertake other transfers of technology, to coordinate the efforts of discrete RTG departments.

b. Farmer Production Scale - The Nathan Report (Annex O) included as a basic recommendation an alternate project scheme involving a farmer production scale of approximately three times that planned by PWD. The recommendation was based on the Nathan Team's calculation that the PWD project scale provided unsatisfactory rates of return for farmers and for the economy. Their alternative was, therefore, aimed at improving these rates of return. We believe the Nathan Team's rate of return calculations were faulty and that the actual rates of return for the project are satisfactory. Moreover, the scale of activity proposed by the Nathan Team, albeit more efficient, would have limited participation to fewer farm families and would have required investment levels unacceptable for poorer farmers. PWD, therefore, rejected the recommendation, although it made many other adjustments in the project to accommodate suggestions made by the Nathan Team.

c. BAAC Interest Rate and Use of Reflows - The RTG has elected to pass on to the BAAC the AID concessional terms. On the surface this would seem to provide BAAC with a large interest rate spread, but it is appropriate in this case because of the higher risks the special lending arrangements entail. In addition, BAAC will assume the foreign exchange conversion rate risk (maintenance of value - MOV) and must set up a special fund for this purpose. It should be noted also that only about half of the farmer and co-op credit requirements for the project are being provided to the BAAC at the AID terms. BAAC is providing the balance from other sources, although it is assuming the higher risks mentioned above for the entire amount. Retention of reflows by the BAAC is appropriate because it will assure that the AID funds will be used to provide rural credit on a continuing basis during the repayment period of the AID loan.

## Part II. Project Background and Detailed Description

### A. Background

#### 1. Why a Sericulture Project

Average per family cash income in Northeast Thailand (approximately 7.9 million people) is probably about \$430/year, lowest in the nation. Ninety percent of the population in the Northeast is engaged in agricultural activities and options for improving incomes in this region are limited by the generally poorer soils and less reliable rainfall conditions as compared to other regions as well as limited non farm employment opportunities. Sericulture has long been practiced in the Northeast, but with a traditional technology whose returns are low. This, and the risk of disease to the silk worms, have heretofore led the region's farmers to devote only marginal and offseason resources to sericulture primarily for family use.

Despite the fact the traditional Thai silk industry was in existence continuously for a thousand years, it was not promoted by the Government until 1901. With Japanese assistance an experimental sericulture station was established at Korat. From 1901, sericulture activities including culturing, reeling, and training were increased. By 1913 however, Thai Government extension activities were devoted to other agricultural crops and the silk extension program at Korat was abolished. Government supported sericulture activities began again in 1936 and increased incrementally over the years to the present time.

With the development by MOAC's Sericulture Division of improved mulberry strains and higher productivity hybrid silkworms capable of producing higher quality silk thread, the RTG conceived of applying this improved technology as part of its Third Five Year Plan which had the goal of raising labor productivity and incomes on a broad scale in rural areas. PWD land settlements in the Northeast provided an excellent environment to develop a high impact program using the new technology since the farmers in these settlements are among Thailand's poorest and because the settlements have the administrative structure needed for proper extension and monitoring. The RTG sought assistance in designing and financing the project from AID. Because of an excellent fit

with AID priorities generally and with the DAP for Thailand specifically, a USOM prepared PID and PRP were approved by AID/W. In addition to the background provided by these documents (DAP, PID and PRP), considerable information is contained in Report on Thailand Sericulture Project dated January 6, 1975 prepared by Uma Lele and John W. Mellor under a USOM contract and in the November 1975 Evaluation and Design of Sericulture Project in Public Welfare Land Settlements (Annex 0) by Robert R. Nathan Associates, Inc. Team to Thailand under contract to AID.

## 2. Land Settlements

The agencies involved with the land settlement programs of the Royal Thai Government are: the Department of Public Welfare and the Department of Land under the Ministry of Interior, the Department of Land Development and the Division of Land Cooperatives under the Ministry of Agriculture and Agricultural Cooperatives. Also under the Ministry of Agriculture and Agricultural Cooperatives, an additional Office of Land Reform has been organized as the agency responsible for the Government's land reform policy.

Despite the existence of four other land agencies, the Department of Public Welfare (PWD) is by far the largest dealing with settlement programs. Its Self-help Land Settlement Division has established in the 35 years of its existence a total of 55 settlements. The development of PWD's policy concerning land settlements can be divided into three main historical phases:

a) 1940 1960 Allocation of land to landless people or farmers with too little land for making a living with emphasis on social welfare aspects. The settlement programs relied on the self-help approach, where the Government merely provided the uncleared land and basic infrastructure, and left it to the settlers to develop the holdings allotted to them with their own resources.

b) 1961-1971 This period was characterized by Thailand's accelerated program of national development. In order to increase agricultural production in settlements, PWD started organizing agricultural supporting services for settlers. The first institutional arrangement was the Demonstration and Training Center at the Saraburi Land Settlement.

c) Since 1971 PWD has increasingly aimed its settlement policy at consolidating the existing settlements and organizing more efficient settler promotion programs. The beginning of these efforts was signalled by a "Statement of Development Policies in the Land Settlements". The most noticeable indicators of policy change over the years has been a retreat from a purely self-help approach and a priority shift from social welfare to economic goals. At some new settlements, PWD not only provides the infrastructure but also clears and develops the land and provides housing materials for the settlers.

With a changing political situation, a new set of objectives of land settlement was also added to the original one of providing living areas for landless people.

- expansion and diversification of the agricultural base of the national economy;
- provision of work opportunities;
- national security and public administration;
- control of forest invasion and destruction.

### 3. Description of Project Settlements

The Northeast settlements, listed on Table I (next page), have been selected for this project as being the most appropriate for sericulture. Their locations are shown on the map in the Table of Contents.

Some settlements have been established as long as 21 years (Phon Phisai and Chiang Phin). The newest settlement is Lam Dom Yai which was established in 1970. (This accounts in part for the few settlers there.) Total area of the settlements ranges from 30,000 rai (12,000 acres) to 414,000 rai (165,000 acres) and each settlement has additional area available for new settlers ranging from 13,750 rai (5,500 acres) to 338,000 rai (135,000 acres). Planning for, and development of, these areas proceeds as conditions warrant.

Each settler family is allocated 15 to 25 rai (6 to 10 acres) of land. The allocation varies between settlements but is generally the same for all settlers in a given settlement. The allocation includes a 2 rai homesite grouped with other settlers (thus fitting the Thai rural village concept) and a farm plot within a short walking distance of the home plot. Layout accords access by settlement roads to all homesites and farm plots. See Annex D for typical layouts. Each settlement has at least one second class health center and at least one primary school (see Table I). An effort is made to locate schools within easy walking distance (2 kilometers) of every village.

The average gross cash income per family in the project settlements, as reported by PWD, varies considerably (from \$120 to \$650 per year, as shown in Table I). The main cash income earners are cassava, maize, kenaf and cattle.

Most of the soil in the Northeast settlement is not suitable for growing rice but it is very suitable for mulberry. The report of a soils survey by Stanly E. Snyder in 1975 is included as Annex C.

### 4. Land Tenure and Titling

Although most settlers in the 10 project settlements do not yet own their land, they do have established security of land tenure. Settlers receive land titles when they meet certain criteria, including repayment of any outstanding debts. Other requirements include 5-year land tenure, utilization of at least 3/5 of the land, and construction of a house and fence around the settler's land. Some settlers in four settlements in the Northeast have already received title to their land.

TABLE I

Sericulture/Settlements General Statistics

<u>Settlement Name</u>	<u>Year Established</u>	<u>Total Area (rai)</u>	<u>No. of Families</u>	<u>No. of People</u>	<u>Stand-ard Farm Size (rai)</u>	<u>Average Family Income</u>	<u>No. of Health Facilities</u>	<u>No. of School</u>
Ban Kruat	1959	211,562	3,250	18,990	25	\$605	2	11
Prasar	1958	245,000	1,955	13,685	25	280	1	8
Phon Phisai	1955	165,625	2,348	10,780	25	450	3	15
Ubonrat	1964	413,900	3,000	14,830	15	150	1	11
Mukdahan	1956	12,375	1,560	11,500	25	555	4	12
Chiang Phin	1955	105,000	2,304	11,780	25	300	3	10
Lam Dom Noi	1959	52,735	995	5,000	15	120	2	4
Lam Dom Yai	1970	18,125	321	1,296	15	196	1	1
Lam Pao	1965	118,000	1,740	9,156	15	400	3	11
Kuchinarai	1963	30,000	506	3,051	25	650	1	6

Source PWD Data

5. PWD Sericulture Efforts Underway

Experimental efforts are underway in several settlements. These efforts are not a part of the presently planned project; they are separate and additional. Operations started in 1975 at Phimai (a settlement which will not be involved in this project) and at Prasat. Each of these has 64 trained participants, a central mulberry plantation, and a central young worm rearing house. A total of 80 families at 5 other settlements have been trained. Seven settlements besides Prasat have young worm rearing houses and all but Lam Dom Yai have central mulberry plantations. Experience from these experimental activities has been invaluable in the design of this project and gives much greater assurance of the accuracy of projections than would otherwise be possible.

6. National Silk Strategy

No formal national silk strategy has as yet been articulated, but industry and government forces are in play that should lead to one. The Department of Industrial Promotion, Ministry of Commerce, recognizing the importance of quality standards and control, intends to establish International Silk Association standards for grades B and C warp yarn as applicable for domestic Thai production. As a step in this direction, the Department issued a regulation requiring that sale of all domestically produced warp yarn be controlled by Narai Phan, a government trading organization, so that quality can be monitored.

A long-range goal is that domestic warp yarn production meet the domestic demand within five years and that imports will not be necessary after that time. Towards this end, the Department issued a regulation on March 16, 1976, requiring that silk weavers secure at least 25% of their warp yarn from domestic sources. In addition, the Department is closely watching world prices and has recently adjusted import duties which are now at 10%. It has also established a \$35 per kg. floor price for domestic warp yarn and will examine and adjust the price monthly.

**B. Detailed Description**

**1. Goal Statement**

The goal of this project is to increase the annual net cash farm incomes of 1,500 families in ten Northeastern settlements by an average of 50% in 5 years. Underemployment of farm labor resources is a major reason for low incomes in Northeastern rural areas where 60% of the labor force consists of unpaid family labor. A labor force survey made by the NSO in 1973 indicated that 53% of laborers in the Northeast worked less than 40 hours a week, and almost 20% of this group worked less than 10 hours per week. The project aims to increase incomes by increasing both productivity and employment opportunities.

Progress toward the goal will be measured by the increase in annual net cash farm income per participating family in comparison with national average statistics and by monitoring employment statistics. Such figures are available from the National Household Expenditures Survey conducted by NSO, National Income Account Statistics compiled by NESDB, and Farm Income and Expenditures Surveys conducted by the MOAC. Population census figures will be used to cross validate population figures.

An important assumption necessary for achieving the project goal is that the RTG continues to stress improvement of rural living and income conditions as a priority national objective. This objective is a firm priority in the proposed RTG fourth Five Year Plan (1977-1981).

Another important assumption for achieving the goal is that the rate of population increases among poor rural families is not greater than family income increases. This assumption is necessary to enable real per capita income for the rural poor to increase. The population growth rate in the Northeast is 2.9% compared with the national average of about 2.56% and is presently the highest in the nation. Family planning services are being emphasized for the Northeast region. Present RTG policy for the land settlement areas in the Northeast includes a provision for the Public Welfare Department to encourage and support family planning in the settlements by cooperating with the Family Planning Programs conducted by the Ministry of Public Health and the Family Planning Association of Thailand.

A final assumption that is necessary for achievement of the project goal is that project benefits can and will spread beyond the 1500 families that are the initial target beneficiaries. Elements of the project design as well as a 'system' for facilitating a productive blend of technology, credit and administrative services, should operate to achieve the desired spread. The most important factor, however, will be the demonstration that participating farmers are earning higher incomes. Demand and price expectations that will influence income levels are discussed in Part III.

Aside from the spread effect discussed above the achievement of higher cash incomes among the 1500 farm families should (all things being equal) result in additional spending for necessities and some luxury items. This incremental spending should stimulate production and investment to some degree in areas other than in agriculture.

## 2. Project Purpose

The project purpose is to establish modern sericulture technology among 1,500 farm families in ten settlements in Northeastern Thailand.

a. Each step in the production of silk is labor intensive. Establishing the use of modern sericulture techniques in the Northeast will alleviate under-employment among the farm families producing silk and lead to increased cocoon production for warp silk (smooth silk).

b. The adoption of modern sericulture technology to be introduced by this project will (assuming reasonably favorable supply-demand conditions) increase farm family cash incomes.

### 3. End of Project Status

It is expected that by the end of this project 1500 farm families in 10 settlements in NE Thailand will be producing a total of 316 metric tons of cocoons suitable for producing 40 metric tons of warp yarn each year. These figures are derived on the basis that each year for five years 300 additional farm families a year, or 30 per settlement in 10 settlements, will be included in the project. At a price of about \$2.50/kg for hybrid cocoons each farm family should earn \$525 gross income or about \$200 net cash income per year from this project. After their loans are paid off (in about 9 years) farmer cash incomes should go up by about \$290 per year, from an average of \$430 to \$720.

(Note: The feasibility and derivation of these figures is shown in Part III).

It is also expected that successful achievement of the project purpose will be indicated by increased demand by other farmers for the sericulture technology introduced in the Project. If significantly more than 1500 farmers are producing hybrid cocoons (or if significantly more than 316 tons/year of hybrid cocoons are traded annually) by the end of the fifth year, this would be a strong positive indication of project success.

Another condition expected at the end of this five-year project is the existence of an institutional structure for the transfer and use of sericulture technology in the Northeast. Such a structure would include institutionalized credit, marketing, extension, training and sericulture production inputs in sufficient quantity and on acceptable terms to allow the profitable production of hybrid cocoons by farmers. Some of these institutions will have benefits that extend beyond sericulture. Timely attainment of project outputs should lead to the achievement of this condition.

The above conditions will be verified through the evaluation data to be collected and analyzed by Kasetsart University as described in Part IV. C, and by checking PWD and cooperative records and project reports.

4. Assumptions:

It is assumed that the target families will be willing to accept the risks involved in adopting the modern sericulture techniques. Experimental efforts in introducing the technology at Phimai, Ban Kruat, and Prasat tend to confirm this as a valid assumption since farmers have continued to participate in the project. New farmers have joined in the second year, and interest among nonparticipants is keen.

The success of this project requires reasonable warp yarn demand and an acceptable price for the farmer's hybrid cocoons. The economic and financial analyses included in Part III examine the reasonableness of these assumptions.

Project success is also contingent on having adequate budget and personnel made available as planned. All necessary production inputs also must be available in sufficient quantities at acceptable prices. Expectations concerning these factors are discussed in Part III.

5. Project Outputs

a. Central Rearing Houses

A total of 30 central silkworm rearing houses will be constructed under this project for the 10 settlements (3 per settlement). Young silk worms must be kept in a clean environment which is protected from the elements and insect pests, disease, and lizards. Adequate space must be provided with good ventilation.

The central rearing houses will be used to rear silkworms for the first three moultings, or for about two weeks, after which the worms will be transferred to the individual farmer rearing houses for the last two moultings and cocoon spinning. Each central rearing house is sufficient for 60 families (120 boxes of eggs). As farmers enter the program (30 families /settlement/ year) necessary central rearing houses will be constructed until 3 per settlement exist. This represents a slight over capacity, permitting additional farmers to join the project in the sixth year.

The central rearing houses to be funded under the proposed project meet these necessary requirements. All windows are covered on the inner side with fine wire mesh to prevent tachina-flies and lizards from entering. During rearing only one door is used to enter the room and an outer-room in front of the door further safeguards the rearing room from pests and predators.

The outer corridor is completely enclosed with ditches, about 20 cm. wide and 15 cm. deep; during rearing, these ditches are filled with water to prevent ants from coming in. Also, all the windows are set with glass or woodenpane, so that the whole building can be closed up. The room has a partitioned section for storing mulberry leaves. This section is made so that it can be completely washed with water. The mulberry storage room also has a ventilator. Where water is readily available, a water faucet is installed both in the rearing room and the mulberry storeroom. The floor of the storeroom is concreted and properly sloped so that washing is possible and dirty water will be drained well.

Hanging rearing beds are provided for the feeding and caring of the worms.

b. Central Mulberry Plantations

A central mulberry plantation of 100 rai (16 hectares) is provided for each settlement. The plantation is required to provide tender mulberry leaves for the young worms being raised in the central rearing houses before the worms are transferred to the farmers. The plantations will be set up in 3 phases to coincide with construction of the central worm rearing houses.

Plantations will be established initially using high yield, tested varieties such as Mon-Noi or Tha-Dam from Korat Center and other Northeast research centers. Yields are expected to range from 1,000 kg. to 1,500 kg. per rai. Under highly favorable conditions yields may reach 2,500 kg. per rai. Rainfall is considered adequate for mulberry in each settlement and irrigation will not be provided. Soils have been surveyed and found suitable for mulberry cultivation in each instance.

As indicated above, the PWD sericulture supervisor will be responsible for the management of the central plantation until the cooperatives are able to assume this responsibility.

c. Cooperatives

The project plan calls for the establishment of farmer cooperatives in each of the Project settlements by the second year of project operations. Five are already in being, two will be established in 1976 at Lam Pao and Chiang Phin and there will be three co-ops established in 1977 at Lam Dom Noi, Lam Dom Yai and Kuchinarai.

Initially, the cooperatives will provide production inputs such as fertilizer and disinfectant for worm houses for coop members. Short-term credit of up to \$250 per member is available for these production inputs through the revolving fund of the PWD. Other services such as marketing and equipment rental will be provided after the procedures for the initial services have been established.

PWD will advise and staff the coops until local farmers are trained to staff them. The Department of Cooperative Promotions of the MOAC will assist in training PWD supervisors and extension officers during their training in Korat. Managers will be recruited from agricultural vocational schools and colleges. Due to the low level of education of most settlement farmers it is expected that several years of on-the-job training will be necessary before the farmers will be able to staff and manage their coops.

After cooperatives are organized in each settlement, they will gradually assume responsibility for management of the central worm rearing facilities, central mulberry plantation, cocoon drying and marketing services, provision of inputs, and credit.

Considerable attention is being given to the development of cooperatives in settlement areas by the Federal Republic of Germany and the IBRD. Their assistance includes financing of revolving funds, training, and technical advice. The sericulture project design therefore does not attempt to be involved directly in these cooperative development activities. Rather the design provides needed financing for coop facilities and a structure of farmer cooperation in sericulture activities that is supportive of the concepts of group cooperation and group action.

d. Farmer Rearing Houses

Each farmer will need a rearing house measuring 4x6 meters to raise an average of 40 kg. of cocoons per cycle.

The farmers' individual rearing house will be used to raise the silkworms from the fourth moulting, or instar, through the cocooning stage. During these stages, which take about two weeks, the silk worms are no longer as susceptible to disease as the young worms, and therefore do not require the delicate care necessary in the central rearing houses.

e. Farmer Mulberry Plantations

The mature worms eat voraciously, and multiply their weight by a factor of 20 during their last two stages of growth. Sufficient mulberry must be provided to insure proper growth of the mature worms and the farmers' mulberry plantations are adequate to handle this requirement.

Each family will cultivate up to 4 rai (1 rai = 0.16 hectare) of high yield mulberry. This should be sufficient for producing 40 kg. of cocoon per worm-rearing cycle for six cycles each year. The mulberry cuttings for establishing the plantations will be provided for about \$2 per rai from the Korat Center and Northeast research stations initially and central plantations when they are established. MOAC extension agents will assist the farmers in establishing their individual plantations.

f. Settlement Roads

A total of 110Km. of main roads and 170Km. of feeder roads will be upgraded and maintained under the Project. Table II below shows the number of kilometers of road that must be upgraded and maintained in each settlement as determined by RTG engineers and reviewed and concurred by the USOM engineer.

Table II

Settlement	Description	Kms.		
		Main	Feeder	Total
Ban Kruat		15	20	35
Prasat		30	30	60
Lam Dom Yai		10	5	15
Lam Dom Noi		10	30	40
Mukdahan		-	25	25
Phon Phisai		-	5	5
Chiang Phin		-	20	20
Ubonrat		20	10	30
Lam Pao		15	10	25
Kuchinarai		10	15	25
Grand Total		110	170	280

Source: PWD survey data

A detailed description of the operations to be implemented and cost breakdowns are contained in Annex B 12.

The roads to be upgraded and maintained under the supervision of the PWD settlement manager are directly related to the sericulture program in the settlements. They link the main highway, the Settlement office, central mulberry plantation, the farmers' rearing houses and the central rearing houses at each settlement. Organizational and financial capability for continued maintenance is in place.

Good, maintained roads are essential to the Project, since the worm eggs must be delivered at the proper time, mulberry must be freshly picked to feed the young worms, and the perishable cocoons must be delivered to the central cooperative drying facility within a few days after the cocoons are spun. Since many of the settlement roads presently become impassable during the rainy season it is essential that they be upgraded and properly maintained to allow timely egg delivery, worm rearing and marketing of the cocoons. Project implementation plans require all roads to be upgraded before the first worm rearing cycle. The benefits of upgrading and maintaining the roads will obviously extend beyond the Sericulture project.

g. Sericulture Officers and Extension Agents

The planned high ratio of extension officers to participating families is intended to allow close supervision of the new participants' worm rearing activities. As project beneficiaries become more proficient in sericulture technology they will require fewer extension visits. The extension officers will then be able to visit other families who are expected to begin raising hybrid silk worms as the success of the pilot venture is established.

The sericulture extension officers operating under PWD will be primarily concerned with worm-rearing technology. MOAC extension agents, Department of Agricultural Extension, will assist participating farmers with their individual mulberry plantations. The MOAC has agreed to provide adequate extension services for this purpose for each settlement. Ninety five MOAC officers who have already had training in sericulture and mulberry production are currently available in the Northeast to assist in this effort.

6. Project Inputs

a. Farmer Training

As currently envisaged, one member of each participating family will be trained in modern silkworm rearing techniques, from worm hatching through the cocoon spinning stage. Training in mulberry cultivation will also be included. Practical training will be emphasized with each trainee actually performing the operations being taught. Each training course will last for 30 days (one worm rearing cycle). Five classes with 60 participants will be conducted in each year of the project. Farmers will be trained at the Surin Silk Experiment Station, which is being expanded and upgraded under this project to accommodate the trainees. Annex B-7.1 lists the equipment and facilities for settler training to be financed under the project. Costs are estimated at \$75,000 total for farmer training and \$194,000 for expansion of the training facilities at Surin.

b. Other Training

Other training to be provided under this project includes training for PWD sericulture extension officers and settlement sericulture supervisors.

