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THAILAND SERICULTURE/SETTLEMENTS PROJECT

JOINT EVALUATION

FEBRUARY 24 - APRIL 4, 1981

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Sericulture Division of Department of Agriculture
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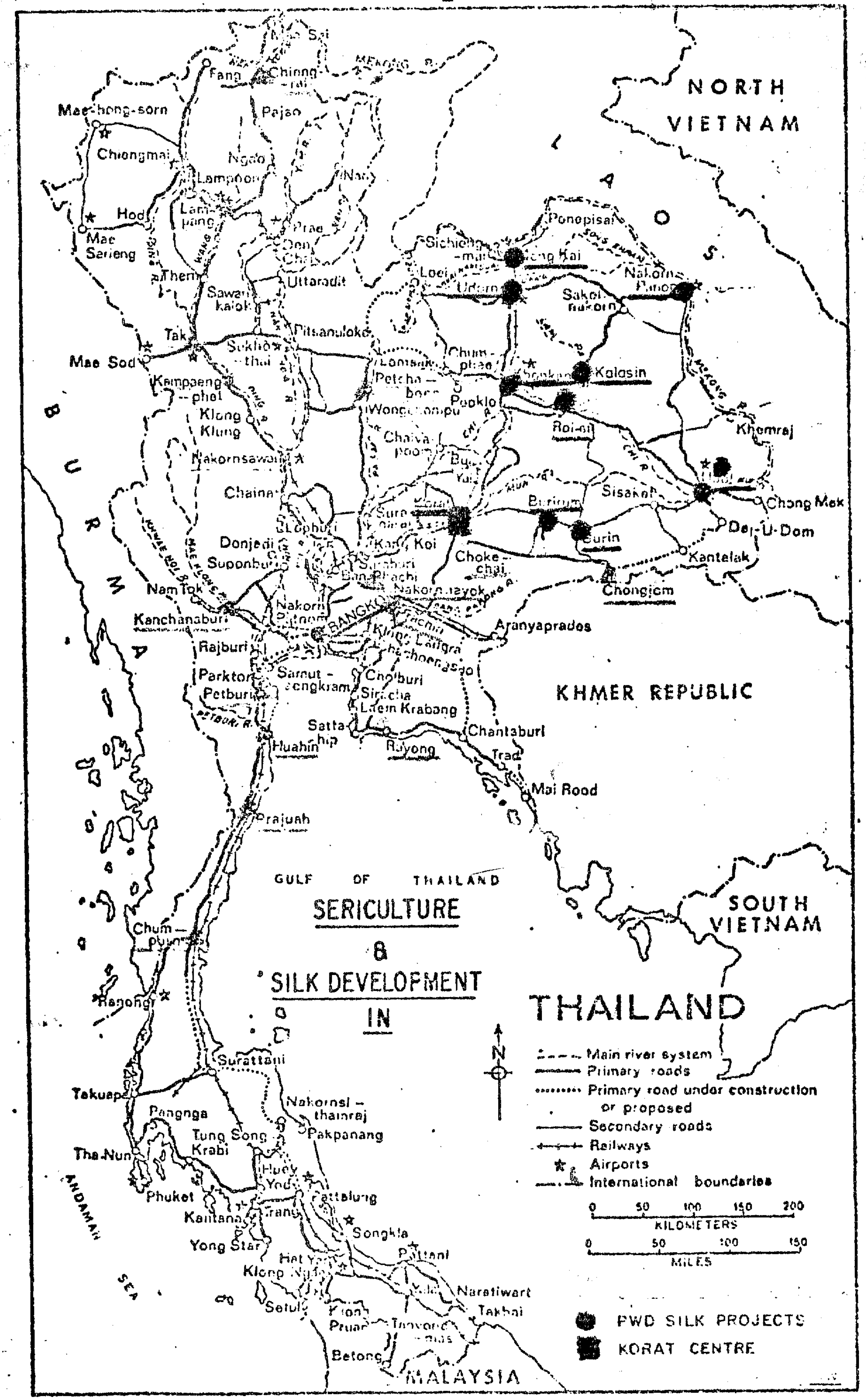
SERICULTURE
&
SILK DEVELOPMENT
IN
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BURMA
KHMER REPUBLIC
SOUTH VIETNAM
MALAYSIA
GULF OF THAILAND
ANDAMAN SEA
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KORAT CENTRE

ACKNOWLEDGEMENT

The Evaluation Team would like to express appreciation to the many people who have so kindly assisted in making this an interesting assignment. We have a list of all of our contacts at the end of this Report, but would like to express a special note of appreciation for the help and guidance of the following:

1. Mr. Chalong Savetavong, Director of Land Settlement Division, PWD and his staff members, especially Ms. Panee Sribantao who accompanied us on the field trips to 5 of the 10 settlements and provided very useful information and hospitalities to the Team.

2. Mr. Chamlong Tohthong, General Manager, Dr. Virach Arromdee, Deputy General Manager, Bank for Agriculture and Agricultural Cooperatives (BAAC) for their valuable contributions on the credit aspects of the Project and his two representatives, Mr. Panomsak Thyatham and Mr. Sompoch Moomuensri who accompanied the Team on the field trips and provided useful information.

3. Mr. Chote Suvipakit, Director of Sericulture Division, Mr. Sompoti Akapanthu, Director of Korat Sericulture Research and Training Centre, MOAC and Mr. Y. Shiina, who accompanied some members of the Team on their field trips. In addition the Team is appreciative of the useful technical information provided by MOAC field staff and wishes to place on record its appreciation to Mr. Ampol Buranasilpin, Legal Counsellor for the contribution of his voluntary and effective service rendered in translation of Japanese/Thai/English written and verbal communication.

4. Mr. Donald D. Cohen, Director and Mr. Robert S. Queener, Assistant Director of the USAID Mission in Thailand and the members of their staff particularly Messrs. Bathrick, Odell, Williamson and Coughlin, all of whom provided the Team with their experience, knowledge and clear thoughts regarding the Project which were very useful to the Evaluation Team.

The Evaluation Team is very appreciative to Mr. Bathrick for having the foresight of assigning Mrs. Thongkorn Hiranraks to work with the Team, prepare its program and collect data useful to the Team. The Team benefited much from Mrs. Thongkorn's most successful effort to make the Team's work effective through her dedication, clear thinking and effective conclusions on many subjects relating to the Project. Her knowledge of the Project was extremely useful to the Evaluation Team. In addition she helped to make appointments, arrange visits for the Evaluation Team to visit 5 of the 10 settlements financed by AID. She located information, prepared travel and other schedules most efficiently and with personel discomfort beyond the call of duty in many instances. The Team wishes to place on record its appreciation to Mrs. Prabha Devahastin Na Ayuthaya and other USAID Secretaries for typing the Report and being helpful in many ways.

I. EXECUTIVE SUMMARY

The Thailand Sericulture/Settlements Project (AID Loan 493-T-018) Agreement between the Royal Thai Government (RTG) and USAID was signed on September 8, 1976 for US$2.6 Millions to be equally divided between the Public Welfare Department (PWD) and the Bank of Agriculture and Agricultural Cooperatives (BAAC). PWD is the implementing agency for the extension aspects of recruiting, training and counselling silk producers. BAAC provides the credit through local branch banks to project participants. Technical information, training, hybrid silkworm, eggs and cocoon marketing services are provided by the Sericulture Division of the Department of Agriculture. Farmer cooperatives were to provide:

a) production inputs

b) short term credit

c) markets and equipment rental

d) staff to train PWD supervisors and extension agents on cocoon marketing, and

e) managers to provide on the job training to settlers.

(These farmers cooperatives were not established). The goal and purpose of the Project, to be completed in 5 years, was to increase the annual net cash farm income 1/ of 1,500 families in ten settlements in North Eastern Thailand through establishment of modern sericulture technologies in these settlements. (The number of project settlements was increased from 10 settlements to 13 settlements in 1980. However, this evaluation will cover only 10 settlements due to the absence of activities in the additional 3 settlements). The original plan stipulated that: (1) Sericulture extension workers operating under PWD will be primarily concerned with silkworm rearing technology and (2) Extension agents under Department of Agricultural Extension would assist participating farmers with their individual mulberry plantations. However, the Project, to date, has not yet requested for such assistance.

The purpose of this evaluation is to identify whether the Project has achieved its goal and purpose and, if not, to indicate specific conclusions and recommendations directed towards:

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1 Each farm family should earn about $200 net cash income per year from this Project. After their loans are paid off (in about 9 years) farmer cash incomes should increase to about $290 per year, from an average of $430 to $720.

-- project managers and specific implementing agencies to be used in implementing the Project, and

-- providing information to be used by the RTG, USAID and project managers to resolve the problems to achieve the project objectives.

A. Major Findings

1. At the design stage, the Project called for many plans from the implementing agencies concerned. These include cooperative development plan, plans for silkworms egg production, training of farmers, supervisors and extension workers, and plan for credit to the cooperatives and participating farmers. However, most of these plans were not implementable. The Evaluation Team also found that:

a. The project planners were overoptimistic in their expectations with respect to availability of staff; coordination between agencies; capacity to adequately train Supervisors and Extension Agents, capacity to supply inputs; availability of surplus labor requirements and ability to recruit able settlers to meet production targets, mulberry and cocoon production. Schedules prepared at appraisal - which was targets rather than best estimates of what were likely to happen - did not allow sufficient time for such essential activities as:

i) need for testing (and if not possible redesigning the Project) reliance of the project design on the use of cooperatives as a vehicle for managing cocoon production and marketing. (Reliance on this without testing proved to be misplaced. Inclusion of this element in the Project appears to have been lightly treated despite the fact that it required a large investment of financial and personnel resources which were neither provided for nor made available when the cooperative component was dropped from the Project).

ii) adequate training for Supervisors and Extension Agents so as to ably demonstrate and promote silkworm rearing including project management to

-- attract potential applicants and able settlers and

-- adequately screen applicants all of which involves several parties in the process of negotiation and often take considerable time.

iii. ensuring adequate supply of hatchable silkworm eggs requirements of farmers,

iv) ensuring adequate supply of mulberry leaves to silkworm rearers.

b. Absence of effective coordination among the implementing agencies. Planners failed to take account of the local environment - institutional political and cultural. These have directly affected the manner and speed with which the Project has been implemented. Existence of administrative weakness have consequently inevitably affected project implementation resulting in management problems surfacing as a major source of delay in this Evaluation.

c. Lack of experience in improved silk rearing business on the part of project personnel because of inadequate training and staffing. One could not expect target groups to accept innovation imposed upon them by a staff in whom they have little confidence. Briefly the inadequacy of extension services, combined with their inability to communicate effectively with less successful settlers, aggrevated the problems. In addition, the inadequate supply and distribution to farmers of good quality eggs, credit for input, etc. contributed to a further lack of communication between the project farmers and the agents.

d. Overoptimistic expectation on the part of the planners of the social and institutional constraints to effective project implementation. This was casually argued away and crisis periods, have resulted directly from lack of consideration of social and political constraints.

e. Credit recovery from settlers in the Sericulture Project has fallen significantly in the past year. The Evaluation Team feels that PWD should not only facilitate borrowing for settlers but also repayment of credit to the BAAC. Every effort also be made by the PWD to assist sericulture settlers who no longer participate in this project because of problems encountered in mulberry production and silkworm rearing. Such settlers should be assisted in finding more suitable alternative employment (which would enable them to repay their debts to BAAC which were incurred due to sericulture production) and enable these settlers to have a higher level of income. A standing issue on credit application relates to the issue of a form entitled "Certificate of Technical Feasibility in Implementing of the Sericulture Settlement Project" which was prepared by BAAC. (See Appendix Y). A recent meeting (March 19, 1981) between BAAC, PWD, MOAC and USAID agreed that the Sericulture Division officially prepare and submit a proposal to BAAC that would be in line with what was suggested at this meeting. This proposal, which essentially, indicates that the Sericulture Division and PWD settlement staff jointly sign the form with the PWD staff providing their evaluation of Part A of the form and sericulture staff providing their assessment for numbers of 2, 3 and 4 of Part B of the form. The Evaluation Team supports this proposal and recommends that BAAC favorably consider expediting the proposal when received from the Sericulture Division. Any delay in implementing this proposal is bound to cause hardship to a number of settlers that have applied for and been recommended for credit. Furthermore this could adversely affect future efforts to recruit able settlers for the Sericulture/Settlements Project.

2. The Evaluation Team concludes that many of the project tasks have proved more difficult to accomplish than expected and will, with remedial measures proposed in other parts of this Report, take longer to accomplish. These start-up and other delays have led to a 3 year delay in implementation. Consequently the Project will be unable to achieve its purpose and goal within the specified 5 year period. It can however hope to achieve the goals and purposes specified if the corrective measures proposed in this Report are implemented. The Project while not yet achieving the targets originally planned, can meet the basic objective of increasing the income of poor people in the 10 settlement areas. The average net cash income of silkworm rearing settlers in the 10 settlements in 1978 to 1980 were Ø3,680; 6,124; and 6,382 respectively (see Appendix R.)

3. The investment in the Project, however, has resulted in the establishment of a very basic infrastructure. Some farmers have taken the first critical step required to move from traditional farming to the management of modern inputs.

4. The Project could successful if improvements in the following are undertaken:

a) management and administration (including adequate staffing and effective project implementation review and monitoring and evaluation at the settlement level as well);

b) training;

c) credit and input supply and

d) technical aspects of mulberry production, silkworm rearing, cultivation practices and demonstration and promotion.

5. Furthermore, initiation of studies should be conducted on the following:

a) measures to ensure the supply of higher, hatchable and good silkworm eggs and

b) the role for the private sector or other alternative participation in sericulture marketing and management and how such participation could help or hinder the Project.