(1) Extension Officer Training

There will be 70 PWD extension officers trained under the project. This will allow a ratio of one officer to every 20 participating families. Most of the officers are expected to be recent graduates at Thai colleges with agriculture-related degrees. Twenty officers will be trained during project years one and two, and ten more will be trained each year thereafter.

The training courses for the extension officers will be held at the existing Korat Sericulture Research Center. Each class will be for 45 days of intensive training. The officers will receive another 60-70 days of practical training (two worm rearing cycles) upon completion of their Korat coursework. After six months and every year thereafter the officers will receive 15 days of refresher training.

(2) Settlement Supervisors Training

One settlement sericulture supervisor will be trained for each of the ten settlements. The supervisors will be responsible for supervising the seven extension agents in each settlement as well as managing the central mulberry plantation and central worm-rearing houses. Supervisors will be trained for four and a half months at the Korat Sericulture Center in sericulture management and technology, and in cooperative management. Every six months thereafter, the supervisors will return to Korat for refresher training for 15 days. All ten supervisors will be trained concurrently at the beginning of the project.

(3) Foreign Training

Supervisors will also be given about two weeks of third country training during the second year of the project. This training will allow the supervisors to compare the organization of silkworm production facilities abroad with the settlements' silkworm production facilities, and give them ideas for improving their sericulture operations. Estimated training costs are \$16,000, including a foreign exchange component of \$6,000 which is to be AID grant funded.

c. Supply of Silkworm Eggs

Eggs for the Project's silkworms will be Japanese/Thai hybrids developed at the Korat Sericulture Research Center and imported Japanese eggs. A description and evaluation of the Korat Center and the reliability of egg supply is contained in Part III.

d. Credit Requirement for Farmer Rearing Houses

The BAAC will provide the credit needed by project farmers for their individual rearing houses and equipment, for establishing 4 rai of mulberry plantation, and for their first year's supply of silk worm eggs. Total credit requirement is about \$1250 per family. BAAC loan terms for project farmers will be 8% with repayment in about 9 years at 40% of sales revenue.

e. Technical Assistance

Management consultants will be provided to assist the Project Manager in coordination and analysis of the management aspects of operations and to make other recommendations for the project manager's use. The project budget contains \$150,000 for this management consultant services. Thai firms and individuals will be eligible to provide these services as well as joint ventures of Thai and U.S. firms.

f. Other Inputs

The other cost components of the project (as shown in the logical framework) consists of:

- (1) Establishment of Central young silk worm rearing houses and central mulberry plantation.
- (2) Road improvement activities
- (3) Expansion of the Farmer Training Center at the Surin Silk Experiment Station
- (4) Salary and related costs for extension workers and supervisors.

7. Other Donor Assistance to Related Projects

Other donor involvement falls into several categories with Japan involved most heavily in the technology side of sericulture and the supply of equipment. Germany, New Zealand, the IBRD and the Mekong Committee have been involved in implementation of various agricultural development activities. Germany and New Zealand have also been involved in assistance aimed at making rural credit more readily available. Private involvement naturally falls into the category of agro-business.

a. Japanese Bilateral

Japan has been providing assistance to the Korat Sericulture Research and Training Center since 1969. The Sericulture/Settlements project will utilize the hybrid silkworm eggs developed at this center with Japanese help, Japanese technicians at the center have also helped design the training courses for cooperative managers and sericulture extension agents. Seven Japanese experts are currently assisting research projects dealing with silkworm rearing, breeding, egg production and disease, as well as mulberry culture and improvement. Particularly applicable to the proposed project is the work being done to develop disease resistant varieties of mulberry. The Japanese assistance will continue at least until March 1978 contrary to earlier expectations that it would terminate sooner.

Japan has also provided technical advice and the refrigeration equipment for the four egg production centers that will begin operation in 1978.

b. The Federal Republic of Germany (FRG)

The Federal Republic of Germany is involved in agriculture and cooperative development in several PWD land settlement areas. So far the FRG has been involved in crop promotion programs in 10 settlements and in the establishment of multi-purpose cooperatives in three. These programs will probably be extended next year to include eight more settlements in the crop promotion program and three in the cooperative establishment program. The German assistance program would then be active in 6 of the 10 designated Sericulture settlements, including cooperatives at Prasat, Lam Pao, Mukdahan, and Kuchinarai.

Fundamental components of the German program in cooperatives are one-year on-the-job training programs in agriculture and cooperative principles for cooperative managers and establishment of cooperative revolving funds of \$8,500 for each cooperative.

The total FRG financial contribution will come to about \$3 million for all these activities.

The German assistance will be especially helpful to the Sericulture project in its support of cooperatives. In addition, there will be opportunities for coordination of evaluation using Kasetsart which is providing data for the FRG projects and is proposed to be involved in the Sericulture/Settlements project.

c. Mekong Committee

The Mekong Committee assisted PWD in the agricultural development of Ubonrat settlement by setting up a multi-purpose service center and by financing five agricultural extension agents. These agents provided extension services for 194 farmers in 7 villages and helped them install water supply facilities. The Mekong Committee also assisted PWD in the Physical planning of Huai Luang settlement.

d. IBRD

Included in the proposed IBRD Northeast Agricultural Development Project loan for \$23 million is a pilot sub-project for agriculture development in two Northeast settlements, Prasat and Ban Kruat. This \$1.3 million, 3-year sub-project will emphasize upgrading the agriculture extension service and establishing viable cooperatives in the two settlements. Those elements (co-op facilities) to be funded under the IBRD loan are not included in the Sericulture/Settlements project.

e. Government of New Zealand, Netherlands and Israel

The Governments of New Zealand, Netherlands and Israel cooperated with PWD in the construction of a pump irrigation system in the Ubonrat settlement at a total cost of \$350,000. The pumping capacity is designed for year around irrigation of the two-rai home plots of 500 families. The facilities have not yet been fully utilized due to unreliable water supply.

f. The Government of New Zealand

The Government of New Zealand is financing two advisors at the BAAC to help in improving the Bank's organization and operations. They have been influential in bringing about some recent improvements.

g. Private

Several private projects provide an illustration of the potential for coordinated government and private development of agriculture business, these include:

(1) A pulp mill based on kenaf in the Ubonrat settlement area which is under study by Phoenix Pulp and Paper Co., Ltd. and PWD. Total project costs are estimated at \$50 million and the mill, if built, would require about 200,000 metric tons of air-dried kenaf from an area of about 222,000 rai. Both settlement families and non-settlement families would be involved in supplying the raw material.

(2) A palm oil mill at Satun settlement beginning with a nucleus of 10,000 rai planted to oil palms.

## Part III Project Analysis

### A. Technical Analysis

#### 1. Sericulture Technology: The Process

The chain of production begins with mulberry which is cultivated and fed to silk worms. The worms pass through five stages, separated by four one day periods of sleep, at which time the old skin is shed. During the first three stages the worms are described as young, and during the last two, as old or mature. In all, the progress through the five stages takes about 21 days; the number varying to some extent according to the variety of worm, the temperature at the time of rearing, the quality and frequency of feeding, and a number of other less significant factors. At the end of this time, the healthy worm starts to spin its cocoon. Having completed this task in a further 5 days, the worm then changes into a chrysalis. If nature is allowed to take its course a moth emerges from the cocoon approximately 7 days later. Mating then occurs within a few hours, followed by the laying of eggs, and the hatching of a new generation of worms. In silk production the cycle is interrupted by drying which kills the chrysalis and preserves the cocoon. This is then placed in hot water which dissolves the serasin by which the cocoon is cemented together, allowing the filament to float free and be combined with others in the reeling process.

#### 2. The Traditional Method

Although sericulture has a long history in Thailand, yields are relatively low and farmers generally produce cocoons for their own use. As traditionally practiced by the Thai-Lao peoples of the North and Northeast, the sericulture technology utilized is very simple. Little attention is paid to the cultivation of mulberry. Once planted, it is rarely, if ever, pruned; fertilizer is not applied, and weeding is invariably not practiced. The worms are bred by the farmers themselves, and there seems to be no expertise in the selection of good, or even healthy worms for breeding. The quality of silk worm varieties does not therefore improve over time, and disease is transmitted readily from one generation to the next. The native worms have developed a certain resistance to the dangers presented by their environment, but at the same time their growth tends to be stunted, and the average length of filament produced is only about 400 meters, which compares with 800-1000 meters for the Korat bred hybrids and 1200-1500 meters for the Japanese variety.

The worms are reared in circular baskets, which may themselves act as receptacles and communicators of disease. The tops are covered with cloth to provide protection from the tachnid fly, which if allowed access to the worms, will lay eggs on their bodies, leading eventually to their death.

The silk filaments being of irregular quality must be reeled or spun by hand and they produce an uneven yarn which gives Thai silk its unique textured quality.

### 3. Economic and Market Aspects of Traditional Production.

In spite of the heavy inputs of labor in the spinning process the gross value of production per rai per year is only about \$22.50 (1 rai yields 400-500 kg mulberry leaf annually which yields 20-25 kg of cocoons which yields 2 -2½ kg of yarn at an average of \$10/kg.)

According to the estimates in the Nathan Report about 330,000 Northeast Thai families produce 8 kg/yr of yarn or 2,640,000 kg/yr total. About 660,000 kg (value \$6.6 million) reaches commercial markets the rest is woven in the home into silk fabric with a value of about \$23 million according to the Nathan Report. (The Nathan Report estimates for total production are probably high; in their January 1975 Report on Thailand Sericulture Project Uma Lele and John W. Mellor state that potential for expansion of the supply of the traditional domestic yarn to the commercial market is limited and that the opportunities for diversion from domestic consumption already have been largely realized.)

### 4. Modern Technology

Since mulberry is at present the only economically viable silk worm food, the foundation of sericulture lies in the growing of mulberry. If mulberry grows fully and has large thick leaves, its harvesting and feeding to worms is easy; silk worms grow well and produce good cocoons. Accordingly, much of the transfer of technology involves the instilling in farmers of improved cultural practices for mulberry such as mulching, fertilizing, and pruning. In addition, the project will utilize strains of mulberry developed by the Korat Sericulture Center that are adapted to the Northeast Thailand environment and are more disease and drought resistant than native varieties. (Disease resistance is especially important because chemicals cannot be used to protect the plant which is eaten by the silk worms.)

The new varieties are not disease free and the Korat Center is working on problems of root rot, stem borer etc. The project design is based on mulberry yields of 1050 kg./rai/year. This is probably conservative (yields can reach 2500 kg./rai/year under favorable conditions) but provides a margin of safety in the event of drought, disease damage, etc.

The silk worm side of the equation has the same two elements, i.e. genetic improvement and improved handling. The Korat Sericulture Center has developed hybrids based on native and Japanese strains which are more productive, produce good quality filament, and survive reasonably well in the local environment if properly handled.

The design of the project provides for the proper handling techniques as developed by the Korat Center, private industry and earlier PWD experiments. Rearing houses are designed to protect against insect intrusion and lend themselves to cleaning by washing and by spraying with a formalin disinfectant solution between cycles. They provide proper light and ventilation. The concept of the central young worm rearing house where supervision can be closer during the stages when the worms are more delicate (and, incidentally, eat considerably less) also favors success.

The modern technology is definitely more sophisticated than the traditional, and perhaps more significantly, requires discipline on the part of the practicing farmers. However, indications from early PWD efforts and the successes enjoyed by private corporations, Chul Thai Silk Co., Pairoj Silk Co., and Chya Agric. Enterprises Co., give little doubt that the improved sericulture procedures can be successfully transferred. These corporations employ people of the same general background and educational attainments as those who will be selected to participate in the Sericulture/~~Settlements~~ project.

## 5. Implications of Higher Quality

Higher quality silk filament as will be produced under this project gives two distinct advantages: a. it can be reeled on machines (whereas the traditional variety must be hand reeled), and b. it produces a yarn that is even and strong (and is thus much preferable for the warp or longitudinal threads in the silk weaving process). Because of its even characteristics the output of weaving machines using such yarn is 4-6 times what can be obtained using the traditional yarn for warp. The latter involves much down time due to tension problems and thread breakage as the fibres move up and down past each other in the weaving process.

The commercial <sup>weaving</sup>/industry thus uses only the higher quality, even yarns for the warp and has turned to imported yarns to meet its needs. Because of their use in the warp of the fabric, the higher quality yarns are commonly referred to as "warp".

In producing Thai silk, commercial weavers continue to use the traditional yarns for the weft of the fabric (the threads that are passed back and forth with the shuttle across the warp of the fabric). It is the uneven nature of these threads which give Thai silk its distinctive "nubby" texture.

Because of their use in the weft of the fabric, traditional yarns are often referred to as "weft". Rural families weave their own silk cloth at home using only traditional yarn produced by themselves. This fabric is sometimes called "weft-weft".

The above suggests that significant and as yet unanalyzed benefits to rural families may be realized through the introduction of the modern sericulture technology. The productivity of their home reeling and weaving operations will be greatly increased by making available to them higher quality cocoons.

6. Environmental Assessment

The environmental impact of the project is minimal. The only chemicals that will be used are moderate amounts of fertilizer for the mulberry and a formalin solution for periodic disinfecting of worm rearing houses. Proper and safe practices in the use of formalin will be imparted in training programs.

Pesticides and agricultural chemicals (other than fertilizer) will not be used as this would be deleterious to the silk worms which eat the mulberry leaves.

An environmental impact statement was prepared by PWD and approved by the RTG office of National Environment Committee. It is included as Annex F together with an evaluation of that statement by Dr. Harvey Ludwig, an AID financed consultant to the RTG National Environmental Board.

The total effect of the project on the environment will be positive because of more intelligent application of resources and techniques, especially in management of mulberry plantation.

## B. Social Soundness Analysis

### 1. Farmer Response

It has long been feared that the economic motivation and profit orientation felt by Northeastern Thai farmers would not be sufficiently strong to overcome certain non economic cultural and social behaviour patterns. Events which occurred in the 1960s go far in removing that fear. The Northeastern Thai farmers have accepted at least three crops, kenaf, cassava and maize, in response to high export prices. Both crops were readily accepted by farmers under the encouragement of middlemen, merchants, and officials who supplied advice, agricultural inputs and price information. The great expansion in corn production has been made possible by high world demand combined with the introduction of a well-adapted variety and the opening of large areas of suitable land along the Friendship Highway.

These examples, strongly suggest that the traditional farmer of the Northeast is an "economic person". Surveys indicate that the behavior of the Northeast Thai farmer is based on some form of economic calculation, although the level of calculation may be fairly elementary. The farmer will respond to economic incentives which calculates to be clearly advantageous, even though the level of risk and uncertainty is high.

With regard to innovative practices, age tends to influence the farmer's receptivity to innovative ideas. That is, a 30 year old farmer will be more receptive to innovative ideas than a 50 years old one.

### 2. PWD Settlements

With few exceptions the settlers are in origin North-easterners. In most settlements more than half lived in the same province before becoming a settler.

Farmers living in PWD settlements seem to be more responsive (relative to non-settlement farmers) to innovations, being less traditionally bound and with no other alternative than commercialized farming since their allocated land is generally not suitable for paddy subsistence production. At the same time, the degree to which farmers use new agricultural methods can be improved substantially. Farming methods in the PWD settlements in many instances reflect a lack of know-how in modern agricultural techniques.

### 3. Requirements for Acceptance

As indicated above past farmer responses to new crops and methods indicate that farmers are likely to engage in the new sericulture technology if they perceive it as being profitable. While farmers do base their decisions on some type of economic calculation, in many cases they have imperfect information related to the cost and future value (resulting income) of various inputs. One requirement therefore is to provide such information to the farmers. Almost ninety percent of the farmers in the Northeast settlements received only a minimum education which consists of four years or less at primary schools. The transfer of sericulture information and skills is designed to take the education level of the prospective participating farmers into account.

Related to the transfer of information and skills is the way in which sericulture officers and extension workers will relate to and be "accepted" by the Northeastern farmers. Sericulture officials who feel that their most important audience is in Bangkok, and convey this feeling to the farmers, are not likely to contribute toward the achievement of project goals.

The two major agricultural concerns among settlement farmers are:

- (1) Credit problems; and
- (2) the trading monopoly of the middlemen.

Lending and buying facilities must be responsive to the farmers requirements. Sericulture production requires a substantial investment by the farmer. If the official lending, buying and repayment arrangements are too cumbersome (for the farmer), he/she may decide to opt for other income alternatives. Special arrangements have been made for the project which are designed to overcome farmer reluctance, especially poor farmer reluctance. These special arrangements include: lending for full amount, flexible payback, no collateral. Further explanation is given in Part IV A under BAAC.

#### 4. Spread Effects

The project offers very good possibilities for the diffusion of "modern" sericulture practices to non-project participants, especially fellow co-op members. They, like all settlement farmers, are engaged in subsistence farming and probably already are engaged in, or are looking for, cash crop opportunities. As mentioned previously, farmers do respond to economic incentives despite a high level of risk. With favorable returns in sericulture, it is quite likely that other non-participating co-op and settlement members will want to "switch" over from one or more cash crops to sericulture.

Other factors that will operate to spread farmer adoption of modern sericulture practice are the favorable growing conditions and widened availability of knowledge and credit.

The Department of Agricultural Extension of the Ministry of Agriculture and Cooperatives will coordinate activities with the Department of Public Welfare in the planning, production and marketing of modern hybrid cocoons to farmers outside of the settlement area.

#### 5. Role of Women

Because sericulture is a labor intensive pursuit of women, the project will reduce female underemployment and unemployment. Women's activities in sericulture are expected to expand, and not necessarily as "unheard" workers. Much attention will be given the women members of farm families since they are the sericulture practitioners; they will be given the training, they will be visited by the extension workers, they will be away from home for the young worm rearing phase, they will manage a substantial family investment, they will be responsible for success or failure. These factors will place the women engaged in sericulture on a higher rung of self and external perception.

Directly and indirectly, female members of the 1500 participating families will benefit from the increased net annual incomes.

#### 6. Farmer Participation in Design

The PWD has tested design of the project on an experimental basis with some 200 farmers in several settlements, as noted in Part II. A. 5. Farmer reaction and feedback has caused some adjustment but reaction has generally been favorable. One important change initiated by farmers is the flexible loan payback provision which protects the farmer against net cash outlays during possible poor production periods. Farmers will participate more fully over time in the policy and marketing decisions of their co-ops.

7. Farmer Selection Criteria

Key criteria for selecting farmer participants in the project as presented by PWD are:

- a. Families volunteer to participate and have a keen interest in the project.
- b. Families have at least one surplus laborer to work full time on sericulture.
- c. Families are willing to cultivate at least 4 rai of mulberry.
- d. Family members are willing to attend the training courses as provided by the project.
- e. Families are industrious and of good behavior.
- f. Families live together in the same village with other participants in the project ~~group~~ (to facilitate ~~group~~ activities).
- g. Families are willing to make compost.
- h. Families understand their obligations and responsibilities in meeting production targets and loan repayments.

For selection of the settlers in this project, PWD will set up committees comprising the superintendent of the settlement, officers from MOAC, DOAE, PWD and village leaders.

PWD has included in its own project description for RTG cabinet approval a firm statement that project emphasis will be on poorer settlement farmers.

Two factors expected to be especially influential in assuring that a heterogenous group of farmers will be selected are: a. the BAAC special arrangements with respect to lending (which are designed to remove the credit bias against poorer farmers), and b. the bias of PWD to select farmers according to location in the settlement.

## 8. Settlement Social Services

The RTG and PWD recognize that success of the settlement program requires concern for, and positive actions to promote, the social welfare and improve the level of living of the settlers. Among other things, it has established health care centers in all of the settlement areas which are run in coordination with the Ministry of Health. One of the more important activities of these centers, given the high population growth rates in the Northeast, is the promotion of family planning concepts and the distribution of contraceptives.

Another positive action program concerns education. In coordination with the Ministry of Education, PWD is promoting elementary, secondary, vocational and adult education programs. It has as a target one school facility for each 200 families not more than 2 kilometers from home.

Special attention will be accorded by the RTG to the settlements in the design and direction of family planning programs, and in adult literacy efforts, as well as in consideration of program opportunity in maternal and child health and nutrition.

Establishment of local market facilities of the traditional type and based on settler entrepreneurship is being encouraged.

C. Financial Analysis and Plan

1. Production/Revenue Relationships

The following relationships based on the present design of the project provide background in considering the economic, marketing and financial implications of the project.

Per Farmer

Mulberry area planted	4 rai
Leaf Production (1053 kg./rai/yr.)	4212 kg./yr.
No. of boxes of eggs used (2 per cycle, 6 cycles/yr.)	12 Boxes/yr.
Cocoon production (39 kg./cycle, 6 cycles/yr.)	234 kg./yr.
Cocoon Sales (allowing for 10% rejects)	210.6 kg./yr.
Farmer Revenue (\$2.50/kg.)	\$526.50/yr.

<u>Total Project</u>	<u>1st Yr.</u>	<u>2nd Yr.</u>	<u>3rd Yr.</u>	<u>4th Yr.</u>	<u>5th Yr.</u>
Cocoon Sales/yr. (kg.)	63,180	126,360	189,540	252,720	315,900
Total Revenue/yr. (\$1000's)	158.0	315.9	473.8	631.8	789.8
Warp Yarn Produced/yr. (kg.)	7,897.5	15,795	23,692.5	31,590	39,487.5
Total Warp Yarn Value (\$1000's)	236.9	473.8	710.8	947.7	1,184.6

2. Total Demand

The following estimated/projected figures adopted from the Nathan Report gives a picture of the amount of project output in the context of total supply and demand for warp silk yarn in metric tons (1000's kg.):

Year	Total Demand	Sources of Supply		
		Thai Private	Existing PWD/MOAC 1/	PWD 1/ Project
1973	137	10	-	-
1974	150	15	-	-
1975	135	20	1	0
1976	145	34	2	1
1977	155	50	3	8
1978	165	90	3	16
1979	175	110	3	24
1980	185	130	3	32

1/ The "PWD Project" column is non-additive; it represents the portion of "Thai private" warp silk yarn production attributable to cocoons supplied by the PWD Project.

Obviously Thai production will substitute for imports.

The figures for "Thai Private" are from reelers who base their projections on the assumption that suitable cocoons would not be available to them unless they engage in cocoon production themselves as a plantation enterprise. These reelers, through their industry association, have said, however, that they would prefer to buy rather than produce their own cocoons. Thus, assuming farmer producers can sell their cocoons at prices competitive with what the private reelers can (or think they can) produce them for, the market potential is considerably greater than the project production and allows room for replicability on a substantial scale.

### 3. Sales Price Expectations

If one accepts the price projections of the Nathan Report, the outlook is rather bleak. The report projects an import price for warp yarn delivered to Bangkok of \$20-\$25 (฿400-฿500) per kilogram through the early 1980's. Working back from this, the Nathan Team Report constructs price to farmers for cocoons by first subtracting \$5 (฿100) per kilogram as a quality differential stemming from the poorer quality of Thai-produced warp yarn as compared to imported. It then assumes that 35% of the remainder represents value added by the reeler and that it requires 8 kg. of cocoons to produce 1 kg. of yarn. The resulting prices to farmers are shown as Case 1 in Table III for various warp yarn import prices.

1/ Reeling facility at Korat Sericulture Center, capacity 3 metric tons per year.

TABLE III

Price Relationships - Imported Warp Yarn and Hybrid Cocoons

<u>Import Price Warp Yarn 1/ (Baht/kg.) (\$/kg.)</u>	400	500	600	700	800
	20	25	30	35	40
<u>Thai Farmer Cocoon Price (\$/kg.)</u>					
Case 1	1.22	1.62	2.03	2.44	2.84
Case 2	1.62	2.03	2.44	2.84	3.25
Case 3	1.50	2.00	2.50	3.00	3.50
Case 4	2.00	2.50	3.00	3.50	4.00

Case 1: With \$5 (฿100) quality differential and with 35% value added for reelers. (These are the Nathan Report assumptions.)

Case 2: Without \$5 (฿100) quality differential and with 35% for value added by reelers.

Case 3: With \$5 (฿100) quality differential and with 20% for value added by reelers.

Case 4: Without \$5 (฿100) quality differential and with 20% for value added by reelers.

1/ Price delivered in Bangkok, including 10% Customs charges and duties.

These projections are unduly pessimistic for three reasons: First, the basis for such a decline from the present price of about \$35 (¥700) per kilogram (current as of March 1976), though articulated in the report, seems unrealistic in the face of a general rising level of prices. Unless other countries, China for example, dump on the international market, such a fall in prices would appear highly unlikely. (Against dumping tactics, Thailand would be well justified to protect its rural industry with appropriate duties.) Second, the quality price differential will likely decline as Thai producers develop know-how. Third, the assumption that as much as 35% of the total value of warp yarn goes to reelers is unproven and runs contrary to experience in Japan where only 20% of the warp yarn sales price represents value added by reelers. With the organization of farmers into cooperatives for the marketing of cocoons, a distribution of value added more favorable to them may be expected. Table III shows the farmer prices for cocoons based on differing assumptions for various warp yarn import prices.

It should be noted also that the Nathan Report itself, in calculating rates of return for the project, uses a warp yarn price of \$37.50 (¥750) per kilogram for its "benchmark" calculation. Moreover, the Ministry of Commerce has recently established a "floor price" for domestic warp yarn of \$35.00 (¥700) per kilogram which equates to a price of \$2.84 to \$4.00 per kilogram of cocoon, depending on which set of assumptions from Table III one chooses.

The view expressed by Uma Lele and John W. Mellor in their Report on Thailand Sericulture Project (1975) is a compelling one: "The physical environment in Northeast Thailand is suitable to six cycles of cocoon production, without irrigation, compared to about four in Japan. The soils of the Northeast are also suited to mulberry production particularly when compared to alternate crops. Thus both through expansion of the total market and displacement of existing producers Thailand appears to have a strong potential competitive position in warp production. It is on these general grounds of comparative advantage that the proposed project should be judged rather than by highly unreliable projections of short term movements in prices. Knowledge of price movements may, of course, be useful in preparing to protect a young industry against short periods of relative price depression."

Thus, for the purposes of this analysis, a sales price for cocoons of \$2.50 (฿50) per kilogram paid to the farmer seems realistic and appropriate.

#### 4. Farmer Income

Table IV projects farmer income based on project design and expectations. The debt service (calculated and displayed in Table V) is based on a total loan of \$1244 (฿24,880) at 8% with annual principal and interest payments totaling 40% of the annual sales value of cocoons. Under these circumstances, the farmer's loan will be repaid in the 9th year.

The internal rate of return to the farmer is just under 22.7%. The calculation is summarized in Table VII. Testing for sensitivity: with a 20% reduction in receipts (lower than expected under any reasonable assumptions), the internal rate of return is just under 14%.

As can be seen from the income projection, the project is much less sensitive to variations in expenditures than to receipts; a 10% increase in cost would be about equivalent to a 5% decrease in receipts.

Of course, farmers can consider alternate activities, such as raising kenaf, cassava or corn. Getting at the income which might be derived from these activities is difficult. The Nathan Report estimated \$125 per year, but this was based on a plot size of 6½ rai. Applying crude data for the Northeast generally to known gross incomes from cassava and kenaf would give an average of about \$80 per year. The Study of Land Settlements in Northeast Thailand by Arno Klempin and Richard Sandler prepared for PWD and IBRD in August-November 1975 indicates that the mean is probably between \$20 and \$25 per rai or \$80 to \$100 for 4 rai. In any case, it would appear that the farmer's income under this project even after debt service compares favorably in the short run and promises the farmer higher returns in the long run. Reactions so far evidenced from PWD's experimental activities indicate keen farmer interest.

#### 5. Cooperative Finances

As indicated in Part II. B., cooperatives will gradually assume responsibility for management of the central worm rearing facilities, central mulberry plantations and cocoon drying and marketing services. Annex Q

TABLE IV a.

FARMER INCOME & EXPENSE STATEMENT  
COCOON PRODUCTION  
Baht

YEAR	0	1	2	3	4	5	6	7
<b>INCOME</b>								
Mature Cocoon Sales		8,530	10,530	10,530	10,530	10,530	10,530	10,530
<b>EXPENSES</b>								
Mulberry Plantation including maintenance	2,440	1,360	1,360	1,360	1,360	1,360	1,360	1,360
Farm Rearing House Maintenance & Supplies	5,505	1,355	820	1,355	820	1,355	820	1,355
Eggs - 12 Boxes (8 @ B150; 4 @ B250)	1,100	2,200	2,200	2,200	2,200	2,200	2,200	2,200
Sub-Total	9,045	4,915	4,380	4,915	4,380	4,915	4,380	4,915
OPERATING INCOME (LOSS)	(9,045)	3,615	6,150	5,615	6,150	5,615	6,150	5,615
Depreciation		933	933	933	933	933	933	933
Interest		1,990	1,813	1,621	1,413	1,190	948	687
NET EARNINGS (LOSS)	(9,045)	692	3,404	3,061	3,804	3,493	4,269	3,995

Note: Total Farmer investment (and borrowing) is estimated at B24,880. This includes year 0 expenses plus cost of rearing house and a small additional amount for working capital.

Farmer labor provided in kind is not costed.

TABLE IV b.

FARMER INCOME & EXPENSE STATEMENT  
COCOON PRODUCTION  
Baht

YEAR	8	9	10	11	12	13	14	15
<b>INCOME</b>								
Mature Cocoon Sales	10,530	10,530	10,530	10,530	10,530	10,530	10,530	10,530
<b>EXPENSES</b>								
Mulberry Plantation including Maintenance	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360
Farm Rearing House Maintenance & Supplies	820	1,355	820	1,355	820	1,355	820	1,355
Eggs - 12 Boxes (8 @ ฿150; 4 @ ฿250)	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200
Sub-Total	4,380	4,915	4,380	4,915	4,380	4,915	4,380	4,915
OPERATING INCOME (LOSS)	6,150	5,615	6,150	5,615	6,150	5,615	6,150	5,615
Depreciation	933	933	933	933	933	933	933	933
Interest	405	100	-	-	-	-	-	-
NET EARNINGS (LOSS)	4,812	4,582	5,217	4,682	5,217	4,682	5,217	4,677

Note: Total Farmer investment (and borrowing) is estimated at ฿24,880.  
This includes year 0 expenses plus cost of rearing house and a small additional amount for working capital.

Farmer labor provided in kind is not costed.

TABLE V

LOAN REPAYMENT SCHEDULE  
(Baht)

(Estimate based on annual cocoon sales receipts of  $\text{P}10,530$  with 40% of that amount applied to debt service.)

<u>Repayment Year</u>	<u>Total</u>	<u>Interest @ 8%</u>	<u>Principal Repayment</u>	<u>Balance Outstanding</u>
0				$\text{P}24880$
1	$\text{P}4212$	$\text{P}1990$	$\text{P}2222$	22658
2	4212	1813	2399	20259
3	4212	1621	2591	17668
4	4212	1413	2799	14869
5	4212	1190	3022	11847
6	4212	948	3264	8583
7	4212	687	3525	5058
8	4212	405	3807	1251
9	1351	100	1251	0

**TABLE VI**  
**FARMER FINANCIAL RATE OF RETURN (22.72%)**  
**Baht**

<u>Year</u>	<u>Income</u>	<u>Depreciation</u>	<u>Profit</u>	<u>Cash Flow</u>	<u>Discount Factor 20%</u>	<u>Present Value</u>	<u>Discount Factor 24%</u>	<u>Present Value</u>
0				-23,045		-23,045		-23,045
1	8,530	933	3,615	3,615	.633	3,011	.806	2,014
2	10,530	933	6,150	6,150	.694	4,268	.650	3,998
3.	10,530	933	5,615	5,615	.579	3,251	.524	2,942
4	10,530	933	6,150	6,150	.482	2,964	.423	2,601
5.	10,530	933	5,615	5,615	.402	2,257	.341	1,915
6.	10,530	933	6,150	6,150	.335	2,060	.275	1,691
7	10,520	933	5,615	5,615	.279	1,567	.222	1,247
8	10,530	933	6,150	6,150	.233	1,433	.179	1,101
9	10,530	933	5,615	5,615	.194	1,089	.144	809
10	10,530	933	6,150	6,150	.162	996	.116	713
11	10,530	933	5,615	5,615	.135	758	.094	528
12	10,530	933	6,150	6,150	.112	689	.076	467
13	10,530	933	5,615	5,615	.093	522	.061	343
14	10,530	933	6,150	6,150	.078	480	.049	301
15	10,530	933	5,615	5,615	.065	<u>365</u>	.010	<u>225</u>
						2,665		-1,250

$$\text{Rate of Return} = \frac{25,710 - 23,045}{25,710 - 21,795} \times .04 = \frac{2,665}{3,915} \times .04 = .0272$$

Financial Rate of Return 22.72

Farmer Cost of Capital 8.00%

Net Benefit to Farmer 14.72%

includes a summary statement of costs of sericulture operations to be incurred by the cooperatives. These costs will be recovered in the sale of dried cocoons to the reelers.

## 6. Financial Plan

Table VII, Summary Cost Estimate and Sources of Funds indicates how AID funds will be used. The project budget provides 20% for contingency and escalation. Any such costs, if incurred, will be for the account of the RTG or the BAAC as appropriate.

The nature of the project is such that most of the costs are in local currency. AID will finance these costs through direct dollar/baht conversion at the most favorable available exchange rate. Payment will be made on a reimbursement basis against documentation that work has been done (loans made) and paid for. Loan financed foreign exchange costs (e.g., for management consultant services) would follow usual letter of commitment procedures.

Given the advanced state of readiness of this project for implementation and in order to maintain the RTG momentum, it is proposed that reimbursement be allowed for expenditures incurred after the date of PP approval if those expenditures otherwise would be eligible.

### D. Economic Analysis

The project internal rate of return to the Thai economy is just over 10%.

The calculation, including the basis on which cost and benefit streams were derived, is summarized in Table VIII. To test for sensitivity, benefits were recalculated at a cocoon sales price 10% lower than projected. This yielded an IRR of just over 7%.

While on the low side, a rate of return of 10% for a project of this type is appropriate. Moreover, many benefits have not been quantified, for example: increased utilization of domestic reeling capacity in the early years, consumption multiplier, environmental benefits, foreign exchange savings, transference to other crops of better and more disciplined farming methods, institutionalization of both sericulture technology and project implementation knowledge (replication potential).

TABLE VII a.

SUMMARY COST ESTIMATE AND SOURCES OF FUNDS

(in \$000)

<u>Project Costs</u>	<u>TOTAL</u>	<u>BAAC</u>	<u>PWD</u>	<u>MOAC</u>	<u>Kasetsart University &amp; Others</u>
Central Rearing House	549		549		
Central Mulberry Plantations	179		179		
Farmer Rearing Houses	1,463	1,463			
Silkworm Eggs	165	165			
Farmer Mulberry Plantations	183	183			
Farmer Training	75		75		
Management Training	40		40		
Farmer Training Center	194			194	
Cooperatives Facilities/Funds	495	495			
Extension Housing	211		211		
Extension Vehicles	466		466		
Extension Salaries	305		305		
Road Improvements	567		567		
Evaluation	77				77
Management Consultants	150		150		
Sub-Total	5,119	2,306	2,542	194	77
Add 20% Inflation & Contingency	1,023	460	508	39	16
<b>TOTAL</b>	<b>6,142</b>	<b>2,766</b>	<b>3,050</b>	<b>233</b>	<b>93</b>

TABLE VII b.

SUMMARY COST ESTIMATE AND SOURCES OF FUNDS

(in \$000)

Sources of Funds

RTG Budget	1,976
BAAC Loan Funds	1,466
AID - Loan <u>1/</u>	2,600
AID - Grant <u>2/</u>	<u>100</u>
TOTAL	<u>6,142</u>

- 1/ AID Loan Funds will be used to reimburse (a) PWD for up to \$1.3 million of costs incurred for Central Rearing Houses, Central Mulberry Plantations, Farmer Training, Road Improvement, and Management Consultants; and (b) BAAC for up to \$1.3 million of its loans made to farmers for Farmer Rearing Houses, Silkworm Eggs, and Farmer Mulberry Plantations, and to Cooperatives for Co-op Facilities and Revolving Funds.
- 2/ AID Grant Funds will be used for (a) Foreign Exchange Costs of Management Training, and (b) costs of Project Evaluations.

TABLE VIII

Sericulture Settlements  
Internal Rate of Return  
((\$1000))

<u>Yrs.</u>	<u>Costs (-)</u> <sup>1/</sup>	<u>Benefits (+)</u> <sup>2/</sup>	<u>Net Benefits</u>	<u>Discount Factor @ 10%</u>	<u>Present Value of Net Benefits</u>
0	1,411.-	-	- 1,411.-	-	- 1,411.-
1	953.5	344.-	- 609.5	.909	- 554.-
2	948.4	541.5	- 406.9	.826	- 336.-
3	834.1	737.8	- 96.3	.751	- 72.3
4	1,135.-	934.6	- 200.4	.683	- 136.8
5	403.6	1,131.3	727.7	.621	751.9
6	422.6	982.3	559.7	.564	315.6
7	422.6	982.3	559.7	.513	287.12
8	422.6	982.3	559.7	.467	261.3
9	422.6	982.3	559.7	.424	237.3
10	422.6	982.3	559.7	.386	216.-
11	422.6	982.3	559.7	.350	195.8
12	422.6	982.3	559.7	.319	178.5
13	422.6	982.3	559.7	.290	162.3
14	422.6	982.3	559.7	.263	147.2
15	422.6	982.3	559.7	.239	133.7
					+ 76.82

IRR = above 10%.

1/ Costs:

- Project costs are from Annex B-0, except:
- a) 50% of cost of co-ops and vehicles are deducted to account for non-project uses.
  - b) Cooperative operating costs are added:
    - I. years 1-5 @ approximately 09 ¢ per kilogram of cocoon.
    - II. years 6-10 @ approximately 25 ¢ per kilogram of cocoon.
  - c) MOAC training and salaries not costed in budget are added @ \$200 per month.
  - d) Extension worker salaries and support. Approximately 20 workers per settlement for sericulture are added in years 6-15.
  - e) Farmer operating costs are added with eggs all domestically supplied after year 6.

2/ Benefits are:

- a) Value of cocoon sales by co-ops at \$3 per kilogram of fresh cocoon (allows for 10% rejects).
- b) Value of roads estimated at 2% of settlement incomes. Average income is \$365.5 for 17,979 families.
- c) Employment represents additions to income of unemployed/underemployed workers as a result of project generated employment @ 50 ¢ per day per person for central young silk work rearing house construction, extension worker housing, road maintenance and improvement, and a portion of extension workers salaries.
- d) Value of cocoons rejected (10%) to be used as weft. Value (in kind or cost) is approximately 89 ¢ per kilogram.

Part IV. Implementation Arrangements

A. Functions and Capabilities of Implementing Agencies

1. Public Welfare Department (PWD) of the Ministry of Interior

Organization charts depicting the Ministry of Interior and PWD and are contained in Annex E. PWD's place in the Ministry, its field organization and the specific project chain of command can be seen. The key element of the PWD for this project, the Land Settlement Division, is long established and has a staff of about 1200 employees, of which some 40% are professional level. The staff is split about 40%/60% between Bangkok headquarters and the field. 143 of the employees are extension workers in the 55 land settlements.

RTG Budget expenditures for the Land Settlement Division have been:

	<u>Sericulture Activities</u>	(1,000 Baht) <u>Total Budget</u>
1973	575	94,914
1974	1,524	91,461
1975	2,663	121,664
1976 (projected)	5,134	211,269

PWD is the project's principal organizer, planner, manager, coordinator, and monitor; it will:

- establish central mulberry plantations (100 rai/settlement)
- contract for the construction of, and equip, central young worm rearing houses (3 per settlement, each with a capacity for about 60 families)
- provide extension service in sericulture technology to participating families (a ratio of one extension worker/20 families)
- select farmers for participation in the project and co-ops
- facilitate farmers' borrowing from, and repayment to, the BAAC

- provide management for coops in initial years
- contract for the execution of the road improvement program
- coordinate and monitor the inputs of all other agencies and organizations
- provide overall administration for the project and for the settlement areas providing or coordinating services and facilities in education, health, roads.

PWD has learned much from its experimental efforts with transfer of sericulture technology, and from the analyses and recommendations made during the project design stage. These have resulted in some adjustments in its initial planning.

The RTG has formally established a Project Monitoring Committee which is responsible for overall coordination, guidance and direction of the project. The Monitoring Committee is chaired by the NESDB, which is the RTG Coordinator for multiagency programs and projects such as this one, and includes participation by agencies having substantive concern for the project. In addition to the NESDB, PWD, the Sericulture Division of MOAC, and the BAAC, other organizations which will be members of the committee are: the Industrial Finance Corporation/Thailand, which provides financing for reelers and weavers; the Ministry of Finance, which is the official representative of the borrower; the Bureau of the Budget, which is responsible for RTG budget and fund flows; the Department of Cooperative Promotion of MOAC, which assists the establishment of cooperatives; the Textile Division of the Department on Industrial Promotion of the Ministry of Industry, which regulates and promotes the reeling and weaving industries; the Silk Promotion Board, which provides input on silk promotion and marketing; the Thai Silk Association, which expresses the private silk industry's views; Department of Extension under MOAC, which advises and assists regarding extension activities; and the Department of Technical and Economic Cooperation (DTEC), which has an approval function for foreign aid grant-funded activities. Other representatives who will participate on the Monitoring Committee are from the National Environmental Board (NEB) to advise on environmental implications of project activities, and the Cooperative League of Thailand to represent the participating farmers through their cooperatives.

Both the PWD Project Manager and Project Coordinator were recently settlement managers of the more successful settlements and are capable administrators.

Considering all of the above, it is clear that PWD has the resources (budgetary, personnel and otherwise) as well as the institutional drive and commitment to carry out its central role in this project.

2. Sericulture Division of the Ministry of Agriculture and Agricultural Cooperatives (MOAC).

This organization is the basic source of technical experience and expertise in silk production for the project. PWD has relied heavily on it in the design of the project and it will continue to play a very important role. The Sericulture Division is staffed by approximately 127 employees, including 70 professionals. The key facility, the Korat Sericulture Center has a staff of 44. The Division's budget in FY 1975 was  $\text{฿}14,500,000$  and in FY 1976 was  $\text{฿}18,500,000$ . These amounts included  $\text{฿}3,000,000$  for the Korat Center in each of those years.

The Sericulture Division will:

- provide hybrid silk worm eggs for the project, initially at Korat and after 1978 at four sub centers.
- conduct research related to improving sericulture practice, including both production of mulberry and the handling of silkworms and cocoons.
- conduct research aimed at genetic improvement and adaptation for Thailand of mulberry and silk worms.
- train PWD extension agents and supervisors in sericulture technology and practice at the Korat Sericulture Center.
- train participating farmers at the Surin Farmers Training Center which will be expanded to accommodate project requirements.
- purchase up to 15 metric tons per year of cocoons from participating farmers.

The Nathan Report contains an extensive section commenting on the Korat Center and includes many ideas for consideration by the Center. A key move to strengthen the project is the planned transfer in 1978 of Korat's silk worm egg production operations to four centers (at Khon Kaen, Mukdaharn, Ubon and Udon). This will permit the Korat Center to concentrate on research and genetic improvement while the centers can handle egg production requirements.

The Sericulture Division is implementing its plans for establishing the four sub centers and most of the needed equipment, supplied under the Japanese assistance program, is already on hand. The following table shows the estimated actual project egg requirements from the implementation plan, the projected production capacity of Korat and the four centers, and the balance to be imported.

No. of Boxes of Eggs

<u>Year</u>	<u>Project Requirement</u>	<u>Korat/4 Center Capacity</u>	<u>Balance to be Imported</u>
77/78	2,880	1,680	1,200
78/79	6,480	4,080	2,400
79/80	10,000	6,400	3,600
80/81	13,680	8,880	4,800
81/82	17,280	11,280	6,000

Farmers will pay Ø150 per box of eggs from the Korat Center (approximately the cost of production). For imported eggs the price is approximately Ø250 per box.

Curricular material for the training programs has been developed and initial training programs already conducted. Plans for expansion of the Surin Farmer Training Center are complete and budgeted for.

The capability of the Sericulture Division to carry out its functions is reasonably well assured. With respect to the key and possibly least certain element, egg supply, an alternative source, that is import, is available at reasonable cost and with short lead time.