The recommendation emphasize more effective planning and implementation to ensure the necessary input supplies and provision of technical expertise and appropriate training including the recruitment of more qualified participants. The recommendations especially relate to:

- improved training of supervisors and extension workers,
- improved organization and management for better coordination,
- assured credit availability for able settlers,
- technical problems in silkworm rearing,
- socio-economics, and
- further studies on silkworm eggs and sericulture marketing and management.

6. The Evaluation Team recommends that the Thailand Sericulture/Settlements Project be extended for an additional 3 years provided that a satisfactory schedule for implementing the above recommendations is presented within the next 3 months by the Project Sub-Executive Committee comprising of the PWD, the MOAC, the BAAC and the Project Officer of USAID.

B. Project Identification Data Sheet

1. Country: Thailand

2. Bilateral Project Title: Thailand Sericulture/ Settlements Project

3. Bilateral Project Number: 493-0271

4. Program Implementation:

a. First Project Agreement: FY 76

b. Final Obligation : Ongoing (FY 81)

c. Final Input Delivery : Ongoing (FY 81)

5. Program Finding:

   a. AID Bilateral Funding: $2,600,000 (Loan)
      $100,000 (Grant)

   b. Other Donors : None

   c. Host Country Counterpart Funds: $3,400,000

6. Mode of Implementation:

   a. Loan Agreement between USAID/Thailand and the Royal Thai Government signed on September 8, 1976.

   b. Letter of Agreement

   c. Project Implementation Letter No. 1-17.

7. Previous Evaluations and Reviews:

   a. Project Identification Document: December 4, 1974

   b. Project Review Paper: January 6, 1975

   c. Evaluation and Design of Sericulture Project in Public Welfare Land Settlements by Robert R. Nathan Associates, INC. Team - November, 1975

   d. Project Paper - March 26, 1976

   e. Socio-Economic Base Line Data - 1975, 1976.

   f. Report on Evaluation of USAID Sericulture Project 1977

   g. Thailand Sericulture/Settlements Project Joint Mid-Term Evaluation - 1979

8. Responsible Mission Officials:

   a. Mission Directors:

      - Mr. Charles L. Gladson, 1976/78
      - Mr. Donald D. Cohen, 1978-present

b. Responsible Project Officers:

- Mr. Wayne H. Slotten, 1976-80

- Ms. Thongkorn Hiranraks, 1980-present

9. Host Country Exchange Rates:

a. Name of Currency: Baht

b. Exchange Rate at Time of Project:
฿20.00 = $1.

II. CONCLUSIONS AND RECOMMENDATIONS

The Evaluation Team concludes and recommends the following:

A. To redefine the project goals and purposes for increasing the annual/net cash (from modern sericulture production) farm income of only 1,000 poor farm families instead of 1,500 poor families in 10 Northeast Settlements over a period of 8 years instead of 5 years (i.e., from 1977 to 1984 instead of 1977 to 1981).

B. Management and Administration

a. Improved Training

1. That Supervisors and Extension Agents be given intensified refresher courses and that they should attend at least 2 such courses every year. Supervisors and Extension Agents should be properly trained so that they would have the confidence of settlers. Such refresher courses should be given to these officials as often as possible because the Project calls for,

i. introducing a very poor element of population to a sericulture system with a high technology component and

ii. the technical requirements to be developed requires a sophisticated management system.

2. Training be provided as soon as possible to the entire settler family during the dry season month when settlers are respectively free.

b. Organization and Management

1. That each settlement be provided with a permanent Sericulture Officer 1/ to advise settlers and train supervisors and extension agents regarding all aspects of silkworm rearing and mulberry production.

1/ This will require the immediate appointment of 10 trained Sericulturists which Sericulture Division will have to provide such staff from its research station. Budgetary and other implications regarding this should be settled speedily.

2. A Project Implementation Review Team comprising of PWD Supervisors, Sericulturists and BAAC Representatives be appointed at every project site and meet at least once a month to solve problems and issues including helping the less successful silkworm rearing settlers without being paternatistic about their approach.

3. That this Project Implementation Review Group be formed in each settlement to review issues and problems confronted in silkworm rearing and mulberry production. In the event that the group is unable to solve the problems they should immediately submit the problems together with suggested solutions, to the Project Sub-Executive Committee in Bangkok and further submit to the Executive Committee which should have a meeting at least twice a year.

4. That an Inspection Team comprising of Representatives of BAAC, Sericulture Division and PWD should be appointed to visit the 10 Settlements on a continuous basis (a flying squad) to monitor activities and progress of the Project to ensure achievement of the objectives of the Project in each Settlement. This will involve releasing from each of the agencies concerned a senior officer who will be able to command the respect of officials in the settlement in order to ably monitor the Project.

5. The Evaluation Team further recommends that a person of high standing (not associated with the agencies concerned) be appointed to chair this Inspection Group. Such a person should be familiar with the Project and preferably be associated with an autonomous agency.

6. That each settlement have regular demonstrations to promote the merit of the sophisticated procedure to increase income levels significantly through expanded silk production.

Effective demonstration and promotion will enable the Project to attract and recruit able settlers for the Project.

7. That the Superintendents of Settlements must support and ensure that the supervisors and extension agents collaborate with settlers to solve their problems including supply of information regarding price setting basis for cocoons.

8. That provision be made for training of more supervisors and extension agents to provide for at least 20% turnovers of project personnel. Currently 3 settlements have no full time supervisors. An interim solution may possibly include provision for the Sericulture Division to provide service of the Supervisor while training is being provided to a permanent staff member of PWD. The borrowing time of the PWD should not exceed two months.

C. Financing and Credit

1. That timely short term credit and input requirements be assured to settlers producing mulberry and rearing silkworms.

2. That the Public Welfare Department expedite decision on its proposal to provide sericulture producing settlers obtain short term credit and input requirements through establishment of a revolving fund.

3. That PWD intensify its efforts to facilitate able farmers to obtain credit from BAAC by more careful selection and screening of applicants. Furthermore PWD should intensify efforts to facilitate and assist settlers (who have borrowed capital from BAAC or PWD's recommendations) to repay their credit to BAAC.

D. Technical

1. That an annual review takes place between the Settlements and the Sericulture Division to ensure timely availability of adequate supply of good quality hatchable eggs required by silk rearing producers.

2. That PWD ensure adequate supply of mulberry leaves, on a payment basis, to silk worm rearers whose mulberry production has failed. PWD is currently considering a proposal to supply mulberry leaves to silk worm rearers, at a charge, by expanding its central mulberry plots in these settlements. The Evaluation Team supports this proposal and recommends that this proposal be implemented as soon as possible provided that the demand for leaves and location of the mulberry plot were taken into account.

3. That PWD staff, with assistance from staff of Sericulture Division, ensure that applicants recommended for participation in the Project have at least 4 rai of lands with soils suitable for mulberry production.

E. Other Recommendations

1. The important selection criteria for applicants to produce silkworm rearing be confined to families that have at least two surplus members (if capital is not available for hiring extra labor force) available in each household selected for silkworm rearing and mulberry production. Persons selected for training should be confined to either the head of the household, his or her spouse or other reliable and responsible member of the household as opposed to children being sent for training.

   That the target group for silkworm rearing should be the family and not women since women in families are not necessarily underemployed as assumed.

2. Briefly, the recommendations or the Evaluation Team focus on areas of intensification of training and staffing; forward planning of production including project implementation reviews and monitoring. The Evaluation Team also recommends undertaking the following two additional indepth studies in order to obtain recommendations on the role for private sector or other laternative participation:

   -- supply of silkworm eggs, and

   -- sericulture marketing and management.

Both of these studies should indicate how such participation could help or hinder such projects.

3. The Evaluation Team concludes that investment in the Sericulture Project has resulted in the establishment of a very basic infrastructure - which after about 4 years of problems associated with poor and inadequate supply of hatchable eggs; inadequate supply of mulberry leaves, inadequate training of supervisory and extension staff; difficulties with recruitment and participation of settlers; poor recovery of credit; can be made capable of maintaining satisfactory production of cocoons, as a supplementory source of income in ten settlements included in the Project if the recommendations stated above are implemented. Some farmers, in the opinion of the Team, have taken the first critical step required to move from traditional farming to the management of modern inputs - improved farming methods - etc.

4. Success of improved sericulture production and the development of institutional facilities (now just beginning to deliver effective information, training assistance including credit and other requirements of commercial farming) has established the potential of the Project, provided the recommended measures are implemented, to rapidly accelerate production, both in volume and quality, into higher value production.

5. The optimum potential of the NE Region in Sericulture cannot however be achieved in the near term (within 3 years) unless a concentrated farmer intensive assistance effort is undertaken, aimed at correcting the technical human and management resources deficiency of the settlers and the organizations dealing with them. This assistance would serve to:

   i. Speed up the growth rate;

   ii. Increase the degree of capacity utilization, and

   iii. Improve the efficiency of resource allocation.

6. The Evaluation Team suggests that for cocoon marketing, the farmers should be paid about 50% of the value of the cocoon sold on delivery to the settlement. The remainder should be settled after the cocoon had been appropriately graded. This should however not exceed 20 days. Funds for such initial payment should be provided from the Sericulture Division's revolving funds.

III. EVALUATION OF THE USAID/THAILAND SERICULTURE/SETTLEMENTS PROJECT

A. Introduction

The Sericulture/Settlements Project was approved in AID/Washington on June 29, 1976 and the Loan Agreement with the Royal Thai Government was signed on September 8, 1976. The Loan Agreement provided a loan of $2.6 million with the standard 40 year repayment plan for the RTG. Of the loan funds, $1.3 million was to be provided to the BAAC with BAAC providing a matching fund, to be loaned to the project beneficiaries. The remaining $1.3 million was to be utilized by PWD to develop facilities at the land settlements, farmer training and to improve roads in the settlement areas. Construction of most the physical facilities at the settlements together with road construction has been largely completed. Grant funds in the amount 100 thousand dollars were to be provided for third country training, baseline studies conducted by Kasetsart University and the evaluations. Most of this provision has been utilized.

The Evaluation Team 1/ composed of Dr. Chamnien Boonma, Agricultural Economist at Kasetsart University, Dr. Chavivun Prachuabmoh, Anthropoligist at Thammasart University, Mr. Masamichi Takatori, Silkworm Rearing Expert (Retired) of Japanese Ministry of Agriculture and Forestry and Mr. Kyaw Myint (on leave from the World Bank Group) who served as the Team Leader. Dr. Chamnien and Dr. Chavivan were assigned to duty a week period to the arrival of the Team Leader in order to provide the information pertaining to the economic and social analysis. The Team Leader arrived March 2, followed by Mr. Takatori who arrived March 11. From March 3 through March 18 field visits were made separately. The Team was split into 3 groups (Economic and Social and Technical) with some breaks for discussion among the team members. The Team visited 5 settlements and discussions were held with settlers, settlement project staff and representative of the different agencies of the RTG and USAID staff. A review of the evaluation and recommendations was scheduled to be conducted by RTG and USAID officials at USAID, Bangkok, April 3, 1981. This did not occur as the USAID Mission was closed. However, the Evaluation Team has discussed its conclusions and recommendations with senior representatives of PWD, BAAC and Sericulture Division who agreed with the findings and recommendations of the Evaluation Team.

1/ The Pathologist was unable to join the Team. The Report of the Team will therefore be subject to the findings of the Pathologist who is expected to be in Thailand in June 1981.

This paper is organized to cover the items listed in the scope of work to determine the status of the Project at the time of this evaluation. We have taken some editorial license in restructuring the scope of work to avoid repetition and, we hope, to make the Report more readable.

B. Goals and Purposes

The stated goal of the Project is to "increase the annual net cash farm income of 1,500 families 1/ in 10 Northeastern settlements by an average of 50% per family in 5 years". It was assumed that: the RTG would continue to stress improvements in rural living standards as a national priority; population increases among the poor would not be greater than family income increases; and the project benefits would be spread among the 1,500 farm families.

The project purpose as stated is to "establish modern sericulture technology among 1,500 farm families in 10 settlements in the Northeastern Thailand". In achieving this purpose, it was assumed that: the target families would be willing to accept the risks involved in adopting modern sericulture technology; there would be a reasonable demand for silk warp yarn; adequate and input supplies and adequately trained staff would be available to manage the Project and that short term credit would also be available as and when needed.

C. Achievements

The goal of the Project to increase net annual cash farm income of 1,500 family in 10 NE settlement by an average of 50% in 5 years has not been achieved. Only 531 settlers are effectively participating the Project as against a planned figures of 1,200 family in the 4 year period of the Project. Reason for this failure can be attributed to

1) inability to recruit settlers

2) shortage and non-availability of input supplies

3) shortage of adequate trained staff 2/ to:

1/ From ฿8,600 ($430) in 1977 to ฿14,400 ($720) in 1981 of which about ฿11,000 was to be derived from silkworm production.

2/ There are at present only 7 supervisors and 27 extension agents in the 10 settlements - with varying degrees and various levels of training.

a. demonstrate and promote profitability of silk worm rearing;

b. recruit and train able settlers;

c. monitor progress of settlers in establish mulberry plots; construction of rearing houses and securing of adequate amounts and quality of good hatchable silkworm egg;

d. supervise rearing of young silk worm rearing houses;

e. provide on-farm follow-up services during the rearing cycle and;

f. make timely payments and collect fresh cocoon for shipment to Korat;

4) multi-agency character of Project which made coordination difficult and resulted in management problems affecting training, credit and extension;

5) careless selection of settlers (some were not qualified for silk rearing production because of location unsuitability of land for use in mulberry production and a few lacked spare cash necessary for short term credit requirements.