3. Bank for Agriculture and Agricultural Cooperatives (BAAC)

The BAAC was established by the RTG in 1966 to make and guarantee loans to farmers, farmers groups and agricultural cooperatives. As of year end 1975: it had total assets of \$260 million (up from \$24 million in 1967), almost 2600 employees (of which most - 87% - were located in 58 branch offices and other field locations), over 516,000 farmer clients and had extended loans during the year of \$167 million to farmers and cooperatives. Annex P gives additional highlights on BAAC operations.

Clearly the BAAC has the capacity and resources to handle the lending to farmers and cooperatives contemplated for this project (loans totalling less than \$2.8 million to 1500 farmers and 10 cooperatives over a 5 year period).

BAAC performance however has been hampered by too complicated and bureaucratic procedures. This has been manifested in delayed drawdown under the AID Agriculture Development Loan and in relatively little long term lending to farmers or to cooperatives.

The BAAC has a new manager however who recognizes its shortcomings. He is taking initial steps to rectify them through reorganization, simplification of forms and procedures, and delegation of authority to branch managers. Moreover, given the very favorable spread which BAAC will enjoy with respect to the \$1.3 of AID funds (the RTG is passing on the AID terms), BAAC will assume some greater than normal risk for this project and is making the following concessions:

a. Loans will be made for the full amount of farmer costs for constructing and equipping the old worm rearing house, establishing his mulberry plantation and for the initial year's supply of eggs (total about \$25,000). This is important as it helps assure that poorer farmers can afford to participate.

b. Loans shall be repaid at a rate of 40% of farmers' gross annual cocoon sales. This is also important for poorer farmer participation as he will not face the prospect of being out-of-pocket if he has a poor year.

c. Although PWD will not give the farmer title to his land if any debt to BAAC other than short term is outstanding, no collateral or mortgage is required <sup>1/</sup>; the bank will accept the guarantee of the other participating farmers (joint liability system).

d. Barring unusual circumstances, loans will be made to all farmers accepted by PWD for participation in the project.

e. Authority to approve loans will be delegated to the local BAAC branch manager; approval will be given and funds made available within approximately 30 days from date of application.

Given these special arrangements BAAC will meet project needs for timely credit. Should there be any slipups, PWD is prepared to advance funds to farmers so they can build their rearing houses and purchase supplies in timely fashion. Farmers would pay back when the BAAC loan comes through

---

<sup>1/</sup> If a farmer does have assets, the BAAC will require that they be put up as collateral.

#### 4. Cooperatives

PWD proposes to organize a producer cooperative in each of the ten sericulture settlements and has outlined a schedule to develop all ten settler cooperatives by the end of the second project year.

Plans for establishing co-ops in project settlements include:

(a) The nucleus of each new co-op will be members of farmers' groups having informal cooperative experience for 2-3- years before the coop is established.

(b) In initial project stages, there will be one full-time RTG (PWD) employee available to work with each settlement cooperative, residing in the settlement; One RTG (MOAC) co-op official at the Province or District level, available to help with settlement co-op problems; and one RTG (PWD) supervisor on call from Bangkok. The functions of these three officials are to train and supervise settlement co-op managers. The period of this support will vary depending on co-op manager capabilities, but could last 5 years, the life of the project. This supervisory arrangement has so far been very successful in the Ban Kruat Settlement.

(c) Qualifications for co-op managers are: (1) Graduate of a Vocational Agriculture School or B.A. in Agriculture or Agriculture Economics; (2) Resident of Northeast, especially those associated with silk production, will be given preference. The recruiting committee is composed of the provincial co-op officer as committee chairman, the settlement co-op chairman, and one representative of the PWD settlement staff.

(d) Prior to commencing work at the settlement, the newly-recruited co-op manager will be trained at the Korat Research Center by representatives from the Co-Op League, Sericulture Division, Textile Division, DOAC, KU, BAAC and Department of Co-Op Promotion. A six-weeks training course has been developed which will include the following topics: the general economic situation in the Northeast, sericulture production, cocoon marketing, credit, bookkeeping, agri-business with special attention to sericulture, and co-op principles and management.

The cooperative will handle the purchase of silkworm eggs from the Korat Center, or import them if necessary. It will purchase a cocoon dryer to be used by all participating farmers. (Drying keeps the cocoons from spoiling and thus enables the farmers to market as a group and to defer entering the market until it is deemed favorable.) Marketing responds to the small farmer perception that he is often victimized by merchants and middlemen.

The cooperatives will make available production inputs such as fertilizer, disinfectant for worm houses, silkworm eggs, etc. Short-term credit to farmers is available through the revolving fund of PWD. Other services such as equipment rental will be provided when these services have been established.

Cooperatives will gradually assume responsibility for management of the central worm rearing facilities, central mulberry plantation, cocoon marketing services, provision of inputs, and credit. The management consultant to be provided under the Project will be vitally concerned with the cooperative management of these items and is expected to make recommendations for improvement of the management and organizational structure if necessary. The Cooperative League of Thailand will also play an important role in advising on cooperative management and representing the Coops' interests through the League's representative on the Project Monitoring Committee.

The Federal Republic of Germany has lent assistance in setting up a training facility at Lamtaklong settlement for PWD cooperatives advisors: Officials for each Northeast settlement will be trained there by 1979. The IBRD pilot project at Prasat and Ban Kruat will also utilize the facility to train PWD officials for these two settlements to help guide the cooperatives in the provision of production credit, tractor and equipment rental services, commodity marketing, and sales of consumer goods. The officials also will be trained for the necessary legal responsibilities, and in organization and administration. The IBRD will provide the necessary facilities in Prasat and Ban Kruat. The proposed Sericulture Project will not duplicate any inputs already provided.

Cooperatives have already been established at:

Phon Phisai with 300 members,  
Ban Kruat with 255 members,  
Mukdahan with 220 members,  
Ubonrat with 800 members and Prasat.

The cooperatives at Lam Pao and Chiang Phin will begin operations in 1976 and at Lam Dom Yai, Kuchinarai and Lam Dom Noi in 1977.

##### 5. AID

This project has been assigned to one of the USOM's project management teams. The team consists of one Assistant Project Officer and a Secretary Administrative Assistant. This team will be responsible for monitoring project progress and will work with the RTG Project Manager and the Project Monitoring Committee to assist with project implementation and evaluation. Personnel staffing projections in the DAP and other documents already provide for these positions.

Fixed-amount reimbursement procedures will be applied to the financing of central rearing houses and central mulberry plantations and perhaps roads. Regarding farmer facilities, AID will reimburse the BAAC on the basis of actual loans made to farmers. The USOM engineer will review any changes in construction plans and designs as they are developed, e.g., specific road improvement/maintenance elements. We propose to make reimbursements against certifications by the responsible RTG officer that facilities have been constructed and expenditures properly made in the stated amounts. The RTG would be responsible to maintain auditable records and documentation (invoices, etc). USOM personnel (Project Officer, Assistant Project Officer or Engineer) will visit each settlement at least twice each year and will file reports establishing that facilities have actually been completed.

## B. Implementation Plan

### I. Arrangements

A detailed life-of-project implementation plan is presented in Annex G. In addition, a detailed network chart and critical path have been prepared and will be used by the PWD project management team.

The PPT Network and CPI's are presented in Annex I.

### II. Local Contracting Procedures

Local contractors will be used for project construction. The RTG has two procedures for selecting contractual services needed for construction of facilities and for equipment procurement. Case One is for services under 50,000 baht (\$2,500.00) and Case Two is for services over the 50,000 baht level.

(1) Case One: The "under 50,000 baht procedure" requires 3 RTG officers on a Committee nominated by the Director of a Division. Each member of the Committee will have in hand all the specifications needed for the procurement of services for construction and equipment. Each member of the Committee will contact a minimum of two Thai firms (for a total minimum of six). Each member of the Committee will collect the sealed bids from the firms they have contacted and then all the bids will be opened in the presence of the 3 Committee members. The Committee will then arrive at a decision and select one firm and then present their recommendation to the Director of the Division for approval.

(2) Case Two: The procurement of services over the 50,000 baht level (over \$2,500) requires two Committees. One Committee selects the firm (as in Case One) and the other Committee's function is to inspect and approve the services received. The authority for approval of services over 50,000 baht (\$2,500) is related to the amount (cost) of services rendered. The 50,000 (\$2,500)-500,000 (\$25,000) level requires approval by the Director General, the 500,000 (\$25,000)-1,000,000 (\$50,000) level by the Under-Secretary and over 1,000,000 (\$50,000) the approval must be done by the Minister who is a cabinet member of the RTG.

As a condition precedent to disbursement for contract goods and services, AID will approve the systems and procedures and a model of the contract for procurements equalling or exceeding the value of \$10,000.

C. Evaluation Plan

Three comprehensive evaluations will be conducted for the Sericulture Settlements project over the five year life of the project by the Faculty of Economics and Business Administration, Kasetsart University, which is already involved in surveys of land settlement areas for PWD in support of other donor activities particularly the Federal Republic of Germany and IBRD. Thus considerable baseline data is or will be available and there are opportunities - which will be seized - for coordination of these evaluative activities. Although these evaluations are to be completed on a scheduled basis, the evaluators from Kasetsart will collect data on a continuing basis to monitor progress in achieving project targets.

In keeping with the concept of joint RTG/USOM evaluations, USOM and PWD will on an annual basis determine (and revise) the proposed scopes of work and foci of each evaluation to be conducted by Kasetsart, as well as to determine appropriate courses of action consonant with the Kasetsart analyses. The project evaluation budget includes funds for the Kasetsart evaluation and for USOM inputs to the annual project review. Following is a summary of the areas in which the Kasetsart analyses will focus. Additional items to be evaluated will be determined by the joint RTG/USOM, project management and evaluation teams.

Year two: (November 1977)

- (1) Collect additional baseline data for both specific and socioeconomic baseline. This can be done as soon as the first 300 settlers have been identified.
- (2) Evaluate the effectiveness of the training program for extension workers, supervisors, and settlers.
- (3) Evaluate the effectiveness of extension services.
- (4) Observe the extent of adoption of new techniques in both mulberry plantation and silk worm rearing at both central rearing and at individual settlers sites, as well as the participation of the settlers.
- (5) Assess the operation and performance of central facilities especially mulberry plantations and rearing houses.
- (6) Ascertain the impact of the project on the role of women in the family and society. (Does it contribute to access to knowledge and resources, increase options, raise status?)

(7) Assess supporting services, e.g. credit facility and marketing service of coops.

(8) Assess the quality and standard of yarn.

(9) Preliminary investigation of project design or redesign.

Year Three: (November 1978)

(1) Follow up to original baseline data survey.

(2) Assess the performance in the past three years in term of objectives and implementation. Special emphasis will be on silk production, training and extension network, technical problems on both mulberry production and in acquiring silkworm, rearing and reeling.

(3) Evaluate the effectiveness of adoption of improved silk production technology and problem encountered by settlers.

(4) Assess the performance of implementing agencies including marketing units and rearing houses.

(5) Determine the level of acceptance of improved silk technology by settlers and non settlers both within and outside land settlements.

(6) Follow up on prior assessments done in Year Two.

Year Five: (November 1980)

(1) Measure the achievement of the project compared with the specified goals, i.e. the amount of raw cocoons produced, reducing the quantity of warp yarn imported.

(2) Evaluate the overall impact to the farmer with respect to income and employment as compared to the settlers outside the project and to the average income of the farmers in the Northeast.

(3) Evaluate the effects of the project as a model to get closer operational and service oriented cooperation among various government agencies.

(4) Assess the overall impact to the development of textile industry.

(5) Assess the operation of the project in term of objectives, implementation, and the validity of specified assumptions.

D. Conditions, Covenants and Negotiating Status

The Loan Agreement will include the following Conditions Precedent and Covenants:

1. Conditions Precedent to Disbursement

1.1 Conditions Precedent to Initial Disbursement. Except as A.I.D. may otherwise agree in writing, prior to the first disbursement or to the issuance of the first Letter of Commitment or other commitment document under the Loan, the Borrower shall furnish to A.I.D. in form and substance satisfactory to A.I.D.;

(a) A legal opinion by the Minister of Justice of Borrower, or other counsel acceptable to A.I.D., that this Loan Agreement has been duly authorized or ratified by, and executed on behalf of, the Borrower and is a valid and legally binding obligation of the Borrower in accordance with its terms;

(b) The name of the person or persons who will act as the representative or representatives of the Borrower together with evidence of his or their authority and a specimen signature of each such person, certified as to its authenticity by either the person rendering the legal opinion or the person executing this Loan Agreement; and

(c) A financial plan, approved by concerned agencies for the Project, including financial procedures, and a timed schedule of expenditures by category and by source of funding, which demonstrates that funds required by the Project will be made available on a timely basis.

(d) A plan for development of a cooperative in each participating settlement, with adequate provision for effective management; competent technical and financial operations; salary and non-monetary incentives sufficient to attract and retain qualified staff; appropriate and coordinated technical assistance from various sources; and orderly transfer of managerial responsibility from government agencies to cooperative staff.

1.2 Conditions Precedent to Disbursement for the Procurement of Goods and Services by Contract. Prior to any disbursement to finance a contract for the procurement of goods and services which will equal or exceed the sum of Ten thousand Dollars (\$10,000.00) or the Baht equivalent, Borrower shall have submitted to A.I.D. for approval, and A.I.D. shall have approved the systems and procedures and a model of the contract to be used for the type of procurement involved; provided, that A.I.D. may, by written notice to Borrower in an Implementation Letter or otherwise, identify particular procurements for which its prior approval of the specific contract, or contractor, or both, will be required.

2. Covenants.

2.1 (a) The Borrower shall cause the executing agencies to carry out the Project with due diligence and efficiency in conformity with sound financial, administrative, and planning practices, and, except as the parties may otherwise agree in writing, in conformity with the Project Description and in accordance with the implementation arrangements set forth in Part IV-A of the Project Paper dated March 26, 1976, and Annexes G, H, and I thereto, and such other plans and procedures as may hereafter be agreed upon by the parties pursuant to this Loan Agreement.

(b) The Borrower shall make available to the executing agencies on a timely basis Thai currency as necessary for the implementation and completion of the Project.

(c) The Borrower shall ensure that an effective program of operation, maintenance and repair, including necessary funding therefor, is provided for all facilities and equipment funded under the Loan.

2.2 Funds and Resources to be Provided by Borrower.  
The Borrower shall provide promptly as needed all funds, in addition to the Loan, and all other resources required for the punctual and effective carrying out of the Project as described in Annex I attached hereto.

2.3 Annual Planning, Review and Evaluation of Progress.  
The Borrower and A.I.D. shall cooperate fully to assure that the purposes of the Loan will be accomplished. To this end, unless A.I.D. otherwise agrees in writing, representatives of A.I.D. and the Borrower shall meet at least once each year to review and evaluate the progress of the Project, its operations, and other matters relating to this Loan Agreement and the Project.

3. Negotiating Status

The project design as represented in this Project Paper is the joint product of the RTG and USOM. The Conditions Precedent (CPs) and Covenants set forth above have been discussed with the appropriate RTG authorities and accepted in principle by them. No issues remain. It is expected that the initial CP's will be met well within the 120 days after loan signature specified in Policy Determination 57.

## ANNEXES

- A. AID/W PRP Approval Messages
- B. Project Cost Details (All Cost Data Source is PWD and Sericulture Division/MOAC)
  - B-0 Projection Budget by Year
  - \* B-1 Central Young Worm Rearing House
    - B-1.1 Estimated Cost for Young Silk Worm Rearing Houses
    - B-1.2 Equipment for Central Young Silk Worm Rearing Houses
  - \* B-2 Central Mulberry Plantation for 10 Settlements
  - \* B-3 Old Silk Worm Rearing Houses and Equipment
    - B-3.1 Farmer Old Silkworm Rearing House
    - B-3.2 Equipment and Supplies Cost per One Unit of Farmer Old Silkworm Rearing House
    - B-3.3 Silk Worm Eggs
  - \* B-4 Farmer Mulberry Plantation
  - \* B-5 Farmer Training 30 per settlement per year for 10 settlements
  - \* B-6 Management Training for Extension Worker and Supervisor
  - \* B-7 Expansion of Farmer Training Center
    - B-7.1 Sericulture Equipment and Supplies for the Rearing House of Farmer Training Center
  - \* B-8 Cooperatives
  - \* B-9 Houses for Extension Workers and Supervisors
  - \* B-10 Vehicle and Vehicle Expenses for the Settlements
  - \* B-11 Salary for Extension Workers and Supervisors
  - \* B-12 PWD Self-Help Land Settlement Area Access Road Cost Estimate
  - \* B-13 Evaluation

- \* C. Soils Analysis
- D. Location and Layout of Sericulture Settlements
  - D-1 Typical Settlement Village, 56 Families
  - D-2 Typical Settlement Village, 90 Families
- E. Organization Charts (Source PWD)
  - E-1 Implementation Committee for Sericulture Project
    - E-1.1 Sericulture Monitoring and Implementation
    - E-1.2 Line of Administration under PWD for Sericulture Project
- F. Environmental Assessment Report -
- G. Implementation Plan, Events prior to project start
  - G-1 First Year
  - G-2 Second Year
  - G-3 Third Year
  - G-4 Fourth Year
  - G-5 Fifth Year
  - G-6 Sixth Year
- H. Logical Framework Matrix
- I. Project Performance Tracking Chart
- \* J. Statutory Checklist
- K. USAID Directors Certification  
(Per FAA 611(E))
- L. Borrowers/Grantee's Application for Assistance
- M. Draft Authorizing Document
- \* N. Project Description Annex to Loan Agreement
- O. Evaluation and Design of Sericulture Project in Public Welfare Land Settlements - Nathan Design Team Report  
(Furnished separately)
- \* P. Highlights of BAAC's Operations 1967-1975 1967-1975
- \* Q. Annual Cooperative Costs per Settlement Sericulture Operations and Statement of Sources and Application of Funds.
- R. Acknowledgements

\* Not contained herein. On file in Office of Project Development, ASIA Bureau.

**TELEGRAM**Foreign Service of the  
United States of America

INCOMING USOM/Thailand

UNCLASSIFIED

Classification

EMB408

PP RUMJQB

DE RUEHC #5568/1 0591847

ZNR UUUUU ZZH

P 281759Z FEB 75

FM SECSTATE WASHDC

TO AMEMBASSY BANGKOK PRIORITY 9060

BT

Control: 008

Recd: MARCH 1, 1975  
1025ACTION  
USOMUNCLAS SECTION 1 OF 2 STATE 045568/1

AIDAC

INFO:

AMB

E.O. 11652: N/A

DCM

TAGS:

EA

SUBJECT: SERICULTURE PRODUCTION/SETTLEMENTS PRP

ECON

FSI

FILES

ACTION  
O/AG

1. BASED ON REVIEW SUBJECT PRP BY EAST ASIA PROJECT ADVISORY COMMITTEE (EAPAC) ON FEBRUARY 18, AID/W APPROVES USOM PREPARATION PP FOR FY 76 LOAN. SERIOUS RESERVATIONS WERE EXPRESSED AT EAPAC MEETING CONCERNING APPROPRIATENESS OF U.E. INVOLVEMENT, COMPLEXITY OF PROJECT, AND HIGH-RISK ASSOCIATED WITH REQUIREMENT FOR EXCEPTIONALLY STRONG MANAGERIAL PERFORMANCE AT ALL LEVELS OF PROJECT IMPLEMENTATION. HOWEVER, PROJECT APPARENTLY REPRESENTS BEST AVAILABLE OPTION TO DEALING WITH INTRACTABLE PROBLEMS OF POVERTY AND LOW PRODUCTIVITY IN NE THAILAND, AND FOR THIS REASON MAJORITY OF EAPAC SHARES USOM CONVICTION THAT POTENTIAL REWARDS JUSTIFY EFFORT.

INFO

D

DD

LA

AD/M

O/FIN

O/PROG

M/CR

2. EAPAC DISCUSSION IDENTIFIED SEVERAL ISSUES THAT REQUIRE SPECIAL ATTENTION IN PP, AS DESCRIBED BELOW.

3. KORAT CENTER: EAPAC CONSIDERS KORAT CENTER CRITICAL TO PROJECT SUCCESS AND THEREFORE CONCERNED WITH APPARENT TERMINATION OF JAPANESE TECHNICAL ASSISTANCE EFFORT AT CENTER. USOM SHOULD CONTRACT WITH APPROPRIATE EXPERT

TO EVALUATE CENTER AND ANALYZE THAI CAPACITY TO SUSTAIN CENTER'S OPERATIONS AT HIGH-LEVEL EFFECTIVENESS, INCLUDING ABILITY TO SUPPLY PROJECT'S DEMAND FOR HYBRID EGGS, TO CONTINUE ADAPTIVE RESEARCH ON IMPROVED SERICULTURE TECHNOLOGY, AND TO PROVIDE TECHNICAL ASSISTANCE AS NEEDED BY PROJECT. PP SHOULD INCORPORATE THIS ANALYSIS, DEMONSTRATING FULL THAI COMPETENCE, OR, ALTERNATIVELY, PLANS FOR ASSISTANCE TO CENTER UNTIL SUCH COMPETENCE IS ATTAINED.

UNCLASSIFIED

Classification

4. ECONOMIC FEASIBILITY: PROJECT SUCCESS DEPENDS PRIMARILY ON FAVORABLE WORLD MARKET FOR WARP SILK AND THAI EFFICIENCY IN SILK PRODUCTION. ECONOMIC FEASIBILITY SECTION OF PP SHOULD INCLUDE SENSITIVITY ANALYSIS OF EFFECTS OF VARIATIONS IN WORLD PRICE AND THAI PRODUCTION COST. DIFFERENTIATE BETWEEN RETURNS WITH SUBSIDIZED AND NON-SUBSIDIZED CREDIT. THIS SECTION SHOULD ALSO DISCUSS POTENTIAL IMPACT OF INCREASED WARP SILK PRODUCTION ON TRADITIONAL WEFT-SILK INDUSTRY AND PROVIDE BASIS FOR CONFIDENCE THAT PROJECT RETURNS WILL NOT BE OFFSET BY PROJECT-INDUCED DECLINE IN WEFT SILK EARNINGS:

5. FARMER PROFITABILITY: ILLUSTRATE FINANCIAL RETURNS SUFFICIENT FOR FARMER ACCEPTANCE OF CONSIDERABLE RISK INVOLVED AND ANALYZE EFFECTS OF VARIATIONS IN COCOON PRICES AND INPUT COSTS ON RETURNS TO FARMER:

6. BENEFICIARIES: THROUGH FOCUS ON GENERALLY POOR SETTLEMENT AREAS IN NORTHEAST THAILAND, PROJECT RESPONSIVE TO CONGRESSIONAL MANDATE TO ADDRESS PROBLEMS OF POOR MAJORITY. HOWEVER, EAPAC CONCERNED THAT WITHIN PROJECT AREAS, REQUIREMENT OF CASH INVESTMENT AND REASONABLE ACCESS TO CREDIT MAY LIMIT PARTICIPATION IN PROJECT TO ONLY MOST PROSPEROUS SETTLEMENT FARMERS: PP SHOULD DESCRIBE WAYS IN WHICH POOR FARMER PARTICIPATION WILL BE ENCOURAGED, INCLUDING MEANS OF CHANNELING NECESSARY CREDIT TO POOR FARMER AND PROVIDING PROTECTION AGAINST LOSSES POOR FARMER CANNOT AFFORD: IN ADDITION, EAPAC SUGGESTS ADOPTION OF CRITERIA FOR SELECTING PARTICIPATING FAMILIES THAT ENSURE HETEROGENEOUS INCOME MIX AND BORROWER COVENANT TO APPLY CRITERIA RIGOROUSLY: IN OVERALL SILK INDUSTRY TO BE FOSTERED BY PROJECT, EAPAC CONCERNED THAT REELING PLANT OWNERS, SILK RETAILERS, AND MIDDLEMEN MAY EXTRACT DISPROPORTIONATE SHARE OF PROFITS AT EXPENSE OF FARMERS, THEREBY AGGRAVATING EXISTING SKEW IN INCOME DISTRIBUTION.