The Project consequently suffered a 3 years start-up delay essentially because:

i. Project planners were overoptimistic in their expectations with respect to availability of staff; coordination between agencies; capacity to adequately train Supervisors and Extension Agents, capacity to supply inputs; availability of surplus labor requirements and ability to recruit able settlers to meet production targets, mulberry and cocoon production. Schedules prepared at appraisal - which was targets rather than best estimates of what was likely to happen - and did not allow sufficient time for such essentially activities as:

a) Testing (and if not possible redesigning the Project) reliance of the project design on the use of cooperatives as a vehicle for managing cocoon production and marketing. (Reliance on this without testing proved to be misplaced. Inclusion of this element in the Project appears to have been lightly treated despite the fact that it required a large investment of financial and personnel resources which were neither provided for nor made available when the cooperative component was dropped from the Project).

b) Provisions of adequate training for Supervisors and Extension Agents. They were unable to demonstrate and promote silkworm rearing including project management to:

-- attract potential applicants and able settlers and

-- adequately screen applicants all of which involves several parties in the process of negotiation and often take considerable time.

c) Adequate supply of hatchable silkworm eggs requirements of farmers.

d) Adequate supply of mulberry leaves of silkworm rearers.

ii. Effective coordination was absent among the implementing agencies. Planners failed to take account of the local environment - institutional political and cultural. These have directly affected the manner and speed with which the Project has been implemented. Existence of administrative weakness have consequently inevitably affected project implementation resulting in management problems surfacing as a major source of delay in this evaluation.

iii. Lack of experience in the improved silk rearing business on the part of project personnel due to inadequate training and staffing. One could not

expect target groups to accept innovation imposed upon them by a staff in whom they have little confidence. Briefly the inadequacy of extension services, combined with their inability to communicate effectively with less successful settlers, aggrevated the problems. In addition, the inadequate supply and distribution to farmers of good quality eggs, credit for input, etc., all contributed to a further lack of communication between the project farmers and the agents.

iv. Over-optimistic expectation on the part of the planners of the social and institutional constraints to effective project implementation. This was casually argued away and crisis periods, have resulted directly from lack of consideration of social and political constraints.

Credit recovery from settlers in the Sericulture Project has also suffered having fallen significantly in the past year. The Evaluation Team feels that PWD should not only facilitate borrowing form, but also repayment of credit to the BAAC. Every effort also be made by the PWD to assist sericulture settlers who no longer participate in this Project because of problems encountered in mulberry production and silkworm rearing. Such settlers should be assisted in finding more suitable attentive employment (which would enable them to repay their debts to BAAC which were incurred due to sericulture production) and enable these settlers to have a higher level of income. A standing issue on credit application relates to the issue of a form entitled "Certificate of Technical Feasibility in Implementing of the Sericulture Settlement Project" which was prepared by BAAC.1/ A recent meeting (March 19, 1981) between BAAC, PWD, MOAC and USAID agreed that the Sericulture Division officially prepare and submit a proposal to BAAC that would be in line with what was suggested at this meeting. This proposal, which essentially, indicates that the Sericulture Division and PWD Settlement staff jointly sign the form with the PWD staff providing their evaluation of Part A of the form and sericulture staff providing their assessment for numbers of 2, 3, and 4 of Part B of the form. The Evaluation Team supports this proposal and recommends that BAAC favorably consider expediting the proposal when received from the Sericulture Division. Any delay in implementing this proposal is bound to cause hardship to a number of settlers that have applied and been recommended for credit. Furthermore this could adversely affect future efforts to recruit able settlers for the Sericulture/Settlements Project.

1/ See Appensix Y

The Evaluation Team concludes that many of the project tasks have proved more difficult to accomplish than expected and will, with remedial measures proposed in other parts of this Report, take longer to accomplish. These start-up and other delays have led to a 3 year delay in implementation. Consequently the Project will be unable to achieve its purpose and goal within the specified 5 year period. It can however hope to achieve the goals and purposes specified if the corrective measures proposed in this Report are implemented. The Project, while not yet achieving the targets originally planned, can meet the basic objective of increasing the income of poor, though not necessary the poorest, people in the 10 settlement areas. The increase in average net cash income of silkworm rearing settlers in the 10 settlements from 1978 to 1980 were ฿3,680, 6,124, and 6,382 respectively. (See Appendix R).

The investment in the Project, however, has resulted in the establishment of a very basic infrastructure. Some farmers have taken the first critical step required to move from traditional farming to the management of modern inputs.

The Project could be successful if improvements in the following areas are undertaken:

a) management and administration (including adequate staffing and effective project implementation review and monitoring and evaluation at the settlement level as well);

b) training;

c) credit and input supply and

d) technical aspects of mulberry production, silk worm rearing, cultivation practices and demonstration and promotion.

Furthermore, the Evaluation Team feels that need exists for initiating studies on the following:

a) the supply of higher hatchable and good silk worm eggs and,

b) the role for the private sector or other alternative participation in, both, egg production and sericulture marketing and management and how such participation could help or hinder the Project.

D. Implementation Arrangements

The Project involves three main units or implementing agencies - PWD, MOAC and BAAC. Each was assigned tasks of carrying out the project operations which is centred around the following activities.

1. Public Welfare Department was to be the projects principle organizer, planner, manager, coordinator and monitor. It was to:

a) establish central mulberry plantations (100 rai/settlement);

b) contract for the construction of, and equip central young worm rearing houses (3 per settlement, each with a capacity for about 60 families);

c) contract for the execution of the road improvement program,

d) provide overall administration for the Project and for the settlement areas providing for coordinating services and facilities in education, health, roads,

e) provide extension service in sericulture technology to participating families (a ratio of extension worker 1:20 families)

f) select farmers for participation in the Project and co-ops;

g) facilitate farmers' borrowing from, and repayment to, the BAAC,

h) provide management for cooperatives in initial years and;

i) coordinate and monitor the inputs of all other agencies and organizations.

Comment: The Evaluation Team found that while PWD had implemented parts of (a) to (i) it has not been as effective in satisfactorily carrying out the following:

-- selecting able settlers for participation in the Project;

-- provideing satisfactory and adequate extension services in sericulture technology for participating families and;

-- providing the participation of cooperatives;

-- facilitating repayment of credit to BAAC.

The Project plans for establishment of cooperatives in each of the settlements did not materialize. Provision was also made for undertaking some of the roles assigned the cooperatives such as provision of short term credit, purchase of silkworm eggs from Korat and provision ov cocoon dryers, etc.

2. The Sericulture Division of the Ministry of Agriculture and Cooperatives (MOAC), the basic source of technical experience and expertise in silk production for the Project, was to:

a) Provide hybrid silkworm eggs for the Project, initially at Korat and after 1978 at four sub-centers.

b) Conduct research related to improving sericulture practice, including both production of mulberry and the handling of silkworms and cocoons.

c) Conduct research aimed at genetic improvement and adaptation for Thailand of mulberry and silk worms.

d) Train PWD extension agents and supervisors in sericulture technology and practice at the Korat Sericulture Center.

e) Train participating farmers at the Surin Farmer Training Center which was to be expanded to accomodate project requirements.

f) Purchase up to 15 metric tons per year of cocoons from participating farmers.

The Sericulture Division implemented 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 Evaluation Team found that the Sericulture Division had difficulty in meetings the requirements of good hatchable quality eggs required by the settlements and had problems in purchasing silk cocoons. The Team examined the remedies proposed and undertaken and feel that the Division is now equipped and capable of meeting the requirements of eggs for the settlements. However need still exists for

i) continuing research for finding better quality and improved variatives of eggs;

ii) monitoring the matching of supply and demand of eggs. Schedules should be prepared one year in advance and the settlements should notify the Sericulture Division of any changes within 2 weeks of the beginning of the rearing cycle;

iii) quality and quantity control by the Sericulture Division to ensure that these meet standard set;

iv) incubation room and cooling store rooms should begin commencing operations immediately to be in time for the 1981 rearing season;

v) training: additional training for PWD staff is needed badly. The Team felt that farmers have not been sufficiently instructed to implement the project affectively because of poor training of supervisors and extension agent. Many required more training in every level of administration. Extension and other techniques (which is so badly required to make this Project achieve its objective of benefiting sericulture producing settlers) should be included in the curriculum for additional refresher courses.

vi) Sericulture staff should be stationed permanently in the settlement during the rearing cycle (i.e. for 8 months) for the next 3 years. The main responsibility of such staff will be to train extension workers in the settlement project in order to ensure provision of the appropriate technology to the farmers. Day to day problem

pertaining to mulberry production and silk worm rearing techniques should be solved immediately by the sericulture staff. Demonstration plots should be planned and directed by participating farmers and extension workers in every settlements. Criteria for selection should include the location of the farmers interested in successful silk rearing. Technical leadership training should be provided to the farmers so that trained farmers will be able to disseminate their knowledge to other farmers in the future.

vii) Courses of trainings should not be fixed. It should be changed and modified according to changing situations in rearing silkworms taking into account new technology available and the problems confronting different settlements.

viii) In the long term silk worm egg supply might need to provided by the private sector in the future when demand begins to exceed the project requirements i.e. by 1984. Therefore, a study should be undertaken to study the role for private sector participation in sericulture marketing and management and how this might help or hinder the Project.

Provision should be made for sending two officials to Japan to study procedures and other requirement, including the preparation of terms of reference for such studies.

ix) Awards should be provided annually to farmers producing the largest quantity and best quality of cocoons. Similar awards should be given to best mulberry producers.

x) A text book on "Silk Worm Rearing Technique in the Tropics", which was written by Dr. Seinosuke Omura should be translated to Thai and be used as a major reference for the staff involved in the Sericulture Project. It should be written in very simple language and be summarized and distributed to the Sericulture Project staff and farmers.

3. Bank for Agriculture and Agricultural Cooperatives (BAAC) has Responsibilities for:

a. Making loans for the full amount of farmers costs for constructing and equipping the old worm rearing house, establishing his mulberry plantation and for the initial year's supply of cost of eggs (totaling about ฿25,000). The intention was to help poor farmers to afford participation in the Project.

b. Having loans repaid at a rate of 40% of farmers' gross cocoon sales. There have been problems on loan repayment and the lesson learned is that PWD staff should be more prudent and careful in selection of settlers and should, in the future, make every endeavour to facilitate and assist BAAC staff in recovery of credit from settlers in default. PWD staff should also assist such settlers to find suitable employment within the settlements. This is necessary for social reasons plus the fact that PWD will otherwise withhold granting such settlers title to their land since they have debts outstanding to BAAC.

c. Making loans, barring unusual circumstances, to all farmers acceptable to PWD for participation in the Project. Therefore, PWD should pay particular attention and care to find able settlers to participate in the Project.

d. Approval of loans and has delegated to the local BAAC branch manager much authority. The Team feels that BAAC meets project needs for asking useful questions that result in better selection of settlers for the Sericulture Project. When the BAAC loan becomes due, PWD should make every endeavour to ensure that repayment be made.

Lesson to be Learned From All of the Above Is That:

i. The design of this Project should stipulate that it benefits the poor, although not necessary the poorest, settlers in the Northeastern part of Thailand.

ii. Project planners, when dealing with a pilot project like the Sericulture/ Settlements Project, need to be more realistic in their expectations regarding production targets; availability of adequate member of trained staff; effective coordination between agencies; availability of input supply; availability of surplus labour; ability of project to recruit required member of able settlers in the time specified; project planners should be experienced in estimating what is most likely to happen (rather than setting targets) and provide sufficient time for evaluation of issues concerning activities such as:

--- Testing reliance of the project design on the use of cooperatives as a vehicle for managing cocoon production and marketing when taking into account inclusion of a component in the Project that required a large investment of both financial and personnel resorces which are scarce resource in a developing country.

--- Obtaining the required numbers of adequately trained supervisors and extension agents.

--- Obtaining assured supplies of inputs such as good quality of hatchable silk worm eggs and availability of quantity of mulberry production.

--- Attracting able potential applicants or recruits for training as silk worm producers.

--- Training project staff to ably screen potential applicants to be recommended for credit supply.

--- Establishment of effective coordination between agencies and the need for taking account of the local environment institutional, cultural and political. All of these have directly affected the manner and spread with which the Project has been implemented.

iii. PWD staff should be trained to be able to identify possible settlers applicants from among farmers with

--- At least two surplus and responsible members of a family to be available to work in this Project.

--- At least 4-6 rai of land available for mulberry cultivation.

--- Some existing assets that can be identified so as to ensure availability of short term capital for purchase of inputs and other supplies.

Such a selection may widen income inequality in the Northeast but it would also narrow income inequality in Thailand.

The Project will however, demonstrate a potential replicability as other settlers become aware of the higher incomes derived from sericulture production and even less successful settlers in the Project will benefit. Non project farmers will also take advantage of such sericulture practices.

iv. It is absolutely imperative to both, facilitate farmers to borrow from, and repay credit obtained from Development Banks such as BAAC in order to ensure continued credit availability for good projects.

v. It is essential for PWD staff to effectively coordinate and monitor the inputs of all other agencies and organization in order for the Project to achieve its objectives.

The Team also found that the more successful sericulture producing settler used:

1. More than 4 rais of land to have adequate mulberry production sufficient to feed the hybrid silkworm in order to produce sufficient revenue for the rearer from cocoon sales;

2. A higher level of investment in terms of:

   -- Making available labor for training (during peak labor requirements for production of other crops;

   -- Investment on manure, fertilizer, insecticides, pesticide and supplies including repair and maintenance of facilities.

These are the settlers that are also considered better risks for loans and it is such settlers only that will be able to make up any gaps between investment requirements and the amount of loans made available by BAAC.

E. Farmer Income, IRR and Cost/Benefit Ratio

It is evident that total family member involvement is needed for successful silkworm rearing and mulberry production. Labor inputs comprise of a full time silkworm raiser and one or two additional helpers for harvesting mulberry leaves. Such family labor inputs must not compete with labor demanded for other farming enterprises of the participating farmers. The return on sericulture production for such family labors can be attributed as supplementary family income. The farmer income analysis in this section deals only with the income from sericulture activities as income data on the other activities of the settlers was not available.

The net income from sericulture production in the 10 settlements rose from ฿3,680 in 1978 (the second year of the Project) to that of ฿6,382 in 1980. This indicates that the participating farmer can earn about $184 net cash income per year from sericulture production since the second year of the Project and it surpassed the Project's goal of a $290 increase

of a farm family income from Sericulture at the end of a 5 year period. However, these incomes were derived by 324 active farmers who cultivated at least 4 rai of mulberry trees. The explanation for about 100 settlers either becoming inactive or dropping out of Project was due to:

1. inadequate supply of mulberry leaves for silkworm feeding,

2. low revenue from cocoon sales resulting from either employing poor silkworm rearing technique or lack of able family members to raise silkworm.

The mid-term evaluation found that sericulture farmers' income for 1977 was found to be an encouraging source. However, the income data has not risen at a steady rate due to the decline in cocoon yield from 17.3 kg. per box of eggs in 1977 to 15.54 kg. in 1980. It was the increase in the cocoon prices during the same period from ฿54.77 in 1977 to ฿83.96 in 1980 that offset decreasing cocoon yields. Available data suggests that only those who cultivate 4 rais or more of mulberry tree can enjoy satisfactorily income. (See Appendix P. Cont.)

The economic analysis indicates that the internal rate of return to the improved Sericulture/Settlements Project, is about 9.07 (See Appendix E). *This internal rate of return is a little lower than that originally calculated in the project design stage. This is due to changes in the mulberry planting areas per farmer and the reduction of number of participating farmers from 1,500 to 1,000. Anticipation of higher output is also projected due to application of recommended measures to recruit higher caliber project farmers and more effective means to train project personnel.

Farmers financial rate of return is about 26.98%. (See Appendix E1). Of course, farmers can consider alternative activities, such as growing kenaf, sugar cane or cassava. But gross income, from utilizing 4-6 rai of land for kenaf or cassava production would yield an average return of about ฿2,200 to 2,500 per year. Therefore, it would appear that the farmer's income under this Project promises the farmer higher returns in the long term. Again, this is heavily dependent upon the effective implementation of the project activities recommended throughout this Report.

* IRR values for individual settlement are Prasat = 14.28, Lam Dom Noi = 14.15, Lam Dom Yai = 4.18, Kham Soi = 22.68, Kuchinarai = 8.40, Lam Pao = 13.86, Ubonrat Dam = 20.67, Chaing Phin 2.89, Phon Phisai = 11.49, and Ban Kruat = 2.01.

F. Farmer Attitude and Participation Including Social-Cultural and Economic Factors

1. Sociological and Cultural Factors Affecting Participation and Interest of Settlers

Settlers interests in the Project is indicated by the relative number of applications to join the Sericulture Project measured against the total number of settler families in each of the settlements shown below:

Name of Settlement	No. of Settler Families	No.of Applicants As of 1980
Lam Dom Yai	500	41
Lam Dom Noi	1,401	105
Kham Soi	1,740	270
Ubonrat Dam	1,946	130

The percentage of actual beneficiaries against the target is 35.40% (531:1500 families). No socio-cultural factors (such as their view of change, adoption of new technology were found to be in conflict with traditional lifestyle, etc.) appear to influence their participation. Factors commonly influencing their non-participation were the following:

-- fear of contracting large indebtedness;

-- non-existence of surplus family labor;

-- skeptism about success of government operated programs or projects.

However, the Thai family structure - the nuclear family with little labor to spare does effect the participation and interest of the settlers in the Project.

a. Technological and Administrative Problems

When the Sericulture/Settlement Project was introduced to the settlers both the agents of change (supervisor, and extension workers) and the recipients of change were not experienced in this sophisticated and complicated technology. Most settlers, despite their efforts, failed initially to produce a satisfactory return for their efforts in mulberry production and silk rearing. Much of this was due to weaknesses in timely supply of inputs, credit, training, etc.

Settlers lost faith and moral to stay on in the Project. Many felt that staying on in the Project was a risk they could ill afford. This combined with the cultural factor of the settlers' perception of a weak "self" (i.e. they did not perceive themselves as being strong actors of changing an environment). Their perception of self is contingent on environment or what is a kin to karma. This, to a certain extent, influenced their lack of will to fight for the new environment. This lack of will to fight for the new environment was further reinforced when they found that extension workers were unable to help them prevent occurence of mulberry diseases and loss of silkworms. Many settlers pointed out that even if they followed instructions, diaster to their mulberry and silkworm could not be prevented. Such attitudes could be remedied if supervisors and extension agents can demonstrate the profitability of silk rearing. Need therefore exists for:

i Giving supervisors and Extension Agents intensified refresher courses and that such they should attend at least 2 such courses every year, so that they are properly trained and would earn the confidence of farmers and settlers. Such courses should be given as often as possible.

ii. Each settlement being provided with a permanent sericulture officer to advise the settlers, extension agents and supervisors regarding all aspects of silk worm rearing and mulberry production.

iii. The supervisors, extension agents and BAAC representatives to concentrate on helping the less successful silkworm rearing settlers without being paternalistic about their approach.

iv. Formation of a Project Implementation Review Group (comprising of the Settlement Superintendent, the PWD Supervisor, the Sericulture Officer and the BAAC representatives) in each settlement to review issues and problems confronted in silkworm

rearing and mulberry production. This Group should meet at least once a month to resolve issues and problems faced by the settlers. In the event that the Group is unable to solve the problems they should immediately submit the problems together with suggested resolution to an Inspection Team (See below) and the Project Supervisory Coordination Committee in Bangkok.

v. Appointment of an Inspection Team (comprising of Representative of BAAC, Sericulture Division and PWD) that should visit the 10 settlements on a continuous basis to monitor activities and progress of the Project to ensure that the logical framework on the Project is being implemented and to achieve the objectives of the Project in each settlement.

vi. Each settlement to have regular demonstrations to convince perspective and able applicants among settlers that the sophisticated procedure of improved silk rearing production could increase their incomes significantly. Effective demonstration and promotion will enable the Project to attract and recruit able settlers for the Project.

vii. The Superintendent of Settlements to effectively support and ensure that the supervisors and extension agents collaborate with the settlers to solve their problems.

viii. Training of more supervisors and extension agents to provide for at least a turnover of 20% of project personnel.

ix. Provision of credit and input on a timely basis to the settlers.

x. The Public Welfare Department to provide financing for purchase of inputs through establishment of a revolving fund, and that short-term credit should be provided to participants for purchasing fertilizer when necessary.

xi. An annual review between the Settlements and the Sericulture Division to ensure availability of adequate supply of good quality hatchable egg as well as measures to provide adequate supply of mulberry leaves.

xii. Soil testing to ensure that mulberry cultivation would be appropriate on the settlers land with particular attention on determining and solving mulberry and silkworm disease problems prevailment in the settlers plot.

b. Socio-Economic and Cultural Problem

Insufficient skilled or trained labor (and ineffective management) in the family. The Project assumed that one extra labor force in the family would be sufficient for sericulture activity. Evidence indicates that this assumption is incorrect. Most of those with low production output have problems regarding availability of labor supply. Insufficiency of skilled and trained labor and the ineffective management of labor have resulted from the following factors:

- Occupational Aspiration and Motivations

The participants are, in general, rice farmers. The Sericulture Project was introduced as a supplementary and secondary occupation. Informants felt that at certain periods of the year (May, July and December) rice farming competes for labor with sericulture (which in fact requires more than one extra labor occupied full time all year round. This is more evident in Lam Dom Noi, Lam Dom Yai, Kham Soi than in Ubonrat Dam Settlements). The settlers naturally give first priority to production of their staple needs - rice farming instead of sericulture. Most successful participants have treated sericulture as a main occupation, and not as a secondary one, and the entire family spend more time on sericulture than on any other occupation. Some settlers have been successful because they hire labor at critical periods.

- Family Structure, Dynamics and Culture Values

  Generally the Thai family is nuclear, not extended. Thus, their will always be changes in family, since a family is likely to loose members. More importantly it loses the skilled/trained labor since most of the sericulture trainee were junior members (mostly daughters of the families). Reasons for this are:

  -- Trained persons were generally those at marriageable ages. After training they go married and moved out and no longer participation in the Project.

  -- Younger people have been socially oriented to urban life, and become laborers in towns in Bangkok or other towns.

  -- The girls, who after marriage stayed on in the same household, devoted most of their time to rearing children rather than silk worm.

The Project thus lost many trained participants. Many of those who are at present rearing silk worm are not the people who received training at the centers.

Even though the technique can be learned many, at the beginning, were not committed to the Project because they were not convinced about its merits. This was due to the absence of adequate demonstrations and promotions and poor training.

The Evaluation Team therefore recommends that:

- A criteria for selection of applicants to produce improved silkworm rearing be confined to families that have at least two surplus members in the household available for silkworm rearing and mulberry production. Persons selected for training should be confined to either the head of the household, his or her spouse or other reliable and responsible members of the household.

- The target should be the family and not just women who were mistakenly assumed to be under employed. Young women only should not be the target.

- Training be provided as soon as possible to the entire family during the dry season month when settlers and farmers are free.

2. Economic Factors Affecting Participation and Interest of Settlers

It was observed that economic factors attributing to the failure of many unsuccessful participating farmers include:

a) Usually low yield of mulberry leaves because of use of unsuitable land (poor land selection with low fertility and long distance from worm rearing house) and improper care of the mulberry plant during cultivation. This is a serious factor sufficient to cause many farmers either drop out from the Project or become inactive participants. Some farmers, approved by BAAC for credit, did not avail themselves of the loan that they could not satisfactorily produce mulberry leaves. Some preventive measure should be set up and used to solve such problem when recruiting new participant farmers.

b) Shortage of labor inputs for undertaking silkworm raising activities, especially in the second year of the Project. Shortage of labor caused many farmers to discontinue their activities. This was due to

   - labor force reduction caused by participants leaving the settlement for personal reasons, and

   - insufficient surplus labor supply in the family to effectively raise silkworm. Again, certain measures need to be set up to screen applicants sufficiently to prevent such recruitment.

c) Lack of short term credit for mulberry production purpose. This was in another serious factor causing failure of farmers. Not possessing spare cash they could not afford purchase of inputs such as fertilizer, etc. for use on their mulberry plots. Other credit sources were not available to such farmers. Many farmers felt that credit in kind (fertilizer) should be provided by the settlement. PWD is taking steps to implement these suggestions for the 1981 sericulture production year by establishment a revolving fund for such purposes.

Participation of settlers was far behind the project target. Only 61 percent of the project goal, in terms of recruitments, was achieved at the end of the second year. It seemed to the project committee at that time that the problem would becoming more serious in the third year and it consequently decided to revise membership recruitment plans by lowing the target from 1,500 to 1,340 farmers in 10 settlements. They also decided to expand project activities to 3 additional settlements1/ in 1979. Main reason for the slow down of recruiting settlers included the failure by the project staff to ably demonstrate and promote the profitability of sericulture production. At the end of the fourth year, the participation rate dropped to 48 percent of the revised target (See Appendix I). Recruitment of able settlers can be successfully achieved if the Project is extended for 3 years and recommendations proposed in this Evaluation are carried out.

G. Distribution of Benefit

About 531 settlers are now participating in the Sericulture/ Settlement Project. About two-thirds of them are benefitting from the Project at a reasonably satisfactorily level. It was clearly indicated that only those who cultivated 4 or more rais of mulberry trees derived an average gross income from

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1/ Those are Phimai, Huey Luang, and Nonsung Land Settlements

silkworm rearing of ฿6,269 (See Appendix P Cont.)2/. This gave participating farmers a net cash income of about nearly ฿4,000 for the use of their 4 rai of lands. The opportunity cost for growing other crops such as kenaf, cassava is about ฿2,200 to 2,500. In short, only those settlers who cultivated at least 4 rai of mulberry trees and have at least 2 surplus family labor with some spare cash available and are willing to follow the instruction to raise silkworm strictly could truly benefit from the Project.

H. Replicability

The Evaluation Team feels that, if the measures proposed in this Report are adopted, the Project would be replicable at the end of the project life, by 1984. The Team has assumed the following levels of participation in each year.

Year	Participants	Amount Increased
1980	530	-
1981	550	20
1982	650	100
1983	800	150
1984	1,000	200

Thereafter the Project, the Team feels, will demonstrate a potential replicability as other settlers become aware of the higher incomes derived from sericulture production and even less successful settlers in the Project will benefit. Non Project farmers will also take advantage of such sericulture practices.

I. Marketing Arrangement and Cocoon Pricing Policy

Marketing activities of the Sericulture/Settlements Project include services on

- procuring and distributing of production input, and
- assembling and selling of cocoon for participating farmers.

The procurement and distribution of production inputs such as fertilizer and disinfectant for silkworm rearing

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2/ This compares to income from traditional silkworm rearing of ฿735 per family as found in the baseline survey of the Sericulture/Settlements Project.

houses, according to the Project Paper, were to be carried out as cooperative activities. As indicated earlier, this component of the Project was not carried out by the cooperatives and PWD has provided such services in a very limited manner. They normally provide the silkworm rearers with formalin as credit in kind to be repaid in full at the time of cocoon selling. A few settlements provide services for obtaining chemical fertilizer, when requested, for farmers. This creates a problem for farmers in other settlements who do not have sufficient spare cash for fertilizer purchase. Many unsuccessful farmers were found to be those not applying fertilizer to their mulberry plantation because they did not have spare cash available for such purchases. Furthermore, farmers who are able to purchase it in cash cannot do so because of the non-availability of the specified kind of fertilizer for mulberry plantation. Therefore, these is a real need for the service of procuring the right formula fertilizer for farmer use either in kind and/or in cash.