PP SHOULD DISCUSS POTENTIAL PROBLEM AND SHOW HOW PROJECT WILL ASSURE SUFFICIENT FARMER BARGAINING POWER AND PROTECTION AGAINST EXPLOITATION.

7. REPLICABILITY: DEMONSTRATE SUFFICIENT POTENTIAL FOR REPLICATION IN NORTHEAST AND REST OF THAILAND TO WARRANT AID DEVELOPMENT LOAN: IDENTIFY CONSTRAINTS TO EXPANSION OF WARP SILK PRODUCTION, E.G., WORLD DEMAND, LAND CONVERTIBLE TO MULBERRY, AVAILABILITY OF CREDIT, ETC., AND DISCUSS CONSEQUENCES FOR PROJECT REPLICABILITY: SINCE KEY ELEMENT IN REPLICABILITY IS MINIMUM USE SUBSIDIES THAT FOSTER UNECONOMIC PRODUCTION AND IMPOSE FINANCIAL LIMITS ON EXPANSION OF ACTIVITY, DESCRIBE PRICE STABILIZATION PROGRAM FOR WARP SILK PROPOSED BY NESDB AND NESDB STRATEGY FOR PREVENTING EVOLUTION OF STABILIZATION EFFORT INTO PERMANENT SUBSIDIZATION. HOW WILL NESDB RECOVER COSTS WITHOUT DISCOURAGING PRODUCTION?

8. CREDIT: CONSIDERABLE SUBSIDY ALSO INVOLVED IN GOVERNMENT CREDIT OPERATIONS AS COMPARED WITH PRIVATE CREDIT SOURCES AND OPPORTUNITY COST FOR CAPITAL. DISCUSS POSSIBILITY FOR APPLYING HIGHER INTEREST RATES THIS PROJECT EVEN ON PILOT-BASIS TO MINIMIZE SUBSIDY, FACILITATE LENDING TO HIGHER-RISK LOW INCOME FARMERS, AND ATTRACT PRIVATE CREDIT SOURCES TO PROJECT:

9. MANAGERIAL PERFORMANCE: SINCE PROJECT SUCCESS ALSO DEPENDS ON STRONG MANAGERIAL PERFORMANCE AT ALL LEVELS OF PROJECT IMPLEMENTATION, DESCRIBE HOW NECESSARY DISCIPLINE/EFFICIENCY WILL BE ASSURED IN GOVERNMENT AGENCIES RESPONSIBLE FOR PROJECT, IN REELING PLANTS, IN CENTRAL REARING HOUSES, AND AT ON-FARM LEVEL: HOW WILL NESDB MONITORING GROUP ENSURE EFFECTIVE COORDINATION OF MULTIPLE PARTICIPATING AGENCIES? HOW IMPORTANT TO PROJECT SUCCESS IS MONITORING ROLE OF USOM/T AND HOW WILL ROLE BE CARRIED OUT? PP SHOULD ALSO DISCUSS

BT

#5568

UNCLAS FINAL SECTION OF 2 STATE 045568/2  
NEED AND PLANS FOR OBTAINING FOREIGN TECHNICAL ASSISTANCE AND STRATEGY FOR PROVIDING CONTINUOUS PROJECT EVALUATION

10. ROLE OF COOPERATIVES: DISCUSS CURRENT STATUS COOP DEVELOPMENT IN TEN SETTLEMENT AREAS. SINCE PROJECT CALLS FOR GRADUAL PROCESS ESTABLISHMENT OF COOPS AND DRP (PAGE 15) SUGGESTS UNCERTAIN SUCCESS IN COOP EFFORT, IDENTIFY COOP FUNCTIONS CRITICAL TO PROJECT AND CONCERNS EXPRESSED ELSEWHERE THIS CABLE AND DESCRIBE HOW THESE

FUNCTIONS WILL BE CARRIED OUT IN ABSENCE EFFECTIVE COOP WHAT CONTRIBUTION CAN BE EXPECTED NEW-FORMED FARMERS MARKETING ORGANIZATION?

11. LAND TITLING: DISCUSS PATTERN OF LAND OWNERSHIP IN TEN SETTLEMENT AREAS AND RTG STRATEGY, IN GENERAL, FOR LAND TITLING IN SETTLEMENT AREAS AND, MORE SPECIFICALLY, AS INCENTIVE TO EFFECTIVE PROJECT PARTICIPATION. HOW DOES FARMER CLAIM-TO-LAND INFLUENCE HIS PERCEPTION ATTRACTIVENESS OF PARTICIPATION IN PROJECT?

12. LOAN-FINANCING OF REELING PLANTS: DESCRIBE ARRANGEMENTS FOR SUB-LENDING TO PRIVATE FIRMS AND JOINT PUBLIC-PRIVATE-COOPERATIVE OWNERSHIP OF REELING PLANTS WHAT LOAN CONDITIONS AND COVENANTS WILL GOVERN SUB-LOANS

TO PRIVATE SECTOR, I;E; WILL NORMAL PRIVATE BENEFICIARY TERMS APPLY OR WILL THIS PORTION LOAN BE CONSIDERED ICI TYPE CREDIT WITH SUB-BORROWER TERMS SAME AS FOR ICI?

13. ADDITIONAL COMMENTS: COMMENTS ON RELATED GRANT-FINANCING, LOCAL-COST FINANCING, VEHICLE PROCUREMENT, FIVE-YEAR DISBURSEMENT PERIOD, LOGICAL FRAMEWORK, ANALYSIS OF ENVIRONMENT IMPACT, AND ROLE OF WOMEN CONTAINED IN CABLE REGARDING SEED DEVELOPMENT PRP ALSO APPLY TO SERICULTURE PRP.

14. LOAN AGREEMENT: AID/W WOULD APPRECIATE DRAFT LOAN AGREEMENT FORWARDED WITH PP.

BT  
#5568

SERICULTURE PROJECT

## Projection Budget by Year \*

	1976/77		1977/78		1978/79		1979/80		1980/81		'000 Baht Total	
	FX	L/C	FX	L/C								
1. Central Young Silk worm Rearing Houses including Supplies and Equipment (Annex B-1.0)	-	3,694	-	41	-	3,599	-	41	-	3,599	-	10,974
2. Central Mulberry Plantation (Annex B-2)	-	360	-	606	-	972	-	820	-	820	-	3,578
3. Farmer Old Silk Worm Rearing Houses including Equipment (Annex B-3, B-3.1, B-3.2)	-	5,852	-	5,851	-	5,852	-	5,851	-	5,852	-	29,258
3.1 Silkworm eggs (Annex E-3.3)	-	660	-	660	-	660	-	660	-	660	-	3,300
4. Farmer Mulberry Plantation (Annex B-4)	-	732	-	732	-	732	-	732	-	732	-	3,660
5. Farmer Training (Annex B-5)	-	300	-	300	-	300	-	300	-	300	-	1,500
6. Management Training (Annex B-6)	-	179	120	276	-	69	-	74	-	80	120	678
7. Expansion of Farmer Training Center (Annex B-7, B-7.1)	-	3,780	-	21	-	30	-	21	-	29	-	3,881
8. Co-ops (Annex B-8)	-	6,368	-	3,522	-	-	-	-	-	-	-	9,890
9. Houses for extension workers and supervisors (Annex B-9)	-	1,725	-	1,000	-	500	-	500	-	500	-	4,225
10. Vehicles & Vehicle expenses for extension workers and supervisors (Annex B-10)	-	3,710	-	1,320	-	1,310	-	1,430	-	1,550	-	9,320

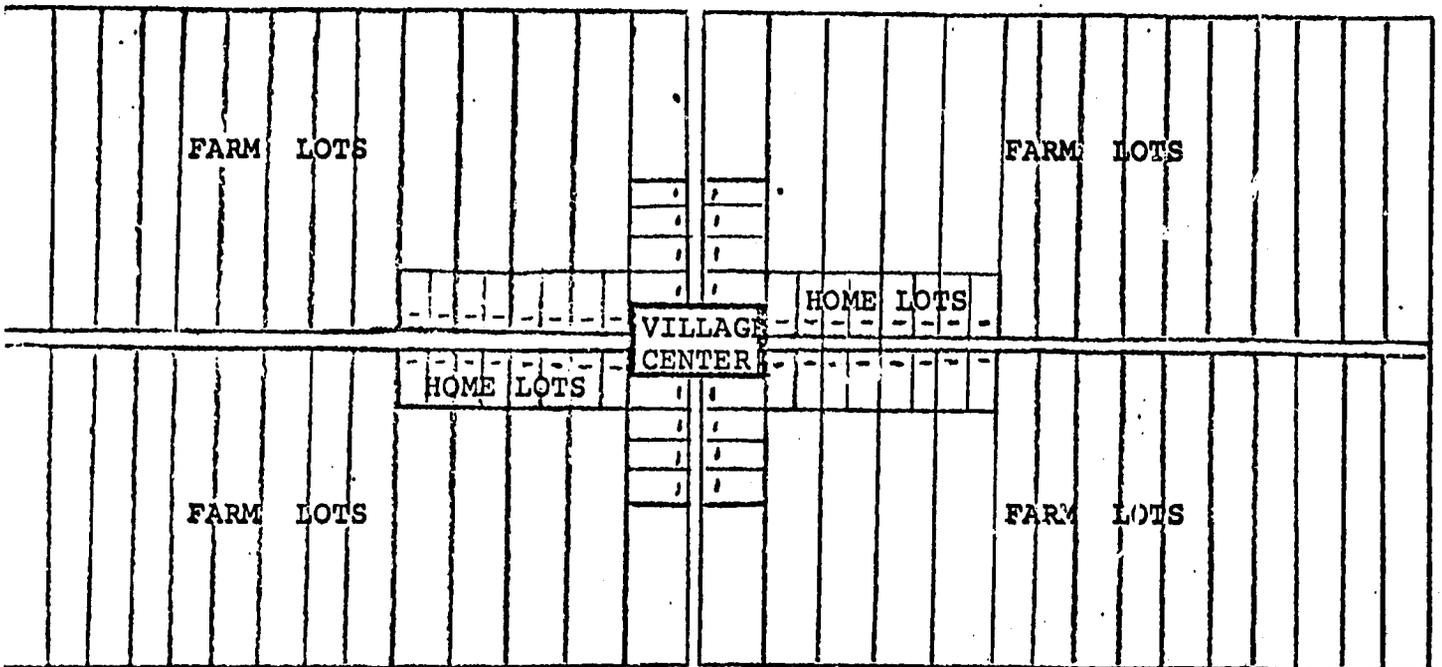
ANNEX B-9

	1976/77		1977/78		1978/79		1979/80		1980/81		'000 Baht Total	
	<u>FX</u>	<u>L/C</u>	<u>FX</u>	<u>L/C</u>								
11. Salary for extension workers and supervisors (Annex B-11)	-	582	-	990	-	1,238	-	1,502	-	1,781	-	6,093
12. Road Improvement (Annex B-12)	-	4,273	-	2,911	-	1,389	-	1,389	-	1,389	-	11,351
13. Evaluation (Annex B-13)	-	-	175	400	-	400	-	-	175	400	350	1,200
14. Management Consultants	1,250	250	1,250	250	-	-	-	-	-	-	2,500	500
<b>Total</b>	1,250	32,465	1,545	18,880	-	17,051	-	13,320	175	17,692	2,970	99,408
Add 20% inflation and contingency	1,500	38,958	1,854	22,656	-	20,461	-	15,984	210	21,230	3,564	119,289
U.S.\$ Equivalent (000) (฿20 = \$1)	75	1,948	93	1,133	-	1,023	-	799	10	1,061	178	5,964

\* All Cost Data Source is PWD and Sericulture Division/MOAC.

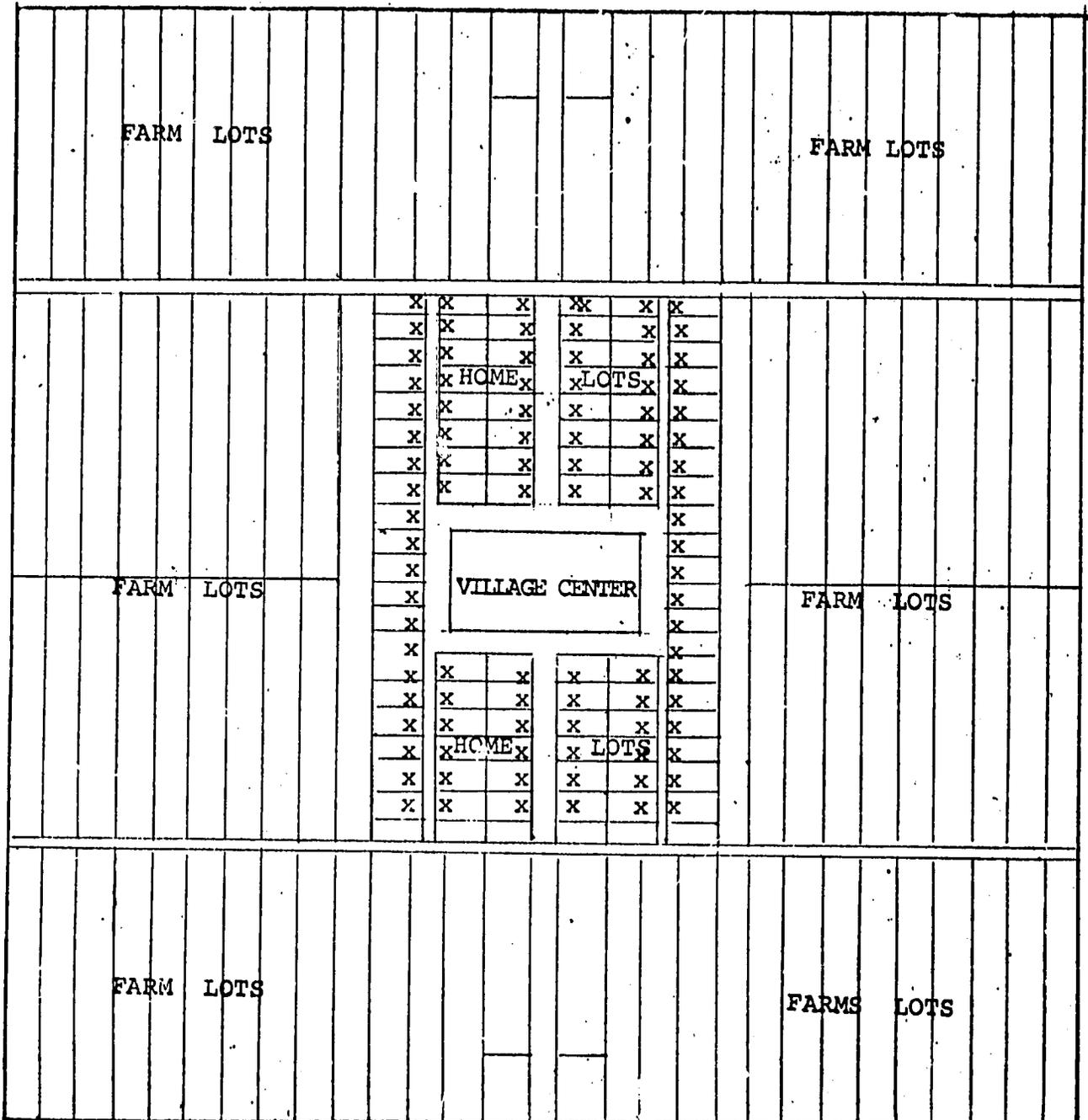
Typical Settlement Village, 56 families

Scale 1:10,000



Typical Settlement Village, 90 Families

Scale 1:10,000



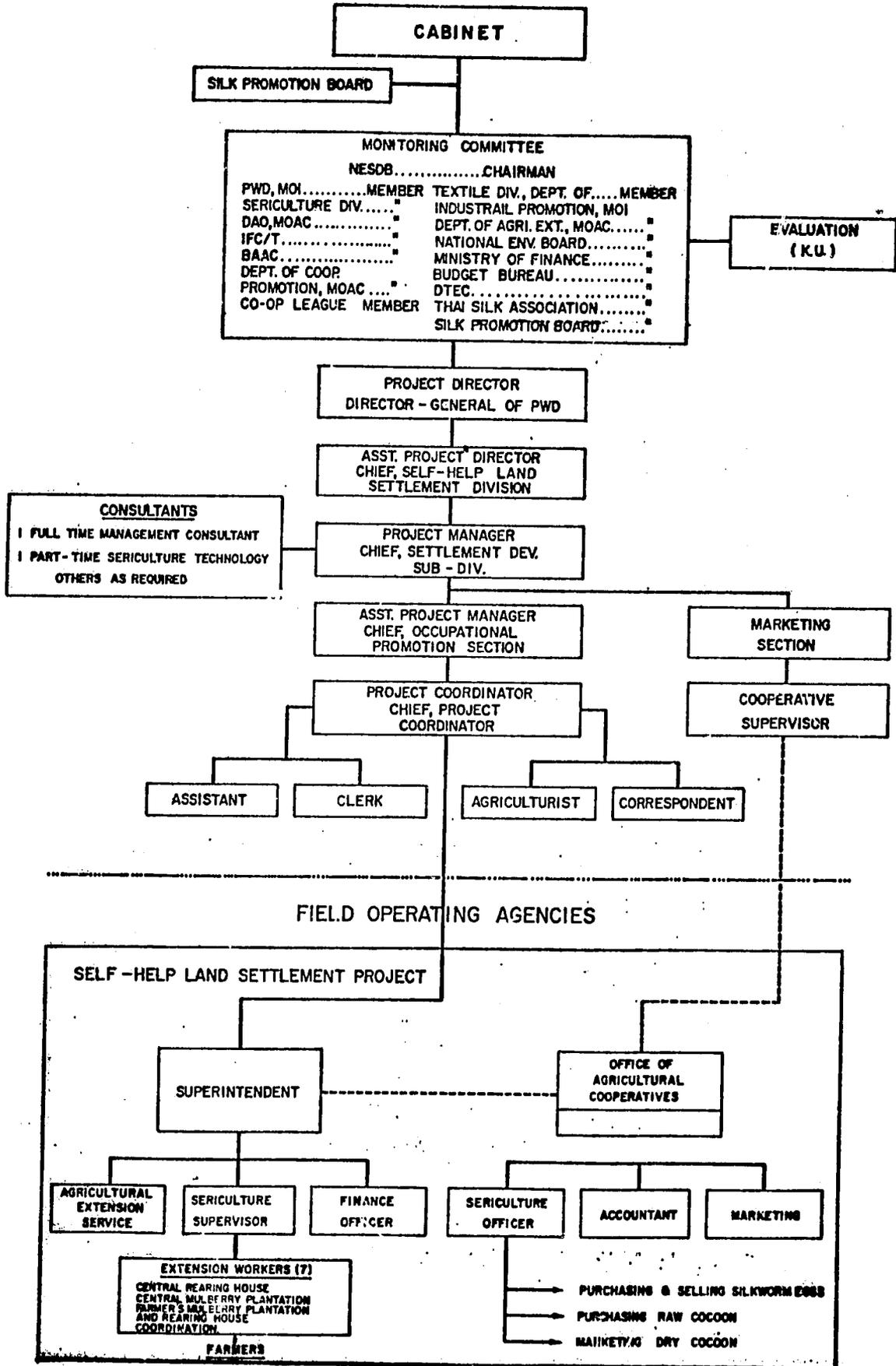
Implementation Committee for Sericulture Project (Source PWD)

This committee is composed of:

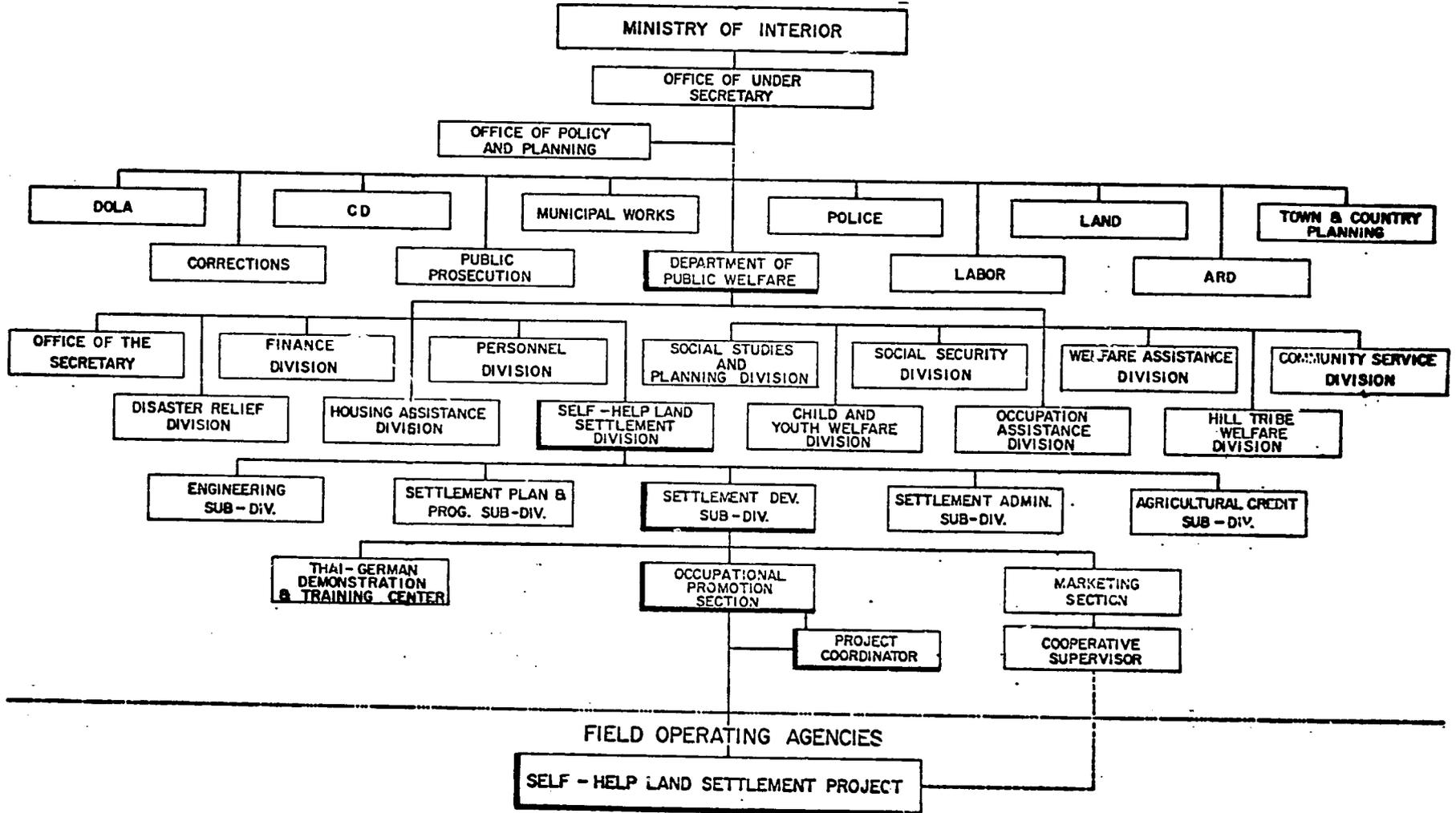
- |   |  |
|---|--|
| 1. Deputy Director of Self-Help Land Settlement Development Division, PWD | Project Manager  |
| 2. Ministry of Finance  | Source of funds  |
| 3. Budget Bureau  | Funds allocation   |
| 4. BAAC   | Provide long term loan and production credits to farmers and Co-ops                              |
| 5. Sericulture Division, MOAC   | Provide eggs and training to farmers, extension workers and supervisors                          |
| 6. Department of Co-op Promotion, MOAC                                    | Provide Co-op training and registration  |
| 7. Textile Division, MOI  | Provide training for silk reeling and quality control  |
| 8. Department of Agricultural Extension, MOAC                             | Help in training and supervising farmers on mulberry plantation and silkworm rearing at the farm |
| 9. Private Sector   | Purchase/reel cocoon from settlements  |

# SERICULTURE MONITORING AND IMPLEMENTATION

(Source PWD)



**SERICULTURE PROJECT  
CENTRAL ADMINISTRATION**



## ANNEX F

The following Environmental Impact Statement was prepared by the Settlement Development Section, Self-Help Settlement Division, Department of Public Welfare, and approved by the RTG office of Environment Committee.

### "1. Fertilization

Land cultivated for mulberry, a perennial plant, cannot be fertilized by means of intercropping or crop rotation during the period mulberry is grown. Fertilization of such land is therefore necessary for the production of mulberry leaves. Presently, farmers in the settlements apply as much manure and chemical fertilizer as they can procure which is lower than the rate determined by the Silk Research and Training Center. Chemical fertilizer improves only the growth of plants, and does not enrich the soil. Consequently, it is recommended that a study be conducted to determine the suitability of using manure and compost instead of chemicals, to insure that both the short and long term impact on the environment is favorable.

### "2. Pest Control

Mulberry pests have existed for quite a long time. Application of chemicals to get rid of the pests is not possible due to the harm of the chemicals to silk worms. To improve the economy in raising mulberry and to maintain the quality of the environment, the best approach is to focus on improvements in research of other species of mulberry which are resistant to disease. In addition, should be the "Soi" species of mulberry, to build resistance against virus diseases.

### " Purification of Young Stage and Mature Stage Silkworms Feeding Quarters

in cultivating silkworms of all stages under the program, it is necessary to have proper cleanliness and disease control measures, especially after each crop. It is essential to purify the feeding quarters with formalin before introduction of the next crop. This chemical may accumulate poisonous substance in those who cultivate silkworms under this program. Preventive measures should be taken by notifying the farmers and officials of the properties of such chemical and providing masks for use in

prevention of poisonous substance during each time the chemical is sprayed, and no entry into the quarters is allowed during the period of purification. Unless used in very large quantities per application (well beyond the amounts generally prescribed in disinfecting rearing houses, formalin does not have an adverse effect on the environment.

"In conclusion the Accelerated Silk Production and Distribution Program does not have an impact in light of being harmful to the environment, or if it is, the corrective action can be taken in all respects."

Following is a statement prepared by Dr. Harvey Ludwig, Consulting Engineer to the RTG National Environmental Board, reviewing the above environmental assessment.

"Based on review of the subject report, and my own knowledge about the sericulture program in Northeast Thailand (from my assignment with the Mekong Committee for evaluating the environmental effects of proposed water resource projects in this region, including evaluation of agro-industrial potentials), I believe it a sound conclusion that few if any adverse effects on environmental resources will result from the proposed expansion of this industry. This assumes competent operating staff and facilities will be an integral part of the program, and while this is not so easy to achieve in the rural areas of Thailand, probably good operation will be provided because otherwise the project is likely to fail financially - the same attention needed to look after the eggs and worms to produce silk effectively will also insure attention to protection of environment.

"Some additional comments are:

(1) Regarding Item A of the Dept of Public Welfare report, "Fertilization", the statements on chemical fertilizers versus manure/chemicals need some clarification. Chemical fertilizers can enrich the soil if added in amounts beyond those removed by crops. Also, while manures and composts are helpful as soil conditioners, they have quite low nutrient content hence can hardly substitute for chemical fertilizers (no amount of research will achieve this). It would probably be worthwhile to conduct tests to check out the value of manures/composts for improving mulberry cultivation provided a preliminary inspection shows the soils in the area are in need of being "loosened up" to suit the needs of the mulberry plant.

(2) Regarding Item B, "Pest Control" (Page 2 of the report), the statement is made that mulberry plants do not cause much harm to environment, but I believe what is meant is that such plants per se are not known to cause any impairment of environment. Also, before money is invested in developing disease-resistant local mulberry types, a careful study should be made of how this problem is solved elsewhere (Don't try to "re-invent the wheel"). Similarly, on Item D on procurement of silk worm eggs, before "research" is done a careful engineering type study should be made to determine whether eggs can be produced adequately in Thailand using established methods - perhaps all that is needed is careful control, not research."

ANNEX GImplementation PlanEvents peior to project start, before June 30, 1976

<u>Events</u>	<u>Date Start - End</u>	<u>Time Con- sumption (months)</u>	<u>Responsibility</u>
<u>Administrative</u>			
1. Monitoring Committee appointed, also project manager	Feb.28-Mar.31	1	RTG
2. Paper approved by RTG loan committee	Mar.15-Apr.15	1	RTG
3. Paper forwarded to AID/W for authorization	Mar.26-May 15	1.5	RTG/AID/W
4. Paper approved by RTG Cabinet	Apr.15-May 15	1	RTG
5. Conditions precedent to disbursement met	Apr.30-June 30	2	RTG
6. Loan Agreement signed	May 30-June 30	1	RTG/USOM
<u>Procedural</u>			
1. Select first 300 farm families	Mar.30-Apr.30	1	PWD
2. 300 heads of families train on mulberry plantation at their farms	Mar.30-May 15	1.5	PWD, Sericulture Div., MOAC
3. Establish 300 rai for Central Mulberry Plantation	Mar.30-May 30	2	PWD, Sericulture Div., MOAC
4. Establish 1,200 rai of mulberry plantation	May 15-June 30	1.5	PWD, DOAE, MOAC & BAAC

First year of implementation plan (June 30, 1976 - June 30, 1977)

ANNEX G-1a

Staffing, Personnel and Construction Features

<u>Events</u>	<u>Date Start - End</u>	<u>Time Consump- tion (Months)</u>	<u>Responsibility</u>	<u>Remarks</u>
1. First recruit 20 extension workers & 10 supervisors	Jul.1,76-Oct.1,76	3	PWD	Two per settlement for extension workers and one per settlement for supervisor.
2. The above 20 extension workers trained at Korat Training Center	Nov.15,76-Dec.30,76	1.5	Sericulture Div.MOAC	-
3. First time for 10 supervisors trained at Korat Training Center	Nov.15,76-Dec.30,76	1.5	Sericulture Div.,MOAC Co-op Promotion Dept, MOAC, PWD	Between training course interval, supervisor return back to his settlement.
4. Select second 300 farm families	Feb.28,77-Mar.31,77	1	PWD	30 families per settlement.
5. The above 300 head of families trained on mulberry plantation at their farms	Mar.31,77-May 15,77	1.5	Sericulture Div. MOAC	The course will take 3 days.
6. Established additional 300 rai for central mulberry plantation	Mar.31,77-May 31,77	2	PWD, Sericulture Div., MOAC	30 rai per settlement.
7. Established additional 1,200 rai of farmer mulberry plantation	May 15,77-June 30,77	1.5	PWD, DOAE, MOAC and BAAC	4 rai per farm family.
8. Second time for 10 supervisor trained at Korat Training Center	May 15-June 30,77	1.5	Sericulture Div.,MOAC Co-op Promotion,Dept, MOAC, PWD	-
9. Established additional 2 co-ops at <u>Lam Pow</u> and <u>Chieng Pin</u> Settlement	Sept.1,76-Oct.1,76	1	PWD and Co-op Promotion Dept., MOAC, BAAC	Five Co-ops have been established previously at Mukdaharn, Ubonrat Dam, Ban Grad, Phon Pisai and Prasart settlement.
10. 165 km. road upgraded and 30 km. road maintained	Dec.1,76-Mar.1,77	3	Contractor	USOM engineer recommended this task should be under PWD.
11. Established first 10 central young silkworm rearing houses with equipment	Nov.1,76-May 1,77	6	PWD	one per settlement. This will be transferred to Co-ops later with gov't subsidy 40%.

<u>Events</u>	<u>Date Start - End</u>	<u>Time Consump- tion (Months)</u>	<u>Responsibility</u>	<u>Remarks</u>
12. Established first 300 farmer old silkworm rearing houses with equipment	Jan.1,77-Apr.1,77	3	FWD, BAAC	30 worm houses per settlement.
13. Expansion of Surin Farmer Training Center with equipment	Nov.1,76-May 1,77	6	Sericulture Div., MOAC	The center will provide training services for 5 times a year, 60 persons each time.
14. First 60 Farmers from Ban Grud and Prasart settlement trained at Surin Training Center	Nov.15,76-Dec.15,76	1	Sericulture Div.,MOAC	Only at this stage, 40 farmers have to be trained at Korat and 20 farmers trained at Surin due to unfinished expansion of Surin Farmer Training Center.
15. First 60 Farmers from Phongpisai and Ubonrat Dam settlement trained at Surin Farmer Training Center	May 15,77-June 15,77	1	Sericulture Div.,MOAC	

<u>Events</u>	<u>Date Start - End</u>	<u>Time Consumption (Months)</u>	<u>Responsibility</u>	<u>Remarks</u>
9. Third time for 10 supervisors trained at Korat Training Center	July15-Aug.30,77	1.5	Sericulture Div., MOAC Co-op Promotion, MOAC, PWD	Previously this group took the training courses on Nov.15-Dec.30,76 and May 15-June 30,77.
10. Recruit second 20 extension workers	July1,77-Oct.1,77	3	PWD	Two per settlement.
10.1 The above 20 extension workers trained at Korat Training Center	Nov.15-Dec.30,77	1.5	Sericulture Div., MOAC	-
11. Established additional Co-ops at <u>Kusinara</u> , <u>Lam Dome Noi</u> and <u>Lam Dome Yai</u> settlement	Aug.1,77-Oct.1,77	2	PWD, Co-op Promotion MOAC and BAAC	-
12. 85 km. road upgraded and 185 km. road maintained	Nov.1,77-March 1,77	4	Contractor	-
13. Established second 300 farmer old silkworm rearing houses with equipment	Jan 1,78-April.1,78	3	PWD, BAAC	Thirty worm houses per settlement.
14. The second 60 farmers from <u>Ban Guad</u> and <u>Prasart</u> settlement trained at <u>Surin Farmer Training Center</u>	Nov.15-Dec.15,77	1	Sericulture Div.,MOAC	Thirty per settlement.
15. The second 60 farmers from <u>Phorpisai</u> and <u>Ubon Rat Lam</u> settlements trained at <u>Surin Farmer Training Center</u>	May 15,-June15,78	1	Sericulture Div.,MOAC	Thirty per settlement.
16. Select third/farm families	Feb.28,78-Mar.31,78	1	PWD	Thirty families per settlement.
17. 10 supervisors go abroad for short course training	April 1-April 15,78	.5	PWD	Country; won't identify may be Korea or India.
18. The head of 300 third selective farm families trained on mulberry plantation at their farms	Mar.31-May 15,78	1.5	Sericulture Div.,MOAC	Course takes 3 days.

## Second Year of Implementation Plan (June 30, 1977 - June 30, 1978)

## Staffing, Personnel and Construction Features

<u>Events</u>	<u>Date Start - End</u>	<u>Time Consump- tion (Months)</u>	<u>Responsibility</u>	<u>Remarks</u>
1. First 60 farmers at <u>Ban Gurad</u> and <u>Prasart</u> settlements rearing worms.	June 30-July 30,77	1	PWD	At the first 2 cycles, the staff of Korat Training Center will help teach the farmers at their farms. Farmers work both at central young silkworm rearing houses and at their worm houses.
	Aug.15-Sept.15,77	1	Sericulture Div.,	
	Sept.30-Oct.30,77	1	MOAC, DOAE,MOAC	
	Nov.15-Dec.15,77	1	BAAC	
	Dec.30,77-Jan 30,78	1		
2. First 60 farmers at <u>Phonpisai</u> and <u>Ubon Raj Dam</u> settlement rearing worms for 6 cycles	June30-July 30,77	1	PWD	Same as above.
	Aug.15-Sept.15,77	1	Sericulture Div.,	
	Sept.30-Oct.30,77	1	MOAC, DOAE,MOAC	
	Nov.15-Dec.15,77	1	BAAC	
	Dec.30,77-Jan.30,78	1		
3. First 60 farmers from <u>Mukdaharn</u> and <u>Chieng Pin</u> settlements trained at <u>Surin Farmer Training Center</u>	Feb.15-Mar.15,78	1	Sericulture Div.,	Thirty per settlement.
	June 30 - July 30,77	1	MOAC	
4. The above first 60 farmers at <u>Mukdaharn</u> & <u>Chieng Pin</u> settlement rearing worms. for 5 cycles	Aug.15-Sept.15,77	1	PWD	Same as event #1.
	Sept.30-Oct.30,77	1	Sericulture Div.,	
	Nov.15-Dec.15,77	1	MOAC, DOAE, MOAC,	
	Dec.30,77-Jan.30,78	1	BAAC	
	Feb.15,78-Mar.15,78	1		
5. First 60 farmers from <u>Lam Dome Noi</u> and <u>Lam Dome Yai</u> settlement trained at <u>Surin Farmer Training Center</u>	Aug.15-Sept.15,77	1	Sericulture Div.,	Thirty per settlement.
6. The above first 60 farmers at <u>Lam Dome Noi</u> and <u>Lam Dome Yai</u> settlement rearing worms for 4 cycles	Sept.30-Oct.30,77	1	PWD	Same as event #1.
	Nov.15-Dec.15,77	1	Sericulture Div.,	
	Dec.30,77-Jan.30,78	1	MOAC	
	Feb.15-Mar.15,78	1	DOAE,MOAC,BAAC	
7. First 60 farmers from <u>Lam Poy</u> and <u>Kusinarai</u> settlement trained at <u>Surin Farmer Training Center</u>	Sept.30-Oct.30,77	1	Sericulture Div.,	Thirty per settlement
			MOAC	
8. The above first 60 farmers from <u>Lam Poy</u> and <u>Kusinarai</u> settlement rearing worms for 3 cycles.	Nov.15-Dec.15,77	1	PWD	Same as event #1.
8.1 First evaluation conducted	Nov.15,77-Jan.15,78	2	Kasetsart Univ.	

<u>Events</u>	<u>Date</u> <u>Start - End</u>	<u>Time Consump-</u> <u>tion (Months)</u>	<u>Responsibility</u>	<u>Remarks</u>
19. Established additional 400 rai for central mulberry plantation	Mar.31-May 31,78	2	PWD Sericulture Div., MCAC	Forty rai per settlement.
20. Established additional 1,200 rai of farmer mulberry plantation	May 15,-June 30,78	1.5	PWD DOAE, MCAC and BAAC	Four rai per farmer family.

Third Year of Implementation Plan (June 30, 1978 - June 30, 1979)  
Staffing, Personnel and Construction Features

Events	Date		Time Consump- tion (Months)	Responsibility	Remarks
	Start	End			
1. The first 60 farmers at <u>Mukdaham &amp; Chieng Pin Settlements</u> rearing worms for 6 cycles	June 30	July 30, 78	1	PWD, Sericul- ture Div., MOAC, BAAC.	Farmers work both at Central young silk worm rearing houses and at their worm houses.
	Aug.15	Sept.15, 78	1		
	Sept.30	Oct.30, 78	1		
	Nov.15	Dec.15, 78	1		
	Dec.30, 78	Jan.30, 79	1		
2. The first 60 farmers at <u>Lam Dome Noi and Lam Dome Yai</u> settlements rearing worms for 6 cycles	June 30	July 30, 78	1	PWD, Sericul- ture Div., MOAC, BAAC	Farmers work both at Central young silk worm rearing houses and at their worm houses.
	Aug.15	Sept.15, 78	1		
	Sept.30	Oct.30, 78	1		
	Nov.15	Dec.15, 78	1		
	Dec.30, 78	Jan.30, 79	1		
3. The first 60 farmers at <u>Lam Pow and Kusinarai</u> settlements rearing worms for 6 cycles	June 30	July 30, 78	1	PWD, Sericul- ture Div., MOAC, BAAC	Farmers work both at Central young silk worm rearing houses and at their worm houses.
	Aug.15	Sept.15, 78	1		
	Sept.30	Oct.30, 78	1		
	Nov.15	Dec.15, 78	1		
	Dec.30, 78	Jan.30, 79	1		
4. The second 60 farmers at <u>Ben Grad and Prasart</u> settlements rearing worms for 6 cycles	June 30	July 30, 78	1	PWD, Sericul- ture Div., MOAC, BAAC	This stage includes the rearing activities of the first group.
	Aug.15	Sept.15, 78	1		
	Sept.30	Oct.30, 78	1		
	Nov.15	Dec.15, 78	1		
	Dec.30, 78	Jan.30, 79	1		
5. The second 60 farmers at <u>Phonpisai and Ubonrat Dam</u> Settlements rearing worms for 6 cycles	June 30	July 30, 78	1	PWD, Sericul- ture Div., MOAC, BAAC	This stage includes the rearing activities of the first group
	Aug.15	Sept.15, 78	1		
	Sept.30	Oct.30, 78	1		
	Nov.15	Dec.15, 78	1		
	Dec.30, 78	Jan.30, 79	1		
6. Second group of 60 farmers from <u>Mukdaham and Chieng Pin settlements</u> trained at <u>Surin Farmer training Center</u>	June 30	July 30, 78	1	Sericulture Div., MOAC	Thirty per settlement
	Aug.15	Sept.15, 78	1		
	Sept.30	Oct.30, 78	1		
	Nov.15	Dec.15, 78	1		
	Dec.30, 78	Jan.30, 79	1		

<u>Events</u>	<u>Date Start - End</u>	<u>Time Consump- tion (Months)</u>	<u>Responsibility</u>	<u>Remarks</u>
7. <u>The above second 60 farmers at Mukdaham and Chieng Pin settlements rearing worms for 5 cycles</u>	Aug.15-Sept.15,78	1	PWD, Sericulture Div., MDAC, DOAC, MDAC, BAAC	Thirty per settlement.
	Sept.30-Oct.30,78	1		
	Nov.15-Dec.15,78	1		
	Dec.30,78-Jan.30,79	1		
	Feb.15,79-Mar.15,79	1		
8. <u>Second group of 60 farmers from Lam Dom Noi and Lam Dome Yai settlements trained at Surin Farmer Training Center</u>	Aug.15-Sept.15,78	1	Sericulture Div., MDAC	Thirty per settlement
9. <u>The above second 60 farmers from Lam Dome Noi and Lam Dome Yai settlements rearing worms for 4 cycles</u>	Sept.30-Oct.30,78	1	PWD, Sericulture Div., MDAC, DOAE, MDAC, BAAC	Farmers work both at Central young silk worm rearing houses and at their worm houses.
	Nov.15-Dec.15,78	1		
	Dec.30,78-Jan.30,79	1		
	Feb.15-Mar.15,79	1		
10. <u>Second group of 60 farmers from Lam Paw and Kusinarai settlements trained at Surin Farmer Training Center</u>	Sept.30-Oct.30,78	1	Sericulture Div., MDAC	Thirty per settlement
11. <u>The above second 60 farmers at Lam Paw and Kusinarai settlements rearing worms for 3 cycles</u>	Nov.15-Dec.15,78	1	PWD, Sericulture Div., MDAC, DOAE, MDAC, BAAC	Farmers work both at Central young silk worm rearing houses and at their worm houses.
	Dec.30,78-Jan.30,79	1		
	Feb.15,79-Mar.15,79	1		
	Nov.15,78-Jan.15,79	2		
11.1 Second evaluation conducted	Nov.15,78-Jan.15,79	2	Kasetsart Univ.	-
12. Recruit third 10 extension workers	July 1-Oct.1,78	3	PWD	One per settlement
12.1 The above 10 extension workers trained at Korat Training Center	Nov.15-Dec.30,78	1.5	Sericulture Div. MDAC	-
13. 270 km road maintained	Nov.1,78-Mar.1,79	4	Contractor	-
14. Established second 10 central young silk worm rearing houses with equipment	Nov.1,78-May 1,79	6	PWD	One per settlement. This will be transferred to Co-ops later with gov't subsidy 40%.
15. Established third 300 farmer old silk worm rearing houses with equipment	Jan.1 - April 1,79	3	PWD, BAAC	Thirty houses per settlement.
16. <u>The third 60 farmers from Ban Grud and Prasart settlements trained at Surin Farmer Training Center.</u>	Nov.15-Dec.15,78	1	Sericulture Div., MDAC	Thirty per settlement.