The cocoon marketing activity was undertaken by PWD supervisor and extension workers instead of the cooperatives as originally planned. This creates some inefficiency of operations because they have not been trained for such marketing services and it takes part of their valuable time of doing regular work. In some settlements, PWD staff were misunderstood as being unfair in identifying individual farmers' cocoon share. However, since cooperatives are not available for such service and there is no other alternatives to perform it better than the present one, it is suggested that PWD should try to improve its efficiency in undertaking this marketing service by providing training for its staff to effectively carry out this function.

Cocoon Pricing Policy and Marketing

A cocoon pricing policy was established since the start of the Sericulture/Settlements Project. This was jointly reviewed and agreed upon by concerned parties including silkworm rearers, importers of warp silk, Thai Silk Association, and government agencies concerned. It has satisfied cocoon producers, processors, and importers regarding the marketing margin received. Consultation among concerned parties to reconsider the pricing modification in relation with changes of output prices and inflation should be maintained. No serious problems affect farmers' income as a result of such cocoon pricing.

The Evaluation Team suggests that for cocoon marketing, the farmers should be paid about 50% of the value of the cocoon sold on delivery to the settlement. The remainder should be settled after the cocoon had been appropriately graded. This should however not exceed 20 days. Funds for such intital payments should be provided from the Sericulture Division's revolving funds.

IV. RECOMMENDATIONS FOR ACHIEVING PROJECT OBJECTIVES

On the basis of the review, indicated in earlier parts of this Report, the Evaluation Team feels that the objectives of the Project can be met provided the following recommendations are implemented by mid 1981:

A. Redefining Project Goals and Purposes: The Goals and Purpose of this Project is to increases the annual net cash farm income (from sericulture production as a supplementary source of income) of only 1,000 poor farm families in Northeast Settlements of Thailand over a period of 8 years ending in 1984.

B. Organization, Administration and Management

1. On Staffing and Support

a) That each settlement be provided with a permanent sericulture officer 1/ to advise settlers and train supervisors and extension agents regarding all aspects of silkworm rearing and mulberry production.

b) That the superintendents of settlements should be requested to effectively support and ensure that the supervisors and extension agents collaborate with settlers to solve their problems including supply of information regarding price setting basis for cocoons.

c) That provision be made for training of more supervisors and extension agents to provide for at least 20% turn-overs of project personnel. Currently 3 settlements have no full time supervisors. An interim solution may possibly include provision for the Sericulture Division to provide the service of Supervisor while training is being provided to a permanent staff member of PWD.

1/ This will require the immediate appointment of 10 train Sericulturists which Sericulture Division will have to transfer such staff from its research station. Budgetary and other implications regarding this should be settled speedily.

2. On Coordination Inclucing Project Implementation Review

a) That Project Implementation Review Team comprising of PWD Supervisors, Sericulturists and BAAC representatives be appointed in every settlemen and meet at least once a month to solve problems and issues including helping the less successful silkworm rearing settlers without being paternalistic about their approach.

b) That this Project Implementation Review Group be formed in each settlement to review issues and problems confronted in silkworm rearing and mulberry production. In the event that the group is unable to solve the problems they should immediately submit the problems together with suggested solutions, to the Project Sub-Executive Committee in Bangkok.

3. On Monitoring and Evaluation

a) That an Inspection Team comprising of representatives of BAAC, Sericulture Division and PWD should be appointed to visit the 10 settlements on a continuous basis (a flying squad) to monitor activities and progress of the Project to ensure achievement of the objectives of the Project in each settlement. This will involve releasing from each of the agencies concerned a senior officer who will be able to command the respect of officials in the settlement in order to able to monitor the Project.

b) That a person of high standing (not associated with the agencies concerned) be appointed to chair this Inspection Group. Such a person should be familiar with the Project and preferably be associated with an Antonomous Agency outside the Government Departments and Agencies concerned.

C. On Training, Demonstrations, Selection Criterion

a) That supervisors and extension agents be given intensified refresher courses and that they should attend at least 2 such courses every year. Supervisors and extension agents should be properly

trained so that they would have the confidence of settlers. Such refresher course should be given to these officials as often as possible because the Project calls for.

- introducing a very poor element of population to a sericulture system with a high technology component and;

- the technical requirements to be developed requires a sophisticated management system.

b) Training be provided as soon as possible to the entire settler family during the dry season month when settlers are respectively free.

c) That each settlement have regular demonstration to promote the merit of the sophisticated procedure to increase income levels significantly through expanded silk production.

d) That selection criteria for applicants to produce important silkworm rearing to confined to families that have at least two surplus members (if capital is not available for hiring extra labor force) in each household available selected for silkworm rearing and mulberry production. Persons selected for training should be confined to either the head of the household, his or her spouse or other reliable and responsible member of the household as apposed to children being sent for training.

e) That target group for silkworm rearing should be the family and not women since women in families in fact are not necessarily under employed as assumed.

f) That PWD staff, with assistance from staff of Sericulture Division, ensure that applicants recommended for participation in the Project have at least 4 but preferable 6 rais of lands with soils suitable for mulberry production.

D. <u>On Financing and Credit</u>

a) That timely short term credit and input requirements be assured to settlers producing mulberry and rearing silk worms.

b) That the Public Welfare Department expedite decision on its proposal to provide sericulture producing settlements obtain short term credit and in-put requirements through establishment of a revolving fund.

c) That PWD intensify its efforts to facilitate able farmers to obtain credit from BAAC by more careful selection and screening of applicants. Furthermore PWD should intensify efforts to facilitate and assist settlers (who have borrowed capital from BAAC on PWD's recommendations) to repay their credit to BAAC.

E. On Input Supply

a) That an annual review takes place between the settlements and the Sericulture Division to ensure timely availability of adequate supply of good quality hatchable eggs required by silk rearing producers.

b) That PWD ensure adequate supply of mulberry leaves, on a payment basis, to silk worm rearers whose mulberry production has failed. PWD is currently considering a proposal to supply mulberry leaves to silk worm rearers, at a charge, by expanding its central mulberry plots in these settlements. The Evaluation Team supports this proposal and recommends that this proposal be implemented as soon as possible.

F. Technical Recommendations

The major findings of the Evaluation Team's Technical Analysis of the Sericulture Settlement Project is presented in Appendix D of this Report. The technical recommendations broadly conclude, on the basis of activities, the following:

1) On Mulberry Production: Need for:

a) More careful selection of suitable plots for mulberry production, taking into account water holding and retaining capacity, location relative to rearing place.

b) Better land prepared than currently undertaken including deep ploughing, better spacing intervals, land levelling, application of manure (about 1-6 tons of manure/year) compost and chemical fertilizers (at least 100 kg/rai/year) to improve soils.

c) More and continued research by the sericulture stations on root rot disease. The root rot disease has occurred in almost every settlement under the Sericulture Project. However, the percentage of the disease was only 10% of the total production area. Farmers should be encouraged to plant, during the rainy season, with the new disease resistance variety of mulberry trees and, to reduce damage from root rot disease and expansion of such areas. That the Sericulture Division adopt a policy to propagete quickly the "grafting method" of high yielding but low resistance variety with those of high resistance.

d) Adoption of better cultivating, prunning and harvesting practices by dividing mulberry plots in 2 separate fields into those for feeding young silkworm and others for the old silkworms. Production of mulberry should be practiced during both the rainy and dry season in order that the farmer will have sufficient mulberry leaves to feed 6 cycles of silkworms annually.

e) One farmer mulberry demonstration plot should be set up in each settlement. This should be located at the center of the villages with good access to everyone in the settlement. Any problems related to production and mulberry disease on these plots should be solved by demonstrating to the farmer how to solve, control or eradicate such problems.

f) Until the root rot disease is brought under control settlements should expand their central mulberry plots so as to have sufficient mulberry leaves for participants rearing silk worms and whose plots have been adversely affected by this disease.

2. <u>On Silk Worm Rearing</u>

To solve the problem of prevailence of high temperatures in OSWRH* (which adversely affect production of cocoon) extension agents should assist farmers by advising on the lay-out, before construction of houses, and suggesting that such houses should:

(*Old Silkworm Rearing House, OSWRH)

a) avoid facing the sun directly;

b) have more shade around them (planting of big trees around building or growing grass around it).

3. On Disease Control

It is imperative that hygenic condition be strictly enforced and the OSWRH must be fumigated with formalin 2-3% at least 2 to 3 times after each rearing of silkworms. The amounts applied shall be higher in the Wet Season. In addition:

a) dead or infected worms must be removed immediately and the OSWRH must be disinfected to prevent disease from spreading,

b) appropriate feeding: at least about 15 kg. of mulberry must be fed in every box of silk worm eggs during the young worm stage. There after about 28.5 kg. per box must be fed. Older silk worms can be fed with branches without picking the leaves.

c) an OSWRH should serve to demonstrate effective practices in disease control, feeding practices, etc. It should be tied with the mulberry demonstration plot. Such demonstrations should include appropriate spacing techniques.

d) Annual awards should be provided to best sericulture producers in order to improve quality of cocoon and mulberry production.

e) A textbook on silkworm rearing techniques should be used as a main reference manual for silk rearing staff and producer.

4. On Silk Worm Egg Supply: Need exists for:

a) Continued research to find better and improved varieties of hatchable good quality silk worm eggs.

b) Matching demand and supply of silk worm eggs and a schedule should be prepared one year ahead of the rearing season. Any changes in demand should be reported to the Sericulture Division at least 2 weeks prior to the rearing cycle.

c) Quality and quantity controles, including standards, should be instituted by the Sericulture Division.

d) Incubation and cooling storage rooms should begin operation immediately so as to be in time for the 1981 rearing cycle.

G. On Additional Studies

That additional areas that require further in depth studies in order to obtain recommendations on the role for private sector or other alternative participation are:

- Supply of silkworm eggs, and

- Sericulture marketing and management and how such participation could help or hinder such projects.

H. Preparation of Implementation Schedule by the Sub-Executive Committee

The Evaluation Team recommends that a satisfactory schedule for implementing the recommendations from A to G of this Chapter be prepared within the next 3 months (by July 1981) by the Sub-Executive Committee comprising of the representatives of the PWD, BAAC, MOAC and USAID.

V. CONCLUSIONS AND USE OF REMAINING FUNDS

A. Conclusion

The recommendations of the Evaluation Team emphasizes more effective planning and implementation to ensure the necessary input supplies and provision of technical expertise and appropriate training including the recruitment of more qualified participants. The recommendations specifically relate to:

a. Improved training of supervisors and extension workers.

b. Improved organization and management.

c. Assured credit availability for able settlers.

d. Technical problems in silkworm rearing being solved.

e. Further studies on silkworm eggs and sericulture marketing and management.

The Evaluation Team, therefore, recommends that the Thailand Sericulture/Settlements Project be extended for an additional 3 years provided that a satisfactory schedule for implementing the above recommendations is presented within the next 3 months by the Sub-Executive Committee comprising of the PWD, the MOAC, the BAAC and the Project Officer of USAID.

B. Use of Remaining Funds

1. The exist financial status, at the end of Fiscal Year 1981 of the US Loan Fund for the Sericulture/ Settlements Project is attached (See Appendix T, V Cont.)

2. Remaining funds with PWD amount to about ฿9.01 million (US dollar equivalent of $450,500). This should be sufficient for

   -- expansion for the Central Mulberry plots in the 10 settlements including assisting the establishment of ten farmer demonstration plots,

-- providing training for farmers and project staff including staff of the Sericulture Division,

-- providing additional in-depth studies on silkworm egg production, mulberry root rot disease control and the role for private sector or alternative participation in sericulture marketing and management.

-- the Inspection Team who will visit the 10 settlements on continuous basis to monitor activities and progress of the Project to ensure achievement of the objectives.

-- the consulting service working on the training curriculum which will be most appropriated to the training courses in all levels.

3. The remaining funds with BAAC amount to ฿14.0 million. The Evaluation Team recommends that some part of these funds (about ฿3 million) should be provided to finance short term credit requirements of the sericulture producers. This amount was included in the Project Paper and it was to have been channeled from BAAC to the cooperatives.

APPENDIX A

SERICULTURE/SETTLEMENTS PROJECT

LAND SETTLEMENT SIZE, NORTHEAST THAILAND

Name of Settlement	Province	Year Established	Total Area (Rai)	Area Alloc. (Rai)	Offic. Inhabit. (families)	Family Size (Person)	Plot Size (Rai)	Actual Land Holding		
								Inside Settlement (rai)	Outside Settlement (rai)	Total Land Holding Family
Prasat	Surin	1958	245,000	50,125	1,955	6.7	25	32.0	3.2	35.2
Lam Dom Noi	Ubol	1969	55,504	21,015	1,401	6.5	15	19.6	8.4	28.0
Lam Dom Yai	Ubol	1971	18,125	7,5000	500	6.6	15	22.6	9.8	32.4
Kham Soi	Nakorn Panom	1956	123,750	38,400	1,740	6.7	25	31.8	9.6	41.4
Kuchinarai	Kalasin	1963	30,000	12,650	506	7.4	25	24.7	6.6	31.1
Lam Pao	Sakon Nakorn	1965	118,000	26,130	1,742	7.5	15	20.2	7.8	27.9
Ubonrat Dam	Khon Kaen	1964	373,900	61,960	1,946	6.4	15	16.6	4.0	20.6
Chiang Phin	Udorn	1955	105,000	47,195	2,304	7.3	25	32.5	7.2	39.7
Phon Phisai	Nong Kai	1955	165,625	56,371	2,348	7.4	25	34.2	5.2	39.4
Ban Kruat	Buriram	1959	211,562	81,950	3,255	6.6	25	35.4	2.7	38.1
Average for all Settlements						6.9	21	26.9	6.5	33.4

Source: Kasetsart University, Faculty of Economics and Business Administration, "Summary Report on Ten Land Settlements Under USAID Sericulture Project, 1977".

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APPENDIX B

SERICULTURE/SETTLEMENTS PROJECT

AVERAGE LAND USE AND INCOME AMONG FARMERS IN 10 LAND SETTLEMENTS IN NORTHEAST THAILAND

	1976 [a]	1977 [b]	1978 [c]	1979 [c]
Total Land Holding Size (Rai)	32.3	33.4	33.4	33.4
Paddy	(13.7)	(12.9)	(12.9)	(12.9)
Upland	(8.4)	(11.1)	(11.1)	(11.1)
Mulberry	(0.7)	(1.7)	(2.8)	(3.2)
Others	(9.5)	(7.7)	(7.7)	(7.7)
Percentage of Farmers who borrow money	31.8	64.6	NA	NA
Weighted Average Debt (฿)	4,455.58	6,760.43	NA	NA
Average Net Cash Income per Family (฿)	9,245.66	10,591.84	NA	NA

a) Kasetsart University, Faculty of Economics and Business Administration, "Basic Baseline Data Summary Report on Five Land Settlement", 1976 Vol.1 and 3, Bangkok, Thailand.

b) Summary Report on Ten Land Settlement Under USAID Sericulture Project 1977, Bangkok Thailand 1979.

c) In Paddy, Upland and other crops have, in absence of data, used 1977 figures.

APPENDIX C

SERICULTURE/SETTLEMENTS PROJECT EVALUATION

SOCIAL ANALYSIS

A. Methodology: Documentation and Field Research

1. Documentation Research:

   a. Project documentation

   b. Anthropological works on the Northeast of Thailand

   c. BAAC and settlement file

2. Field Research (8 days by interview technique and rapid reconnaissance approach):

   a. RTG, BAAC and USAID personnel

   b. Settlers (random sample) interviewed in four settlements (Kham Soi, Lam Dom Noi, Lam Dom Yai and Ubonrat Dam) and stratisfied as follows:

Settlers outside the Project	=	7
Non-successful project members	=	28
Moderately successful project members	=	7
Successful project members	=	11
Total Interviewed		53

Note: Criteria of performance in the Project*

Successful - produces about or over 150 kg. of cocoon per year
Moderate - produce cocoon at 100-150 kg. (approx.) per year
Non-successful - produce less than 100 kg. (approx.)

* Plan of cocoon production was set for 240 kg. per farm household per year.

B. Distribution of Benefits

It was expected that within 5 years, 1,500 families in the 10 settlements will benefit from this Project. At the time of evaluation only 531 families in 10 settlements participate in the Project. Most of the families (approximately 90%) benefitting from this Project belong to the Thai-Lao (Isan) ethnic group. They share the Loatian language and snycretized animistic-Buddhistic tradition and political history despite some local variation. The rest are Bhuthai, (in Kham Soi), and Cambodian descendants in Prasat. The other two ethnic groups do not share the language and political history with the Thai Laotians but did not share the Buddhistic-animistic tradition. In addition to this ethnic distinction, the characteristics of the beneficiaries can be classified in the following terms:

1. Economic Status

The economic status of these families is relatively low in some settlements and higher in the other as appearing, in 1977 Kasetsart University Report (See Summary Sheet). For example, the average net family income of the families participating in Sericulture Project in Ban Kruat, Prasat, Kham Soi, Kuchinarai, Lam Pao and Ubonrat Dam is even higher than that of the settlers outside the Project. My interview reveals that those (7) who are non-members are likely to be very poor, with little capital and little surplus labor force available in the family. Some of them applied and were rejected on these two bases (poverty and insufficient labor force). Most of the 11 successful members in my sample have at least ฿5,000 savings which can be utilized as capital. (See Attachment I for the characteristic of the successful farmers). However, it is true, that those who failed also had the same savings.

This resulted from:

a) The Project requires at least 1 extra labor force (which is in fact not sufficient) in a family applying for the project membership. Generally a poorer family tends to consist of a young husband and wife with young children, with a small plot of land and with no capital. They are not thus eligible for project membership. A BAAC branch manager

informally indicated to me that applicants should have savings at least ฿1,000 in order to demonstrate that they have potential for repaying capital.

b) The implementation of this Project in a family in fact need labor force and capital for hiring labor and buying fertilizer) than the Project ever estimated.

The families who are struggling for day-to-day survival are less likely to be successful since they devote their time to their traditional practice like rice farming and pay less attention to sericulture in order to quarantee their day-to-day life. In other words they cannot afford risk to spend time in sericulture.

2. Educational Status

It appears that the families participating in the Project have similar educational background. About 90% in Kasetsart sample completed Grade 4. This is consistent with our sample.

The presumption that higher education might lend to the high level of acceptance or the maximization of benefit from the Project was not verifiable since the sample of successful members was small. Among the 11 successful, 9 of the household heads completed Grade 4 with only 2 having higher education. Based on the sample and general observation, one can conclude that possession of higher formal education benefited settlers to maximize returns since a high degree of sophisticated procedures were needed for being successful although this could be made up by dedication. Other social traits such as personality (deligence, cleanliness, carefulness, prudence, entrepreneural skill, etc.) are also important. Evidence indicates that settlers with Grade 4 levels of education is basically sufficient for members to be successful if the other attributes are present.

3. Social Status (Age, sex and family size)

a. Sex and Family Size

It is not meaningful to classified beneficiaries in terms of sex since this occupation requires the participation of the entire family. The sample interviewed provides no clear-cut division of labor (except for cleaning cocoons) in the family with regard to sericulture as indicated below:

Task	Exclusively Men	Exclusively Women	Mixed
Clearing field	8	-	3
Planting mulberry	6	-	5
Picking mulberry leaves	-	1	10
Feeding silkworm & cleaning	-	4	7
Cleaning cocoon	-	11	1

The income earned from this Project, like all other income, are in the women's (wives) hand since it is a cultural practice that women govern the household budget. About 95% of the 53 families women govern household budgets.

The larger families with older children have benefited more from the Project because the Project requires availability of at least 1 full time extra surplus labour force in a family. This assumption is verified by Kasetsart University 1977 Report. In all settlements (except Kham Soi) the family size of the sericulture project members is larger than that of the non-sericulture settlers in the same settlement (See Summary Sheet). However, it should be noted that the larger families with small children did not benefit as much from the Project. Interviews revealed that a family with many young children is not admitted to the Project. Thus it seems that the extended family (as opposed to the nuclear family) is likely to benefit more from the Project because of the potential of its labor force.

b. Age Distribution

Following the requirement of the extra labor force in the family, it is likely that young household heads can rarely benefit from the Project as revealed in the application file of BAAC which is summarized below:

Age of Household	No. of Families
30 & under	12
31-40	38
41-50	59
51 & over	63
	172

The household heads who benefit most from the Project are middle aged group with children who are generally older - thus providing a more effective labor force.

C. Analysis:* Sociological and Cultural Factors For Low Participation and Interest

a. Non or Low Participation In the Project

Settler interests in the Project is indicated by the relative number of applicant to join the Sericulture Project measured against the total number of settler families in each of the settlements shown below:

Name of Settlement	No. of Settler Families	No. of Applicants As of 1980
Lam Dom Yai	500	41
Lam Dom Noi	1,401	105
Kham Soi	1,740	270
Ubonrat Dam	1,946	130

No socio-cultural factors (such as their view of change, adoption of new technology which may be in conflict with their traditional lifestyle, etc.) appeared to influence their participation. Factors commonly influencing their non-participation were the following:

i) being fear of contracting for large indebteness;

ii) non-existence of surplus labor

iii) skeptism about success of government operated programs or projects.

One can believe that even though settlers are generally skeptical of change and any new technology, they would be willing to change if they were convinced about the profitability of the new technology. Need to ably demonstrate and promote the profitability of improved silk-rearing technology. Many settlers have therefore adopted a "Wait and See" attitude as they feel they cannot afford to undertake risks. It should be noted that "farmers" in general

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* See Attachment II for Framework of Analysis

make their decision on whether to adopt new practices on the basis of experiences of their neighbours who have adopted the new technology and not on the basis of projected incomes indicated by Extension Agents.

For example, if sugar cane produces yielded at satisfactory prices and income in past years, farmer can be expected to grow more sugar cane this year.

The introduction of new technology assumed that settlers had at least 1 extra member of the family available to work full time on improved sericulture production. This was based on a belief that women were underemployed. This was in contradiction to the Thai farmers' family structure which is inherently nuclear. Besides, farming is a family activity. Traditionally, women contribute to the income of family in addition to housework, child rearing and weaving. Thus there was really no responsible member of families available, except children or very old members of the household who could be spared for training. The nature of the Thai family structure also affected the sufficiency of labor force in the family which to a certain extent, led to low participation and low production of cocoons.

b. Low Participation and Production

Usual complaints by project staff regarding this were that participants:

1. -- did not strictly follow instructions, thus adversely affecting the production of mulberry and cocoons,

   -- did not prepare and take care of the mulberry plot properly as instructed;

   -- were careless of sanitary procedures required for rearing silkworms;

   -- were reluctant to throw away the infected silkworm, which led to low cocoon production and that

2. -- were fleeting from the Project.

All of which contributed to delay in project implementation, and failure to recover cost.

On the basis of interviews and other evidence the conclusion is that the factors responsible for low participation and production are the following:

1. Technological and Administrative Problem

When the Sericulture/Settlements Project was introduced to the settlers both the agents of change (supervisor, and extension workers) and the recipients of change were inexperienced in this sophisticated and complicated technology. Most settlers, despite their efforts, failed initially to produce a satisfactory return for their efforts in mulberry production and silk rearing. Much of this was due to weaknesses in timely supply of outputs, credit, training, etc. Settlers lost faith and morale to stay on in the Project. Many felt that staying on in the Project was a risk they could not afford. This combined with the cultural factor of the settlers' perception of a weak "self" i.e. They did not perceive themselves as being strong actors of changing and environment. In their perception, self is contingent on environment or what they called "boon wasana" (like karma concept) which is the half-interpretation of Bhuddhistic value. This, to a certain extent, influenced their will to fight for the new environment. When they see that even the extension workers did not understand or were unable to prevent mulberry diseases and death of silkworms, they lost all faith. They pointed out that even if they followed instructions, diaster to their mulberry and silkworm could not be prevented.

2. Socio-economic and Cultural Problems

Insufficiently skilled or trained labor (and ineffective management) in the family. The Project assumed that one extra labor force in the family would be sufficient for sericulture activity. Evidence indicates that this assumption is incorrect. Most of those with low production output have problems regarding availability of labor supply for this activity as shown in the following sample:

	No. of Manpower in Family	Ag. Activity	No. of Class
1.	1	10 rai of paddy and others	3
2.	2	10-15 rai of paddy & others (kenaf, sugar cane, cassava)	6
3.	2	25 rai of paddy & others	1
4.	3	20 rai of paddy & others	5
5.	4	30 paddy rai & others	2
6.	4	15 paddy rai & wage labor & others	1
7.	5	25 rai sugar cane & others	2
8.	8	45 paddy rai & 30 sugar cane rai and others	1

Insufficiency of skilled and trained labor and the ineffective management of labor have resulted from the following factors:

i. Occupational Aspiration and Motivations

The participations in general have been rice farmers. The Sericulture Project was introduced as a supplementary and secondary occupation. The informants felt that a certain periods of the year (May, July and December) rice farming competes for labor with sericulture (which in fact requires more than one extra laborer occupied full time all year round, this is more evident in Lam Dom Noi, Lam Dom Yai, Kham Soi than in Ubonrat Dam Settlements).* The settlers naturally give just priority to production of their staple needs - rice farming instead of sericulture. Most of the successful participants have treated sericulture as a main occupation, and not as a secondary one, and the entire family spends more time on sericulture than on many other occupation. Some settlers have been successful as they hired labor at critical periods.

* At Ubolrat Dam Resettlement, there is a high labor competition between Sericulture Project and the Phoenix Paper Pulp Industry. Many farmers gave up the Project because of the high demand on labor for the Paper Pulp Industry.

ii. Family Structure, Dynamics and Culture Values

Generally the Thai family is nuclear, not extended. Thus, there will always be changes in family. This effects the Project significantly, since a family is likely to loose members. More importantly it loses the skilled/trained labor since most of the sericulture trainee were junior members (mostly daughters of the families). The following sample will illustrate:1/

	Less Successful Settlers	Intermediate & Successful Settlers
Senior members (parents)	3	53
Junior members (children and others)	43	48

Reasons responsible for this:

-- Trained persons were usually at marriagable ages. After training they get married and moved out and no longer participated in the Project.

-- These young people have been socially oriented to urban life, thus become laborers in towns or in Bangkok.

-- The young girls, after marriage despite staying in the same household, spend most of their time rearing children rather than silk worms.

-- Authority in the household is in senior members' hand. The junior ones cannot supervise the former.

The Project thus lost many trained participants. Many of those who are at present are rearing silkworm are not the people who received training at the centers. (See attachment III).

1/ This sample is taken from the name list of the sericulture participants in the four land settlements. Extension Workers and supervisors were asked to give information on the trainees and to evaluate the level of participants's success.

Number of trained person (illustrated in Table 3 Attachment III) Resons of Stopping Participation In the Project

	No.	%
Working in other areas	24	45.3
Married out	21	39.9
Pregnancy/rearing children	3	5.7
Others	5	9.4
	53	100.0

Eventhough the technique can be learned many, at the beginning, were not committed to the Project because they were not convinced about its merits. This was due to the absence of adequate demonstrations and promotions and poor training.