<u>Events</u>	<u>Date Start - End</u>	<u>Time Consump- tion (Months)</u>	<u>Responsibility</u>	<u>Remarks</u>
17. The third 60 farmers from <u>Phonpisai</u> and <u>Ubonrat Dam settlement</u> trained at <u>Suri Farmer Training Center</u>	May 15 - June 15, 79	1	Sericulture Div., MOAC	-
18. Select Fourth 300 farm families	Feb. 28, 79 - Mar. 31, 79	1	P.O	Thirty families per settlement
19. The head of 300 fourth selective farm families trained on mulberry plantation at their farms	Mar. 31 - May 15, 79	1.5	Sericulture Div., MOAC	Course takes 3 days
20. Established additional 1,200 rai of farmer mulberry plantation	May 15 - June 30, 79	1.5	PWD, DOAE, MOAC and BAAC	Four rai per farm families.

Fourth Year of Implementation Plan (June 30, 1979 - June 30, 1980)

Events	Staffing, Personnel and Construction Features			Responsibility	Remarks
	Date		Time Consumption (Months)		
	Start	End			
1. The second 60 farmers at <u>Mukdaham</u> and <u>Cheng Pin</u> settlements rearing worms for 6 cycles	June 30-July 30,79		1	PWD	This stage includes the rearing activities of the first group.
	Aug.15-Sept.15,79		1	Sericulture	
	Oct.30-Nov.30,79		1	Div.,MOAC	
	Dec.15,79-Jan.15,80		1	DOAE,MOAC	
	Jan.30-Feb.30,80		1	BAAC	
2. The second 60 farmers at <u>Lam Dome Noi</u> and <u>Lam Dome Yai</u> settlements rearing worms for 6 cycles	June 30-July 30,79		1	PWD	Same as above.
	Aug.15-Sept.15,79		1	Sericulture	
	Oct.30-Nov.30,79		1	Div.,MOAC	
	Dec.15,79-Jan.15,80		1	DOAE, MOAC	
	Jan.30-Feb.30,80		1	BAAC	
3. The second 60 farmers at <u>Lam Pow</u> and <u>Kusinarai</u> settlements rearing worms for 6 cycles	June 30-July 30,79		1	PWD	Same as above.
	Aug.15-Sept.15,79		1	Sericulture	
	Oct.30-Nov.30,79		1	Div.,MOAC	
	Dec.15,79-Jan.15,80		1	DOAE,MOAC	
	Jan.30-Feb.30,80		1	BAAC	
4. The third 60 farmers at <u>Ban Guad</u> and <u>Prasart</u> settlements rearing worms for 6 cycles.	June 30-July 3,79		1	PWD	This stage includes the rearing activities of the first and second group.
	Aug.15-Sept.15,79		1	Sericulture	
	Oct.30-Nov.30,79		1	Div.,MOAC	
	Dec.15,79-Jan.15,80		1	DOAE,MOAC	
	Jan.30-Feb.30,80		1	BAAC	
5. The third 60 farmers at <u>Phongisai</u> and <u>Ubon Rat Dam</u> settlements rearing worms for 6 cycles	June 30-July 3,79		1	PWD	Same as above.
	Aug.15-Sept.15,79		1	Sericulture	
	Oct.30-Nov.30,79		1	Div.,MOAC	
	Dec.15,79-Jan.15,80		1	DOAE,MOAC	
	Jan.30-Feb.30,80		1	BAAC	
	Feb.15-Mar.15,80		1		

Events	Date Start - End	Time Consump- tion (Months)	Responsibility	Remarks
6. Third group of 60 farmers from <u>Mukdaharn</u> and <u>Chieng Pin</u> settlements trained at <u>Surin Farmer Training Center</u>	June30-July 30,79	1	Sericulture Div.,MOAC	Thirty per settlement.
7. The above third 60 farmers at <u>Mukdaharn</u> and <u>Chieng Pin</u> settlements rearing worms for 5 cycles	Aug.15-Sept.15,79 Sept.30-Oct.30,79 Nov.15-Dec.15,79 Dec.30,79-Jan.30,80 Feb.15,80-Mar.15,80	1 1 1 1 1	PWD Sericulture Div.,MOAC DOAE,MOAC EPAC	-
8. Third group of 60 farmers from <u>Lam Dome Noi</u> and <u>Lam Dome Yai</u> settlements trained at <u>Surin Farmer Training Center</u>	Aug.15-Sept.15,79	1	Sericulture Div.,MOAC	Thirty per settlement.
9. The above third 60 farmers at <u>Lam Dome Noi</u> and <u>Lam Dome Yai</u> settlements rearing worms for 4 cycles	Sept.30-Oct.30,79 Nov.15-Dec.15,79 Dec.30,79-Jan.30,80 Feb.15-Mar.15,80	1 1 1 1	PWD Sericulture Div.,MOAC DOAE,MOAC BAAC	-
10. Third group of 60 farmers from <u>Lam Pow</u> and <u>Kusinarai</u> settlements trained at <u>Surin Farmer Training Center</u>	Sept.30-Oct.30,79	1	Sericulture Div.,MOAC	Thirty per settlement.
11. The above third 60 farmers at <u>Lam Pow</u> and <u>Kusinarai</u> settlements rearing worms for 3 cycles	Nov.15-Dec.15,79 Dec.30,79-Jan.30,80 Feb.15-Mar.15,80	1 1 1	PWD Sericulture Div.,MOAC DOAE,MOAC BAAC	-
12. Recruit fourth 10 extension	July1-Oct.1,79	3	PWD	One per settlement.
12.1 The above workers 10 extension workers trained at <u>Korat Training Center</u>	Nov.15-Dec.30,79	1.5	Sericulture Div.,MOAC	-
13. 270 km. road maintained	Nov.1,78-Mar.1,79	4	Contractor	-
14. Established fourth 300 farmer old silk worm rearing houses with equipment	Jan.1-April 1,86	3	PWD BAAC	Thirth worm houses per settlement.

- 3 -

<u>Events</u>	<u>Date Start - End</u>	<u>Time Consump- tion (Months)</u>	<u>Responsibility</u>	<u>Remarks</u>
15. The fourth 60 farmers from <u>Ban Guad</u> and <u>Prasart</u> settlements trained at Surin Farmer Training Center	Nov.15-Dec.15,79	1	Sericulture Div.,MOAC	Thirty per settlement.
16. The fourth 60 farmers from <u>Phon Pisai</u> and <u>Ubon-Rat Dam</u> settlements trained at Surin Farmer Training Center:	May 15-June 15,80	1	Sericulture Div.,MOAC	-
17. Select fifth 300 farm families	Feb.28-Mar.31,80	1	PWD	Thirty families per settlement.
18. The head of 300 fifth selective farm families trained on mulberry plantation at their farms	Mar.31-May 15,80	1.5	Sericulture Div.,MOAC	Course takes 3 days.
19. Established additional 1,200 rai of farmer mulberry plantation	May 15-June 30,80	1.5	PWD	Four rai per farm families.

Fifth year of Implementation Plan (June 30, 1980 - June 30, 1981)  
Staffing, Personnel and Construction Features

ANNEX G-5a

Events	Date		Time Consump- tion (months)	Responsibility	Remarks
	Start	End			
1. The third 60 farmers at <u>Makdaham</u> and <u>Chieng Pin</u> settlements rearing worms for 6 cycles	June 30	July 30, 80	1	FWD, Sericulture	This stage includes the rearing activities of the first and the second group.
	Aug. 15	Sept. 15, 80	1	Div., MDAC,	
	Oct. 30	Nov. 30, 80	1	DOAE, MDAC, BAAC	
	Dec. 15, 80	Jan. 15, 81	1		
	Jan. 30	Feb. 30, 81	1		
2. The third 60 farmers at <u>Lam Dome Noi</u> and <u>Lam Dome Yai</u> settlements rearing worms for 6 cycles	June 30	July 30, 80	1	FWD, Sericulture	This stage includes the rearing activities of the first and the second group.
	Aug. 15	Sept. 15, 80	1	Div., MDAC,	
	Oct. 30	Nov. 30, 80	1	DOAE, MDAC, BAAC	
	Dec. 15, 80	Jan. 15, 81	1		
	Jan. 30	Feb. 30, 81	1		
3. The third 60 farmers at <u>Lam Pow</u> and <u>Kusinarai</u> settlements rearing worms for 6 cycles	June 30	July 30, 80	1	FWD, Sericulture	This stage includes the rearing activities of the first and the second group.
	Aug. 15	Sept. 15, 80	1	Div., MDAC,	
	Oct. 30	Nov. 30, 80	1	DOAE, MDAC, BAAC	
	Dec. 15, 80	Jan. 15, 81	1		
	Jan. 30	Feb. 30, 81	1		
4. The fourth 60 farmers at <u>Ban Guad</u> , and <u>Prasart</u> settlements rearing worms for 6 cycles	June 30	July 30, 80	1	FWD, Sericulture	This stage includes the rearing activities of the first through the third group.
	Aug. 15	Sept. 15, 80	1	Div., MDAC,	
	Oct. 30	Nov. 30, 80	1	DOAE, MDAC, BAAC	
	Dec. 15, 80	Jan. 15, 81	1		
	Jan. 30	Feb. 30, 81	1		
5. The fourth 60 farmers at <u>Phon Pisai</u> and <u>Ubonrat Dam</u> settlements rearing worms for 6 cycles	June 30	July 30, 80	1	FWD, Sericulture	This stage includes the rearing activities of the first through the third group.
	Aug. 15	Sept. 15, 80	1	Div., MDAC,	
	Oct. 30	Nov. 30, 80	1	DOAE, MDAC, BAAC	
	Dec. 15, 80	Jan. 15, 81	1		
	Jan. 30	Feb. 30, 81	1		
6. Fourth group of 60 farmers from <u>Makdaham</u> and <u>Chieng Pin</u> settlements trained at Surin Farmer Training Center	June 30	July 30, 80	1	Sericulture Div., MDAC	Thirty per settlement.

<u>Events</u>	<u>Date Start - End</u>	<u>Time Consumption (Months)</u>	<u>Responsibility</u>	<u>Remarks</u>
7. The above fourth 60 farmers at <u>Mukdaharn</u> and <u>Chieng Pin</u> settlements rearing worms for 5 cycles	Aug.15-Sept.15,80	1	PWD, Sericulture Div., MOAC, DOAE, MOAC BAAC	-
	Sept.30-Oct.30,80	1		
	Nov.15-Dec.15,80	1		
	Dec.30,80-Jan.30,81	1		
	Feb.15-Mar.15,81	1		
8. Fourth group of 60 farmers from Lam Dome Noi and Lam Dome Yai settlements trained at Surin Farmer Training Center	Aug.15-Sept.15,80	1	Sericulture Div., MOAC	Thirty per settlement
9. The above fourth 60 farmers at <u>Lam Dome Noi</u> and <u>Lam Dome Yai</u> settlements rearing worms for 4 cycles	Sept.30-Oct.3-,80	1	PWD, Sericulture Div., MOAC, DOAE, MOAC, BAAC	-
	Nov.15-Dec.15,80	1		
	Dec.30,80-Jan.30,81	1		
	Feb.15-Mar.15,81	1		
10. Fourth group of 60 farmers from <u>Lam Paw</u> and <u>Kusinarai</u> settlements trained at Surin Farmer Training Center.	Sept.30-Oct.30,80	1	Sericulture Div., MOAC	Thirty per settlement
11. The above fourth 60 farmers at <u>Lam Paw</u> and <u>Kusinarai</u> settlements rearing worms for 3 cycles	Nov.15-Dec.15,80	1	PWD, Sericulture Div., MOAC, DOAE, MOAC, BAAC	-
	Dec.30,80-Jan.30,81	1		
	Feb.15-Mar.15,81	1		
11.1 Third evaluation conducted	Nov.15,80-Jan,81			
12. Recruit fifth 10 extension workers	July 1 -Oct.1,80	3	PWD	One per settlement
12.1 The above extension workers trained at Korat Training Center	Nov.15-Dec.30,80	1.5	Sericulture Div., MOAC	-
13. 270 km road maintained	Nov.1,80-Mar.1,81	4	Contractor	-
14. Established third 10 Central Young Silk Worm rearing houses with equipment	Nov.1,80-May 1,81	6	PWD	One per settlement. This will be transferred to Co-ops later with gov't subsidy 40%
15. Established fifth 300 farmer old silk worm rearing houses with equipment	Jan.1-April 1,81	3	PWD, BOAC	Thirty worms houses per settlement
16. The fifth 60 farmers from <u>Ban Grud</u> and <u>Prasart</u> settlements trained at Surin Farmer Training Center	Nov.15 - Dec.15,80	1	Sericulture Div., MOAC	Thirty per settlement.
17. The fifth 60 farmers from <u>Phon Pisai</u> and <u>Ubonrat Dam</u> settlement and trained at Surin Farmer Training Center	May 15 - June 15,81	1	Sericulture Div., MOAC	Thirty per settlement.

## Sixth Year of Implementation Plan (June 30, 1981 - July 30, 1982)

## Staffing, Personnel and Construction Features

Events	Date		Responsibility	Remarks
	Start - End	Time Consumption (months)		
1. The fourth 60 farmers at <u>Mukdah m</u> and <u>Chieng Pin</u> settlements rearing worms for 6 cycles	June 30-July 30,81	1	PWD, Sericulture Div., MOAC, DOAE, MOAC, BAAC	This stage includes the rearing activities of the first through the third group.
	Aug.15-Sept.15,81	1		
	Oct.30-Nov.30,81	1		
	Dec.15,81-Jan.15,82	1		
	Jan.30-Feb.30,82	1		
	Feb.15-Mar.15,82	1		
2. The fourth 60 farmers at <u>Lam Dome Noi</u> and <u>Lam Dome Yai</u> settlements rearing worms for 6 cycles	June 30-July 30,81	1	PWD, Sericulture Div., MOAC, DOAE, MOAC, BAAC	This stage includes the rearing activities of the first through the third group.
	Aug.15-Sept.15,81	1		
	Oct.30-Nov.30,81	1		
	Dec.15,81-Jan.15,82	1		
	Jan.30-Feb.30,82	1		
	Feb.15-Mar.15,82	1		
3. The fourth 60 farmers at <u>Lam Paw</u> and <u>Kusinarai</u> settlements rearing worms for 6 cycles	June 30-July 30,81	1	PWD, Sericulture Div., MOAC, DOAE, MOAC, BAAC	This stage includes the rearing activities of the first through the third group.
	Aug.15-Sept.15,81	1		
	Oct.30-Nov.30,81	1		
	Dec.15,81-Jan.15,82	1		
	Jan.30-Feb.30,82	1		
	Feb.15-Mar.15,82	1		
4. The fifth 60 farmers at <u>Ban Guad</u> and <u>Prasart</u> settlements rearing worms for 6 cycles	June 30-July 30,81	1	PWD, Sericulture Div., MOAC, DOAE, MOAC, BAAC	This stage includes the rearing activities of the first group through the fourth group
	Aug.15-Sept.15,81	1		
	Oct.30-Nov.30,81	1		
	Dec.15,81-Jan.15,82	1		
	Jan.30-Feb.30,82	1		
	Feb.15-Mar.15,82	1		
5. The fifth 60 farmers at <u>Phonpisai</u> and <u>Ubonrat Dam</u> settlements rearing worms for 6 cycles	June 30-July 30,81	1	PWD, Sericulture Div., MOAC, DOAE, MOAC, BAAC	This stage includes the rearing activities of the first group through the fourth group
	Aug.15-Sept.15,81	1		
	Oct.30-Nov.30,81	1		
	Dec.15,81-Jan.15,82	1		
	Jan.30-Feb.30,82	1		
	Feb.15-Mar.15,82	1		
6. Fifth group of 60 farmers from <u>Mukdaham</u> and <u>Chieng Pin</u> settlements trained at <u>Burin Farmer Training Center</u> .	June 30-July 30,81	1	Sericulture Div., MOAC	Thirty per settlement.

<u>Events</u>	<u>Date Start - End</u>	<u>Time Consump- tion (months)</u>	<u>Responsibility</u>	<u>Remarks</u>
7. The above fifth 60 farmers at <u>Mukdaharn</u> and <u>Chieng Pin</u> settlements rearing worms for 5 cycles	Aug.15-Sept.15,81	1	PWD, Sericulture Div., MOAC, DOAE, MOAC, BAAC	-
	Sept.30-Oct.30,81	1		
	Nov.15-Dec.15,81	1		
	Dec.30,81-Jan.30,82	1		
	Feb.15-Mar.15,82	1		
9. Fifth group of 60 farmers from <u>Lam Dome Noi</u> and <u>Lam Dome Yai</u> settlements trained at Surin Farmer Training Center	Aug.15-Sept.15,81	1	Sericulture Div., MOAC	Thirty per settlement.
9. The above fifth 60 farmers at <u>Lam Dome Noi</u> and <u>Lam Dome Yai</u> settlements rearing worms for 4 cycles	Sept.30-Oct.30,81	1	PWD, Sericulture Div., MOAC, DOAE, MOAC, BAAC	-
	Nov.15-Dec.15,81	1		
	Dec.30,81-Jan.30,82	1		
	Feb.15-Mar.15,82	1		
10. Fifth group of 60 farmers from <u>Lam Paw</u> and <u>Kusinarai</u> settlements trained at Surin Farmer Training Center	Sept.30-Oct.30,81	1	Sericulture Div., MOAC	Thirty per settlement.
11. The above fifth 60 farmers at <u>Lam Paw</u> and <u>Kusinarai</u> settlements rearing worms for 3 cycles	Nov.15-Dec.15,81	1	PWD, Sericulture Div., MOAC, DOAE, BAAC	-
	Dec.30,81-Jan.30,82	1		
	Feb.15-Mar.15,82	1		

PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

ANNEX H

Life of Project  
From FY 1977 to FY 1982\*  
Total U.S. Funding \$2.6 million  
Date Prepared: March, 1976

Project Title & Number: Sericulture/Settlements Loan 493-0271

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	SPECIFIC TARGETS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Program or Sector Goal: The broader objective to which this project contributes:</p> <p>To increase the per capita income of farm families who are on the lower end of the income scale.</p> <p><u>Sub-goal</u></p> <p>To increase the annual net cash farm incomes of 1,500 families in ten Northeastern settlements.</p>	<p>Measures of Goal Achievement:</p> <p>Percentage increase in per capita incomes.</p> <p>Increase in annual net cash farm income per family</p>	<p>Goal Targets:</p> <p>Greater than or equal to the national average.</p> <p>Average of over 50% per family by 1981 (from \$430.00 to \$720.00 per year)</p>	<p>NSO., NESDB and MOAC data.</p> <p>NSO., NESDB and PWD data.</p> <p>* Disbursement will begin in FY 1977.</p>	<p>Assumptions for goal targets:</p> <ol style="list-style-type: none"> <li>1. Government will continue to stress improvement of rural living and income conditions as a priority goal.</li> <li>2. Stable security and political situation.</li> <li>3. Population increases among poor rural families is not greater than family income increases.</li> </ol> <ol style="list-style-type: none"> <li>1. It is assumed that the rate of income growth in the non project areas of Thailand will remain constant.</li> <li>2. Profitability of warp yarn production relative to other alternatives will stimulate increased sericulture activities among non-project farmers.</li> </ol>

PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

ANNEX II

Life of Project:  
From FY 1977 to FY 1982  
Total U.S. Funding \$2.6 million  
Date Prepared March, 1976

Project Title & Number: Sericulture/Settlements Loan 493-0271

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	SPECIFIC TARGETS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS																					
<p>Project Purpose:</p> <p>To establish modern sericulture technology among 1,500 farm families in ten Northeastern settlements of Thailand.</p>	<p>Conditions that will indicate purpose has been achieved: End of project status.</p> <ol style="list-style-type: none"> <li>1. Number of families added</li> <li>2. Total annual gross production of fresh cocoon (MP)</li> <li>3. Increase in demand of families to engage in modern sericulture production.</li> <li>4. Existence of institutional structure for effective and continued transfer of modern sericulture technology to farm families.</li> <li>5. Farmers will follow the new sericulture technique rigorously.</li> </ol>	<p>Performance Targets: FY's</p> <table border="1"> <tr> <td></td> <td>77</td> <td>78</td> <td>79</td> <td>80</td> <td>81</td> <td>82</td> </tr> <tr> <td>1.</td> <td>300</td> <td>300</td> <td>300</td> <td>300</td> <td>300</td> <td>-</td> </tr> <tr> <td>2.</td> <td>-</td> <td>57.6</td> <td>129.6</td> <td>201.6</td> <td>273.6</td> <td>345.6</td> </tr> </table> <ol style="list-style-type: none"> <li>3. Number of families on PWD waiting list in 1981 is greater than 1975 level.</li> <li>4. Institutional structure               <ol style="list-style-type: none"> <li>a. Flow of information among all participants (management, workers).</li> <li>b. Positive motivation which contributes to production.</li> </ol> </li> </ol>		77	78	79	80	81	82	1.	300	300	300	300	300	-	2.	-	57.6	129.6	201.6	273.6	345.6	<ol style="list-style-type: none"> <li>1. NSO, NESDB, PWD data.</li> <li>2. HOAC reports</li> <li>3. Evaluation</li> </ol>	<p>Assumptions for achieving purpose:</p> <ol style="list-style-type: none"> <li>1. Serious and unexpected crop diseases will NOT drive farmers to or away from sericulture.</li> <li>2. The farm families are able to have sufficient rate of return and therefore will accept risk of new sericulture technology.</li> <li>3. Interaction of supply and demand will result in reasonable prices for fresh warp cocoons</li> </ol>
	77	78	79	80	81	82																			
1.	300	300	300	300	300	-																			
2.	-	57.6	129.6	201.6	273.6	345.6																			

PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

ANNEX B

Life or Project  
From FY 1977 to FY 1982  
Total U.S. Funding \$2.6 million  
Date Prepared: March, 1976