D. Conclusions

Certain sociological and cultural factors operated against the success of the Project. Yet, these were not solely responsible for the low participation and interest. Much of this was due to ineffective management (poor screening of applicants, recruiting, involuntary settler, poor training by inexperienced supervisor/extension workers, inadequate supply of inputs, the technological problem, insufficient understanding of disease, and also misplaced assumption regarding the Project). All of these contributed to the lacks of communications between the extension workers which reduced the creditability of the latter and to introduce change. Furthermore poor knowledge of pricing and weighing the cocoon aggrevated the problem. Based on the available evidence, one can conclude the following as a remedy to the situation:

1. Intensify work on the present participants without stressing targets of membership to ensure success of present participations' which will motivate and attract other settlers later.

2. Intensify training of extension worker/supervisor to enable them to effectively demonstrate and assist the

settlers to solve their mulberry production and silk rearing problems and hence to communicate effectively and command respect of participants.

3. The Project's Goals and assumption regarding number of recruits should be redefined.

4. There should be change in the target of training (for other specific suggestion see recommendation in the main Report).

ATTACHMENT II

Framework of Analysis

It should be noted that these are functionally related multi-factors affecting the success of the Project as follows:

1. Techno-Environment Factors

a. Environment

- soil quality
- water supply
- climate

b. Technological

Adequate knowledge relating to mulberry and silkworm raising which include:

- fertilizer
- preparation of soil
- picking of leaves
- understanding of disease and preventive measures
- feeding silkworm
- cleaning

2. Economic Factors

- adequate capital
- adequate skilled labor force

3. Socio-Cultural Factors

Concerns human factors involved in the Project:

a. The government agents who introduce the technology; adequate knowledge of technology, ability to communicate the technology and effective institutional arrangements.

b. The settlers: the target of this technological change:

i. cultural background

- their view on occupation, goal of life, change, self, debt, investment and sense of commitment;
- their habit, i.e. hygenic orientation.
- decision making process, occupational pattern and allocation of time
- enterpreneural experience
- experience with the government agencies.

ii. social structure:

- family structure: authority composition and residence pattern
- community structure: leadership.

It should be noted that:

1. This analysis concentrates on common factors rather than "individual" factors such as the extension workers' personality (such as deligence, carefulness, and the will to struggle) which in fact can also effect the success of the Project.

2. The extent to which the various (economic, techno-economic and socio-cultural) factors affect the success are different from one settlement to another. For example, in Lam Dom Yai the emphasis on the environmental factor (quality of soil and supply to water) was greater than in Kham Soi Settlement.

3. These factors are related to each other. For example, the socio-cultural factor such as residence pattern after marriage led to the loss of surplus labor force in the family, which affected production. Since functional relationship is presented in the main report, this analysis will only cover the socio-cultural perspectives and relationship to other factors will indicate wherever necessary.

ATTACHMENT III

Table 1: Number of families classified by level of Performance in the Project (261 sample)

	No.	%
More successful	38	14.6
Intermediate successful	91	34.8
Less successful	132	50.6
	261	100.0

Table 2: Number of families classified by the rate of repayment (Sample extremely small only 23)

	No.	%
Ahead of schedule	3	14
On schedule	2	8
Behind schedule	18	78
	23	100

Table 3: Number of families classified by the participation of the trained person (261 sample)*

	No.	%
Full participation	52	45.6
Partly participation	6	5.2
No participation	53	46.5
Dead	3	2.7
	114	100.0

* There is no information for 147 trained persons.

APPENDIX D

SERICULTURE/SETTLEMENTS PROJECT

TECHNICAL ANALYSIS

I. Executive Summary

Rearing of silkworms has been done in Thailand for hundreds of years and is still done in the villages of the Northeast probably much the same as several generations ago. The native silkworm reproduces throughout the year and a few cocoons are kept from each batch to provide the eggs for the next cycle. A few mulberries planted near the house provides the worm food supply. The silk fiber is irregular and only about one third the length of that produced by the hybrid worms. The resulting yarn is not suitable for the warp, but when used as the weft, it produces a nubby texture so characteristic of Thai Silk.

Introduction of the hybrid silkworms has brought a new technology to the Northeast that is similar to modern broiler production in contrast to raising a few chickens around the yard. Technology for the production of hybrid worms has come from Japan and is largely a temperate zone technology being transplanted and adapted to the Tripics. The hybrid silkworm produces a high quality filament which is triple the length of the native filament and which can be used for warp as well as weft.

Being a temperate zone creature, the Japanese silkworm reproduces only twice a year. The eggs can be held in cold storage up to 6 months. With a change in temperature and when treated with a weak solution of hydrochloric acid, the hybrid eggs can be induced to hatch at most any time of the year. Once the worms are hatched they must be well cared for as they are voracious eaters of mulberry and are more susceptible to disease and insect pests than the native worms.

The technology introduced in this Project includes the following practices:

Hybrid eggs are produced at Korat, Mukdahan, Khon Kaen, Udorn and Ubol and are provided to the members of this Project through the land settlements. In the event that a sufficient supply of eggs is not available locally, they can be imported from Japan.

Young worm rearing house: At each of the settlements, a young worm rearing house has been constructed where the eggs are hatched and the young worms fed through the first three stages or about 10 days. During these early stages the worms must be fed only the most tender leaves.

Old worm rearing house: Each of the participants in this Project constructs or has built an old worm rearing house, usually about 4m. x 6m. and has the capacity to rear two boxes of worms at a time or produce 40 to 50 kilos of fresh cocoon at a time. The building must have a cement floor and foundation and be constructed of materials that are tight to keep out all insects and permit fumigation between cycles. Windows must be tightly screened and must be adjustable to provide adequate ventialation for worm comfort.

Equipment: The rearing beds are about 90 cm. x 2.5m. and are made of a wooden frame covered with half-inch chicken wire. Paper is usually placed over the frame during the rearing period and can be changed frequently as a sanitary measure. The beds are placed in an adjustable rack and can be stacked 10 high. As the worms begin to spin their cocoons, they must have something to which to attach themselves. The most commonly used equipment for this purpose is the half-inch wire mesh crimped into a corrugation much like metal roofing. However, a more desirable frame copies from one used in Japan is made of cardboard consisting of cells about 1 x 1½ x 1 inch deep. Other miscellaneous equipment would include baskets and sacks for gathering the mulberry and transporting the cocoons as well as cleaning materials.

Mulberry Plot: Each participating member is expected to plant 4 rai of mulberry, which under most circumstances should be enough to feed the two boxes of worms to the cocoon stage. The mulberry cuttings are planted in rows about 2.5 meters apart. Application of compost, manure and mulching as well as some chemical fertilizer is essential for good leaf production. The plot must also be pruned and kept free of weeds.

At each of the land settlements, 100 rai of mulberry is planted and used to feed the newly hatched worms in the young worm rearing house. This mulberry is pruned somewhat differently to induce maximum growth of tender leaves. This plot is under the supervision of the project supervisor and the extension workers. Most of the labor is hired from the surrounding settlers and paid for by the Land Settlement.

To learn the technology the potential participants first attend three to four days of training in the planting and cultivation of mulberry at a land settlement. They return home to establish their mulberry plots. At a later date the farmers return to the center for a month long training period to take the silkworms through a complete cycle.

The BAAC loan to the farmer is approved at the time of the first training and the funds are provided for the planting of mulberry. After the second training cycle is completed and the mulberry plot well established, the bank provides the funds for the construction of the old worm rearing house and equipment. The farmer can construct the house himself or hire it built, but it must meet certian specifications and be approved by the project supervisors.

Project Goal: It was planned in the Project that for 4 rais of mulberry plantation per family will enough to produce mulberry leaves to feed 2 boxes of silkworms per cycle for 6 cycles a year. This will yield a cocoon production of 240 kg. per year.

II. Major Findings

The evaluation found that.

a. in 1980, there were 542 farm households which are engaged in sericulture. However, among this, the number of farmers who stop rearing silkworm or only produces 2-3 times a year is considerable,

b. the production amount of cocoon is about 21.8% of the initial target of production. See Table below. The reasons for not reaching the targeted production are as follows:

1) The Project targeted was unable to attract and recruit the number of farm household to participating in the Sericulture Project.

2) Mulberry leaf production was not adequate to feed silkworms.

3) Cocoon production per box for different types of silkworm variety was low.

4) Amount of silkworms per box was inadequate.

5) Frequent occurence of silkworm disease.

SUMMARY TABLE ON COCOON PRODUCTION, Third Year 1979-1980

Settlement	Farmer	No. of Farmer Rearing Silk Worm	Silk Worm Egg (Box)	Kg. of Cocoon	Cocoon Kg/Box
Prasat	55	134	247.6	3,289.7	13.56
Ban Kruat	60	84	127.4	1,680.1	13.18
Lam Dom Noi	41	123	129.7	1,695.9	13.07
Lam Dom Yai	35	111	128.6	2,081.3	16.18
Kham Soi	84	882	515.6	8,227.6	15.95
Lam Pao	46	132	165	2,236.7	13.55
Kuchinarai	50	249	345	5,782.3	16.90
Ubonrat Dam	107	417	440	7,816.4	17.76
Chiang Phin	20	66	130	1,807.7	13.90
Phon Phisai	42	112	154.6	2,484.4	16.06
Total	542	1,710	2,378.5	37,101.1	15.59

The Evaluator would like to address the following issues in relation to the modern sericulture technology which has been designed for the Project. These are:

A. Appropriate Technology

Promotion and development of sericulture is planned through introduction of modern sericulture technique using hybrid silkworm suitable for Thailand.

As technology consists of establishing priority in the silkworm production, the cultivation of mulberry, the rearing of silkworms; the prevention of harmful insects to the silkworm and mulberry; the completion of training in each of above fields is accomplished at the settlements by clearly specifying problems of a technical nature. The above are goals.

All the work conducted, including the results, is recorded and accumulated year after year. Practical techniques to be used among technicians and the farmers are:

1) Preparation and harvesting method used in mulberry fields to feed young silkworms.

2) Preparation and harvesting method used on mulberry fields to feed fully-grown silkworm.

3) Standard schedule for rearing of young silkworm.

4) Standard schedule for rearing of full-grown silkworm.

Of course, it is natural that the technique should be modified and improved all the time together with the change in social and economic conditions.

B. Important Technical Factors on Cocoon Production

Important factors are varieties of silkworm, rearing of silkworm (including silkworm rearing house), and mulberry leaves (cultivation of mulberry).

Concerning the varieties of silkworm, these must be easy to propagate and easy to rear, strong and can produce good yarn.

The present egg production system is such that with the cooperation of Japan, most are produced in the country and provided to the farmers. However, part of this has yet to be imported.

The preduction of silkworm egg and incubation is performed by the specialists at the Silkworm Experimental Station. Extension personnel then takes over the responsibility to provide leadership to the farmers during the stage of rearing of silkworm until the marketing of cocoons by the farmers.

1. Rearing of silkworm (including the silkworm rearing house)

The silkworm rearing house is the place where silkworm are reared. In high humidity tropical areas, measures should be taken to prevent the temperature from going over 30°C., and care must be taken to maintain the environment suitable for the healthy rearing of silkworms.

Moreover, in the case of expanding, the rearing scale, the farmer old silk worm rearing house should be expanded.

2. Mulberry leaves (cultivation)

Since this is the food of silkworm, the good or bad quality of mulberry leaves exerts great influence over the production of silkworm. Therefore, there is a need to have good production technique.

3. Techniques to prevent root rot disease of mulberry trees

In Thailand the biggest obstacle to the sericulture promotion project is the root rot disease of mulberry tree which is harful to the production of mulberry. The root rot disease has occurred in almost every settlement under the Sericulture Project. However, the percentage of the disease was only 10% of the total production area. The research about the cause of disease and the understanding about it occurence, the outspread condition, the resistance of mulberry, etc., are being conducted. However, the suitable prevention and curing method have not yet been discovered. At present, the technique has been established to reduce the damage caused by root rot disease by grafting Noi, Soi varieties with good quality and high out-put leaves (low resistance trees) to Pai type with high resistance. Therefore, until the discovery of suitable prevention and curing method, it is important that the grafting method should be propagated quickly and a policy adopted to reduce the damage of root rot disease so that damaged area can be reduced.

C. Silkworm Production Stabilizing Technique

From the beginning when the modern sericulture technique using Bivoltine silkworm was introduced, the foremost policy of securing silkworm production was adopted and suitable technique has been established in Thailand. The result of this effort reveals that Japanese technology can be suitably adopted to obtain a significant increases at newly cultivated sericulture areas. However, there are frequent examples of unstable silkworm production according to silkworm period (generally during rainy season namely June-September). The result of the investigation indicated that fundamental techniques are not strictly adhered to or are difficult to follow resulting in the frequent occurence of disease. These include the purification of environment at the first, middle and latter phase, of rearing in the sericulture farmer's silkworm rearing rooms and at the young silkworm cooperative rearing places, i.e. The separation of discease fungi, the carrying out of disinfection. (Structure of silkworm rearing house, the rearing density, and the ventilation). It is therefore important that leaders should gain more understanding of the techniques and sericulture farmers be given more training in order to obtain more effective results. These include:

-- Removal of impurity to keep the uniform standards of silkworm varieties by farming households.

-- Appropriate management of young silkworm cooperative rearing places.

-- To prevent the spread out of silkworm disease, it is recommended that Sericulture Division should concentrate on silkworm disease research together with seminar and training the supervisors, extension workers and farmers once every month for about 1-2 days each time. Farmers should also receive trainings about 2-3 times a year, at the project sites, especially when diseases break out.

-- Intensification of training of sericulture farmers on mulberry production and silkworm rearing technique.