Project Title & Number: Sericulture/Settlements Loan 493-0271

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	SPECIFIC TARGETS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS																															
Outputs:	Magnitude of Outputs:	Output Targets:		Assumptions for achieving outputs																															
1. Central rearing houses and mulberry nurseries operating.	1. a. Number of central rearing houses.* b. Rai per settlement for central mulberry nurseries.*	<table border="1"> <tr> <td></td> <td></td> <td></td> <td colspan="3">FY's</td> </tr> <tr> <td></td> <td></td> <td></td> <td>77</td> <td>78</td> <td>79</td> <td>80</td> <td>81</td> <td>82</td> </tr> <tr> <td>1.a</td> <td>10</td> <td>20</td> <td>-</td> <td>-</td> <td>30</td> <td>-</td> <td>-</td> </tr> <tr> <td>b.</td> <td>50</td> <td>60</td> <td>100</td> <td>100</td> <td>100</td> <td>-</td> <td>-</td> </tr> </table>				FY's						77	78	79	80	81	82	1.a	10	20	-	-	30	-	-	b.	50	60	100	100	100	-	-	1. FWD and MOAC records.	1. Low turnover rate among trained extension personnel.
			FY's																																
			77	78	79	80	81	82																											
1.a	10	20	-	-	30	-	-																												
b.	50	60	100	100	100	-	-																												
2. Functioning cooperatives:	2. Number of functioning Cooperatives.	2. 7 10 10 10 10 -	2. Cooperative records.																																
3. Individual farmer silkworm rearing houses and mulberry production.	3. a. Number of farmer old silkworm rearing houses* b. Farmer Mulberry plantation (rai)*	<table border="1"> <tr> <td>3.a</td> <td>300</td> <td>600</td> <td>900</td> <td>1,200</td> <td>1,500</td> <td>-</td> <td>-</td> </tr> <tr> <td>b.</td> <td>1,200</td> <td>2,400</td> <td>3,600</td> <td>4,800</td> <td>6,000</td> <td>-</td> <td>-</td> </tr> </table>	3.a	300	600	900	1,200	1,500	-	-	b.	1,200	2,400	3,600	4,800	6,000	-	-	3. Evaluation																
3.a	300	600	900	1,200	1,500	-	-																												
b.	1,200	2,400	3,600	4,800	6,000	-	-																												
4. Transportation available to market cocoon and other products on a timely basis.	4. Fresh cocoons marketed per year (MT)	4. - 51.8 116.6 181.4 246.2 311.0																																	
5. Trained sericulture supervisors and extension workers introduce and reinforce sericulture production concepts requirements.	5. a. Number of trained sericulture supervisors working. b. Number of trained extension workers working with farmers	<table border="1"> <tr> <td>5.a.</td> <td>10</td> <td>10</td> <td>10</td> <td>10</td> <td>10*</td> <td>-</td> <td>-</td> </tr> <tr> <td>b.</td> <td>20</td> <td>40</td> <td>50</td> <td>60</td> <td>70*</td> <td>-</td> <td>-</td> </tr> </table>	5.a.	10	10	10	10	10*	-	-	b.	20	40	50	60	70*	-	-																	
5.a.	10	10	10	10	10*	-	-																												
b.	20	40	50	60	70*	-	-																												
		* Cumulative																																	

- 4 -  
PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

**ANNEX B**

Life of Project:  
From FY 1977 to FY 1982  
Total U.S. Funding \$2.6 million  
Date Prepared: March, 1976

Project Title & Number: Sericulture/Settlements Loan 492-0271

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	SPECIFIC TARGETS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<b>Inputs:</b> <u>Project Funds</u> U.S. \$2.7 million* LAG \$3.4 million	<b>Implementation Target (Type and Quantity)</b>	<b>Budget and Implementation Schedule:</b> '000 dollars @ 1975 prices FY's 77 78 79 80 81 Total		<b>Assumptions for providing inputs</b>
<b>1. Central Facilities</b> <b>a. Construction and equipment</b>  <b>b. Road improvement and maintenance</b>  <b>2. Farmer Requirements</b> <b>a. Training</b>  <b>b. Credit</b> Mulberry plantation  Old silkworm rearing house  Eggs  <b>3. Administration</b> <b>a. Training supervisors and extension workers</b> <b>b. Salaries and facilities</b>  * Includes \$0.1 million of grant funds.	<b>1.</b> a <sub>1</sub> 30 central young silkworm rearing houses and equipment a <sub>2</sub> Expansion of Surin Farmer Training Center a <sub>3</sub> 1000 rai for central mulberry plantation and maintenance  <b>b.</b> 250 kms of road upgraded and 1,025 kms of road maintenance  <b>2.</b> a. 1,500 farmers trained on silkworm rearing and mulberry plantation  b <sub>1</sub> 6,000 rai for farmer mulberry plantation and maintenance b <sub>2</sub> 1,500 farmer old silkworm rearing houses and equipment b <sub>3</sub> Two boxes of silkworm eggs per cycle, 6 cycles a year  <b>3.</b> a. Training for 10 supervisors and 70 extension workers. b <sub>1</sub> salaries for 10 supervisors and 70 extension workers b <sub>2</sub> Houses for 10 supervisors and 70 extension workers b <sub>3</sub> Vehicles for 10 supervisors and 70 extension workers	<b>1.</b> a <sub>1</sub> 185 2 180 2 180 549 a <sub>2</sub> 189 1 2 1 1 194 a <sub>3</sub> 18 30 49 41 41 179  <b>b.</b> 214 146 69 69 69 567  <b>2.</b> a. 15 15 15 15 15 75  b <sub>1</sub> 36 37 36 37 37 183 b <sub>2</sub> 293 292 293 292 293 1,462 b <sub>3</sub> 33 33 33 33 33 165  <b>3.</b> a. 9 20 3 4 4 40 b <sub>1</sub> 29 50 62 75 89 305 b <sub>2</sub> 86 50 25 25 25 211 b <sub>3</sub> 186 66 65 72 77 466	See Implementation Plan (net work) in Part IV B.	Project funds will be made available on timely basis.

PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

ANNEX H

Life of Project: \_\_\_\_\_  
From FY 1977 to FY1982  
Total U.S. Funding \$2.6 Million  
Date Prepared: March, 1976

Project Title & Number: Sericulture/Settlements Loan 493-0271

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	SPECIFIC TARGETS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS														
Inputs:	Implementation Target (Type and Quantity)	Budget and Implementation Schedule:		Assumptions for providing inputs:														
		<table border="1"> <tr> <td></td> <td>77</td> <td>78</td> <td>79</td> <td>80</td> <td>81</td> <td>Total</td> </tr> <tr> <td>c.</td> <td>75</td> <td>75</td> <td>-</td> <td>-</td> <td>-</td> <td>150</td> </tr> </table>		77	78	79	80	81	Total	c.	75	75	-	-	-	150		
	77	78	79	80	81	Total												
c.	75	75	-	-	-	150												
c. Technical assistance	c. Management consultants for the first two years of project implementation	c.																
d. Evaluation	d. Evaluate reports at the end of second and third year and at the end of the project.	d. - 29 20 - 29 78																
4. Co-ops	4.	4.																
a. Construction	a. Offices including facilities and storage for 10 Co-ops.	a. 43 34 - - - 77																
b. Vehicles	b. Vehicles for 8 Co-ops	b. 138 82 - - - 220																
c. Equipment	c. Equipment for 10 Co-ops	c. 50 22 - - - 72																
d. Revolving fund	d. Revolving fund for 10 Co-ops	d. 87 38 - - - 125																
	Total	1,686 1,021 852 666 893 5,118																

country:	project no:	project title:	date:	/x / original / / revision #	approved:
Thailand	493-0271	Sericulture Settlement			

## CPI DESCRIPTION

## PRIOR ACTIONS:

CPI#	DATE	DESCRIPTION	RESP.
1.	July 76	First 300 members selected and trained in mulberry plantation techniques. Began first central mulberry plantation and farmers' mulberry plantation.	RTG
2.	August 76	Loan Agreement Signed.	RTG/USOM
3.	Oct. 76	Conditions Precedent to disbursement satisfied, and disbursement made.	RTG
4.	Nov. 76	Start building first 10 units of central rearing houses.	RTG
5.	Jan. 77	20 extension workers trained and equipped.	RTG
6.	Feb. 77	Two additional cooperatives operational.	RTG
7.	April 77	First group of selected farmers trained in worm rearing.	RTG
8.	May 77	First 10 central rearing houses completed. First 300 farmer's rearing houses built and equipped.	RTG
9.	July 77	Second 300 farmers selected and trained in mulberry plantation. Began second central mulberry plantation and farmer's plantation.	RTG
10.	Sept. 77	Supervisors training completed.	
11.	Jan. 78	First evaluation completed.	RTG/USOM
12.	Jan. 78	20 extension workers trained and equipped.	RTG

country:	project no:	project title:	date:	/x / original / / revision #	approd:
Thailand	493-0271	Sericulture Settlement			
<u>CPI</u>					
<u>CPI#</u>	<u>DATE</u>	<u>DESCRIPTION</u>	<u>RESP</u>		
13.	Feb. 78	Three additional cooperatives operational	RTG		
14.	April 78	First year cocoon produced and sold 50.4 MT.	RTG		
15.	April 78	Second group of selected farmers trained in worm rearing.	RTG		
16.	May 78	Second 300 farmer's rearing houses built and equipped.	RTG		
17.	July 78	Third 300 members selected and trained in mulberry plantation. Began third central mulberry plantation and farmer's plantation.	RTG		
18.	Jan. 79	Second evaluation completed.	RTG/ USOM		
19.	Jan. 79	10 extension workers trained and equipped.	RTG		
20.	April 79	Second year cocoon produced and sold 113.4 MT.	RTG		
21.	April 79	Third group of selected farmers trained in worm rearing.	RTG		
22.	May 79	Second 10 central rearing houses completed. Third 300 farmer's rearing houses built and equipped.	RTG		
23.	July 79	Fourth 300 members selected and trained in mulberry plantation. Began fourth central mulberry plantation and farmer's plantation.	RTG		

country: Thailand	project no: 493-0271	project title: Sericulture Settlement	date:	/x/ original / / revision #	approved:
----------------------	-------------------------	--	-------	--------------------------------	-----------

CPI NARRATIVE

<u>CPI#</u>	<u>DATE</u>	<u>DESCRIPTION</u>	<u>RESP.</u>
24.	Jan. 80	10 extension workers trained and equipped.	RTG
25.	April 80	Third year cocoon produced and sold - 176.4 MT	RTG
26.	April 80	Fourth group of selected farmers trained in worm rearing.	RTG
27.	May 80	Fourth 300 farmer's rearing houses built and equipped.	RTG
28.	July 80	Fifth 300 members selected and trained in mulberry plantation. Began fifth central mulberry plantation and farmer's plantation.	RTG
29.	Jan. 81	Third evaluation completed.	RTG/ USOM
30.	Jan. 81	10 extension workers trained and equipped.	RTG
31.	April 81	Fourth year cocoon produced and sold 239.4 MT	RTG
32.	April 81	Fifth group of selected farmers trained in worm rearing.	RTG
33.	May 81	Third and last 10 central rearing houses completed. Fifth 300 farmer's rearing houses built and equipped.	RTG
34.	April 82	Fifth year cocoon produced and sold - 302.4 MT.	RTG





AGENCY FOR INTERNATIONAL DEVELOPMENT  
UNITED STATES OPERATIONS MISSION TO THAILAND

CERTIFICATION PURSUANT TO SECTION 611(e) OF  
THE FOREIGN ASSISTANCE ACT OF 1961, AS AMENDED

I, Roger Ernst, the principal officer of the Agency for International Development in Thailand, having taken into account, among other things, the maintenance and utilization of projects in Thailand previously financed or assisted by the United States, do hereby certify that, in my judgment, Thailand has both the financial and human resources capability to effectively maintain and utilize the project described in the Sericulture/Settlements Project Paper dated March 26, 1976, to which this certificate is annexed.

s/ Roger Ernst

Roger Ernst  
Director

Date: 3/26/76

ที่. ท. ๓๓๖/ ๙๓๐/ ๙๓๐  
โดยส่งเรื่องถึงที่ปรึกษาแล้ว

โพเจกงานทำกิจการเศรษฐกิจการคลังรวมทวนสำหรับนอกไป

ANNEX L

กระทรวงการคลัง

๙ เมษายน

No. MF. 0302/ ๙๓๐

(ถ้าเนา)

Ministry of Finance, *(Signature)*  
Grand Palace (มณฑลราชดำเนิน) (ตึกกระทรวง)  
Bangkok, Thailand *(Signature)*  
ปลัดกระทรวง  
มหาดไทย

April ๙, 1976.

H.E. Charles S. Whitehouse,  
Ambassador Extraordinary and  
Plenipotentiary,  
Embassy of the United States of America,  
Bangkok, Thailand.

Dear Mr. Whitehouse,

Re: Sericulture/Settlements Project

We wish to refer to the discussions between the officials concerned of the Thai Government and USOM regarding the Sericulture/Settlements Project in which the Thai Government has been requested to submit an official request for a loan for financing partial costs of the Project from the United States Government through the Agency for International Development of Washington in order to obtain the Agency's authorization of the loan.

On behalf of the Thai Government, we hereby apply for a loan from the Agency for International Development of Washington under the United States Development Assistance Program for Thailand up to the principal amount of about \$2.6 million for financing partial costs of the Sericulture/Settlements Project.

We trust that our request will have your early and affirmative reply.

With best regards,

Yours sincerely,

*(Signature)*

(Amnuay Viravan)  
Under-Secretary of State  
for Finance

c.c. USOM

*(Signature)* วิชาญ  
สุนทรวิวัฒน์ วิชาญ  
*(Signature)* วิชาญ  
กรร

ANNEX M

L O A N   A U T H O R I Z A T I O N

Provided from: Food and Nutrition

(Thailand: Sericulture/Settlements)

Pursuant to the authority vested in me as Assistant Administrator, Bureau for Asia, Agency for International Development ("A.I.D."), by the Foreign Assistance Act of 1961, as amended, and the Delegations of Authority issued thereunder, I hereby authorize the establishment of a loan (the "Loan") pursuant to Part I, Chapter 1, Section 103, and Chapter 2, Title I, the Development Loan Fund, to the Government of Thailand ("Borrower") of not to exceed Two Million, Six Hundred Thousand Dollars (\$2,600,000) to finance the foreign exchange and certain local currency costs of goods and services necessary to assist the Borrower to raise the incomes of participating farm families by establishing the use of modern sericulture technology and supporting infrastructure in certain settlements in Northeast Thailand. The Loan shall be subject to the following terms and conditions:

1. Interest and Terms of Repayment

Borrower shall repay the Loan to AID in United States dollars within forty (40) years from the first disbursement under the Loan, including a grace period of not to exceed ten (10) years. Borrower shall pay to A.I.D. in United States dollars, on the disbursed amount of the Loan, interest at the rate of two percent (2%) per annum during the grace period, and three percent (3%) per annum thereafter.

2. Other Terms and Conditions

(a) Goods and services financed under the Loan shall have their source and origin in Thailand, and countries eligible under A.I.D. Geographic Code 941.

(b) A.I.D. and the Borrower shall agree to appropriately detailed plans concerning additional facilities for egg production; training of farmers, project supervisors, and extension workers; cooperative development; and provision of credit to cooperatives and participating farmers.

(c) The Loan shall be subject to such other terms and conditions as A.I.D. may deem advisable.

---

Assistant Administrator,  
Bureau for Asia

ACKNOWLEDGEMENTS

USOM wants to acknowledge the contributions, big and small, occasional or pervasive, direct or indirect of the many who have helped produce this project design.

Public Welfare Department (PWD)

Mr. Aram Suddhabindu	Director-General
Mr. Vichit Piyarom	Director, Hilltribe Welfare Div.
Mr. Thaveep Thaveepanich	Deputy Director, Land Settlement Development Div.
Mr. Somvong Vongvornsaeng	Asst. Deputy Director, Land Settlement Development Div.
Mr. Inson Chompoo	Second Grade Officer
Ms. Orachit Singkalvanich	Second Grade Agri. Economist
Mr. Somphong Yodpruttikarn	Second Grade Public Administration
Mr. Thongkham Bunsamrit	Superintendent, Ban Kruat Land Settlement, Buri Ram
Mr. Abhirak Lourvanij	Superintendent, Prasat Land Settlement, Surin
Mr. Narong Amonrak	Superintendent, Lam Dom Yai Land Settlement, Ubon Ratchathani
Mr. Nian Klattisan	Superintendent, Lam Dom Nai Land Resettlement, Ubon Ratchathani
Mr. Pathom Sirisombun	Superintendent, Mukdahan Land Settlement, Nakhon Phanom
Mr. Praphat Khrutsut	Superintendent, Phon Phisai Land Settlement, Nong Khai
Mr. Pracha Visuthyothin	Superintendent, Chiang Phin Land Settlement, Udon Thani
Mr. Bunloet Suriyawan	Superintendent, Ubonrat Dam Land Resettlement, Khon Kaen
Mr. Samrit Chantharat	Superintendent, Lam Pao Land Resettlement, Kalasin
Mr. Siriwat Suksin	Superintendent, Kuchinarai Land Settlement, Kalasin

Sericulture Division, DOA, MOAC

Mr. Chote Suvipagit	Director
Mr. Somchart Ratanathata	Chief of Korat Sericulture Research Center
Mr. Sompoj Akraphan	Assistant Chief
Ms. Phonthip Leelawong	DOA

Bank for Agriculture and Agricultural Cooperatives (BAAC)

Mr. Thamnong Singkalavanich	Manager (Former)
Mr. Chamlong Tothong	MANAGER
Dr. Virach Arromdee	Director, Long-Term Loan Dept.
Mr. Kasem Mairiang	Second Grade Economist
Mr. Thotsaphon Phrumadet	Second Grade Economist

National Economic and Social Development Board (NESDB)

Dr. Snoh Unakul	Secretary-General (Former)
Mr. Krit Sombatsiri	Secretary-General
Mr. Kosit Panpiemras	Deputy Secretary-General
Mr. Kanchit Kantangkul	First Grade Economist

Kasetsart University

Dr. Sopin Tongpan	Dean, Faculty of Economics and Business Administration
-------------------	--

Accelerated Rural Development (ARD)

Mr. Somkiat Phadungtham	Second Grade Agri. Economist
-------------------------	------------------------------

National Environment Board (NEB)

Dr. Thira Phantumwanich	Chief of Environmental Impact
Mr. Niwat Kitirattrakarn	Second Grade Economist

Textile Industry Div., Department of Industrial Promotion (DOIP)  
Ministry of Industry

Mr. Chane Boonsong	Chief
Mr. Sanit Arromdee	Assistant Chief
Mr. Ekachai Boonpakdee	Second Grade Economist
Mr. Chom Si-Amphai	DOIP

Bureau of the Budget (BOB)

Ms. Suchitt Srisa-an	First Grade Budget Analyst
----------------------	----------------------------

IFCT (Industrial Finance Corporation of Thailand)

Mr. Tos Phantumsen	Manager
Mr. Anan-Vichai Dhanasunthorn	Chief, Project Development Section

Private Sector

Mr. Banchong Cunvong	Chul Thai Silk Co., Phetchabun
Mr. Sombat Cunvongs	" " " " "
Ms. Suwanee Cunvongs	" " " " "
Mr. Surapan Shinawatra	Shinawatra Thai Silk
Mr. Supphong Mongkonkarn	Thai Silk Co., Ltd.
Ms. Somsamon Vanij-Vongse	" " " " "
Ms. Phayung Isarangkul	President of Thai Silk Association
Mr. Zykeman	Manager of Star of Siam

Government of Japan

Dr. Seinosuke Omura	Japanese Team Leader at Korat (Former)
Dr. Tashiro Sugiyama	Japanese Team Leader at Korat

Federal Republic of Germany

Mr. Franz Heim	German Team Leader at Lamtakhong
----------------	----------------------------------

Design Personnel

Dr. Harvey Ludwig	Environmentalist - SEATAC
Mr. William Klausner	Sociologist - Asia Foundation
Dr. John Mellor	Economist - Cornell University
Dr. Uma Lele	Economist - IBRD
Dr. John Eklund	Agri. Coop. Dev. Int'l

Robert R. Nathan Associates Design Team

Mr. W.J. Maddock	Management Analyst and Team Leader
Mr. O. Koropecky	Economist
Mr. F.J. Poats	Market Analyst
Dr. C.B.N. Rao	Sericulture Specialist

AID/W

Mr. John Tennant	Loan Officer
Mr. M.M. Pehl	EA/CCD
Mr. A.R. Love	A/CCD
Mr. Kenneth P. Brundage	Agricultural Economist, TAB
Dr. Fletcher E. Riggs	Agriculture Development Officer
Dr. Edgar C. Harrell	USOM/AD/P (Former)
Mr. Stanley E. Snyder	Soils Scientist
Ms. Violet E. Ponders	IDI

AID/W (Continued)

Mr. Phillip W. Ruppert  
Mr. John W. MacQueen  
Mr. George T. Cosgrove  
Mr. John F. Parmenter  
Mr. Alton F. Gamble

Regional Economic Dev. (RED)  
Development Officer, CDD  
USAID/Laos (TDY)  
USAID/Laos (TDY)  
USAID/Philippines (TDY)

USOM

Mr. Roger Ernst  
Mr. James E. Williams  
Mr. Robert A. Cahn  
Mr. Leonard D. Hagerty  
Mr. Edwin J. Clapp  
Mr. Robert Ellison  
Dr. R.W. Smail  
Mr. Scott W. Edmonds

Mr. Elroy C. Carlson  
Mr. Wayne H. Slotten  
Mr. Desmond O'Riordan  
Mr. Jon L. Sperling  
Mr. David Lundberg  
Dr. G.S. Hammond

Mr. Mintara Silawatshananai  
Mr. Kamol Chantanumate  
Mr. Opath Juta Sirivongse  
Ms. Thongkorn Hiranraks  
Ms. Angkana Harnphanich  
Mr. Saiphan Chitprasert

Director  
Deputy Director  
Program Officer  
Controller  
Regional Legal Advisor  
Asst. Program Officer  
Project Officer/TTMS, NEPP  
Project Officer/PP, DEIDS,  
Nutrition  
Project Officer/Lam Nam Oon  
Project Officer/Sericulture  
General Engineer (Former)  
Program Economist (Former)  
Project Officer/Seed  
Project Officer/TTMS, NEPP  
(Former)  
Senior Engineering Officer  
Admin. Specialist, O/PROG  
Asst. Project Officer/Narcotics  
Asst. Project Officer/Sericulture  
Secretary/SLOT  
Printing Production Specialist