III. Conclusions and Recommendations

1. Mulberry Production. Need to obtain sufficient mulberry leaves to feed two boxes of silkworms for 6 cycles a year. Measures needed for this are:

a) Selection of suitable land for mulberry production. The land should have water holding as well as water content capacity and should be closed to rearing places as much as possible for better maintenance of field and easier harvesting and transport of leaves.

b) Land preparation. The soil should be ploughed deeply; soil surface must be uniform; manure, compost, etc, must be applied to improve soils. About 1.6 tons of manure per rai which the farmers should prepared by themselves. Where water drainage is very poor in the rainy season, a drainage plan must be prepared with installations of outlets. Spacing between (a) rows must equal 1.5 meters and (b) mulberry trees must be 0.75 meters. For such spacing intervals, a small hand-tractor can be used. Manure and compost must be applied annually so that soil fertility is restored. This must be supplemented with chemical fertilizer of about 100 kgs. per rai per year). This must be applied at the end of each rearing cycles i.e., about 6 times a year.

c) Plantation. The Sericulture Division recommended to use the Noi variety that gives a better production of leaves but it is susceptible to root rot disease to graft with Pai variety that have been proved to be a highly resistance to root-rot disease. The Sericulture Division should provide enough cuttings for the farmers to be planted in time for this planting season.

d) Mulberry Management. To facilitate silkworm rearing, mulberry field for young silkworm has to be planted separately from the field for old silkworms. The cultivation, prunning and harvesting method, for the young and old mulberry plots at the dry and rainy seasons should be practiced differently. The farmer's mulberry plot should be divided into two fields, each field will be harvested three times. By doing this, the farmer will have enough mulberry leaves for feeding 6 cycles of silkworms annually. See picture.

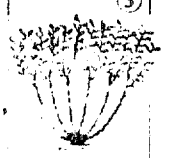
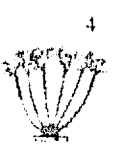
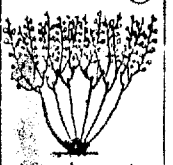
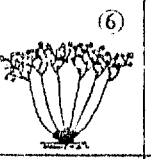
Plot to be set up	Base cutting	Rearing order					
		I	II	III	IV	V	VI
		Time to be harvested					
		Early in June	Early in August	Mid-September	Early in November	Mid-December	Early in next February
A	Mid-March 	Before harvest (1)  After harvest (Cut at 1 m from the base) 		Before harvest (3)  After harvest (Cut above the parting of shoots, leaving 4–5 leaves) 4 		Before harvest (5)  After harvest (Cut above the parting of regenerated shoots, leaving 4–5 leaves) (6) 	
	The expected leaf yield per rai, 2,000kg	600 kg		1,000 kg		400 kg	
	Leaf yield ratio for each rearing season, %	30%		50%		20%	
B	Early in May 		Before harvest See (1) After harvest See (2)		Before harvest See (3) After harvest See (4)		Before harvest See (5) After harvest See (6)
	The expected leaf yield per rai, 2,000 kg		600 kg		1,000 kg		400 kg
	Leaf yield ratio for each rearing season, %		30%		50%		20%

Fig. 2. Harvesting method of mulberry shoots for grown silkworms, reared 6 times in a year.

e) One demonstration farm should be set up in every settlement. This plot should be at the center of the villages access to good communication. The extension workers should be responsible for selection for this demonstration plot. After consulting the sericulturist about the suitability of the soil the Agents should use their own judgements in alternating plots. Arrangement should also be made for other project participants to observe development in this plot. Any problems on mulberry disease should be solved at the same time.

f) Unexpected event. Root rot disease* has spread out to every settlement. Each settlement should be made responsible for providing sufficient mulberry leaves to the settlers for feeding silkworms. The central mulberry plot should be expanded for this purpose and mulberry leaves sold to settlers with payments for leaf purchase being deducted when the cocoons are sold. Pruning and harvesting schedules should be carefully planned taking into consideration the schedule of farmers rearing silkworm with other competing activities.

At present, the technique established to reduce damage caused by root rot disease is to graft Noi, Soi varieties of mulberry (which has good quality and high output leaves but low resistance to disease) with Pai type which has a high resistance. Until the discovery of suitable prevention and curing method is found and it is recommended that a policy be adopted to promote the grafting method. This should be propagated quickly in order to reduce the damages from root rot disease and reduce damage areas.

2. Silkworm Rearing. The evaluator found the following concerning the undermentioned activities:

a) Old Silkworm Rearing House. The temperature inside of the old silkworm rearing house is too high (above 30 C). Usually the appropriate temperature should be at 21 -22 C., humidity at 75%. To solve this problem, the extension workers should assist farmer in laying out the rearing house. The house should not directly face the sun.

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* The research on root rot disease is still going on by the Sericulture Division. However, suitable prevention and curing method have not yet been discovered.

More shade should be built up by planting big trees around the house. Planting grass around the house also helps reduce the heat. Ventilation should be provided by insulating the ceilings under the roof. This will reduce temperatures considerably - and be more appropriate for rearing silkworms.

b) Disease Control. Hygenie techniques should be strictly followed by farmers both in and out of the houses. The old silk worm house should be cleaned as much as possible. The house should be fumigated with fomaline 2-3 percent for 2 to 3 times after each rearing of silkworm. The amount should be higher in the wet season when diseases occurrence is high. (This is low during the dry season). The dead or infected worms should be picked out and disinfected in order to prevent spread of disease. Any problems on diseases should be brought to the attention of the agent and supervisor as soon as possible.

c) Appropriate Feeding. Farmers should feed the worms in sufficient quantities and at appropriate times. At the young stage mulberry leaf requirement is about 15 kg. per box and about 58.5 kg. per box for the older stage. Faded leaves should not use in feeding silkworms. Old silkworms should be fed with branches instead of leaves in order to save picking time.

d) Demonstration Home. This should be done consistent with the mulberry demonstration plot as stated before.

e) Spacing. Silkworm grows very fast, the space consumed increases with each feeding. Spacing is very important in order to provide silkworm with sufficient mulberry leaves. At the young stage, the size of tray should be spaced at 80 cm. x 110 cm. It requires 3 trays for silkworms at the third stage. For the old worm the appropriate space is 150 worms for 30 cm. x 30 cm.

3. Silkworm Eggs Supply

The Sericulture Division is responsible for providing silkworm eggs to the farmers in sufficient amount as demanded by the farmers. Existing variety is suitable to the Northeast Thailand which can yield not less than 20 kg. per box. However, research should be done continuously in order to get a better variety. The new improved variety, which is a cross between the hybrid silkworms and the native silkworms, is still under study and the result not firmed. (See Attachment 1).

The demand and supply of silkworm eggs should be matched in order to meet with the schedule. The schedule should be made about a year ahead of time. Any changes in demand should be reported to the Sericulture Division within 2 weeks prior to the rearing cycle.

Quality and quantity should be controlled by the Sericulture Division in order to meet the standard. Incubation room and cooling storage room should be put into operation immediately to be in time for 1981 rearing cycle.

4. Training

Many level of trainings are required within the project. This includes the superintendent, project supervisor, extension worker and the sericulture staff. As shown in the table below, as of 1980 the Korat Center was provided the training to 10 supervisors, 56 extension workers and 161 farmers for 10 land settlements. (The rest of the farmers received trainings from the other training stations, such as Surin and Mukdahan Sericulture Experiemental Station).

The evaluator found that the farmers did not do well in implementing the project because of poor training of project staff. These require more trainings in every level of administration. Extension technique should be included in their curriculum with more refresh courses. The sericulture staff should stay permanently in the settlement during the rearing cycle for the next 3 years. The main responsibility of the sericulture staff is to train the extension workers at the project site in order to provide the right appropriate technology to the farmers. Day to day problems pertaining to the mulberry production and silkworm rearing technique should be solved right away by the sericulture staff. Demonstration plots should be conducted by extension workers in every settlements. Criteria for selection should include the location of the farmer who is interested in participating more successfully in the Project. Technical leadership training should be provided to farmers so that trained farmer would be able to train other farmers in the future.

Course of trainings should not be fixed. It should be changed according to the situation in rearing silkworms and the new technology found at that time and the problem confronting each of the different settlements.

Number of Sericultural Training at Korat Center (1976-80)

	Supervisor	Extension Staff	Farmer
1976	-	10	102
1977	10	21	43
1978	-	14	16
1979	1	11	-
1980	0	0	0
Total	10	56	161

Remark: The supervisor refresh training 1-2 weeks in every year.

5. Others

a) Silkworm egg supply should be provided by private producers in the future whenever the demand exceeds those projected in this Project.

b) Cocoon marketing also might be an appropriate role to the private sector. An observation tour to Japan for one or two persons for 1-2 months is needed to serve this purpose in order to be sure that the farmers receive an appropriate share of their incomes.

c) Awards should be provided to the farmers every year in order to improve the quality of cocoon production.

d) The textbook on "Silkworm Rearing Technique in the Tropics which written by Dr. Seinosuke Omura should be translated to Thai and should be used as a major reference for the staff involved in the silk project. Simple language with a lot of pictures should be summarized and distributed to the sericulture project farmers.

Attachment 1

TRANSLATION

At present, there are 3 main types of silk worm varieties that are produced by the Sericulture Division for the farmers. These are:

1. Polyvoltine

This variety is used by most of the farmers in rearing silkworms, such as Naw Khaw 4, Paw Chaw 21 or Raw Or 3, etc. The selection, reproduction and reservation of these varieties are conducted in 10 sericulture experimental stations in the Northeast.

2. Bivoltine

This is the hybrid silkworm crossed between Chinese and Japanese silk worm varieties. The Korat Sericulture Research and Training Centre is responsible for reservation, selection, improvement and transporting the parents for reproduction to Khon Kaen, Udon, Mukdahan and Ubol Sericulture experimental stations. These varieties are $K_1 \times K_{14}$, $K_1 \times K_8$ etc. The Sericulture/Settlements Project under the Public Welfare Department uses these varieties.

3. Hybrid silkworm crossed between polyvoltine and bivoltine (new improved native variety). The study has been carried out by the technicians of the Sericulture Division in the last 10 years. It was found that this silk worm variety can be reared under our environment and can give a better yield than the polyvoltine variety and has a tendency for moderate resistance to silkworm diseases.

The new improved native silkworm variety mentioned in item 3, if we usepolyvoltine as a mother, the silkworm eggs have a characteristic of polyvoltine which means that it takes about 12-15 days for hatching by nature. If mother is bivoltine variety, the egg production will be either bivoltine or polyvoltine. Without the artificial hatching the hatch-ability rate is high and sometimes it is low which is the characteristic of the bivoltine variety. The production of this new improved silkworm variety has some technical problem. The production plan can not be fixed and it caused the problem of unable to produce in a mass form.

In the last 2 years, Buriram Sericulture Experimental Station and some stations have been success in producing this new improved silkworm variety. They can produce the silkworm eggs which mother is either the polyvoltine or bivoltine varieties by little adapting the artificial hatching technique which is being used for the bivoltine variety. The Sericulture Division has asked the Buriram Sericulture Station distribute the new improved native variety to the farmers for testing. It is received an acceptance from the farmers. The fibre produced from this variety can be reeled by hand and sold as a weft. However, the production of the new improved native variety is still had some problems for a mass production in many levels, such as it can not be sure in defining the fixed parents. This is still under experimentation for the prolong life of the silkworm eggs in the cold storage room in order to control the hatching time. It is estimated that it will take about 1-2 years for developing this new improved native variety.

Prepared by Mr. Chote Suvipakit, Director of the Sericulture Division, April 10, 1981.

Appendix E

Sericulture/Settlements Project Evaluation: Data for Economic Analysis

Internal Rate of Return (฿1,000)

Year	Costs (-)[1/]	Benefits (+)[2/]	Net benefits
0	20,698	-	-20,698
1	9,989	2,930	-7,059
2	7,672	4,697	-2,975
3	6,934	5,003	-1,930
4	5,806	5,694	- 112
5	8,103	6,768	-1,335
6	9,465	8,012	-1,452
7	10,866	11,249	383
8	7,254	16,036	5,781
9	6,837	18,880	12,043
10	7,032	19,200	12,168
11	7,154	19,200	12,046
12	7,300	19,200	11,900
13	7,434	19,200	11,766
14	7,520	19,200	11,680
15	7,607	19,200	11,593

IRR = 9.07

1/ Costs: Project costs include Central Rearing Houses, Central mulberry plantation, Farmer rearing houses, Farmer mulberry plantation, Farmer training, Management training, Extension housing and salaries, Vehicles, road improvement, Farmer training center.

2/ Benefits are: 1) value of cocoon sales; 2) value of roads, and 3) employment represents additions to income of workers as a result of project generated employment.

Appendix E1

Sericulture/Settlements Project Evaluation Data for Economic Analysis

Average Financial Rate of Return (26.98%),

Year	26%		27%	
	Discount factor	Present value of cash flows	Discount factor	Present value of cash flows
1	.794	-3,779	.787	-3,746
2	.630	2,818	.620	2,773
3	.500	3,796	.488	3,705
4	.397	2,978	.384	2,881
5	.315	3,139	.303	3,019
6	.250	2,820	.238	2,685
7	.198	2,555	.188	2,426
8	.157	2,195	.148	2,069
9	.125	2,353	.116	2,183
10	.099	1,810	.092	1,682
11	.079	1,582	.072	1,441
12	.062	1,208	.057	1,111
13	.050	1,001	.045	901
14	.039	760	.035	682
15	.031	621	.028	561
		25,857		24,373

Financial rate of return	26.98%
Farmer cost of capital	8.00%
Net benefit to farmer (Excluding farmer labor cost)	18.98%

Appendix E1 (Continued)

Farmer Income and Expense Statement on Cocoon Production

Unit: Baht

Year	Income From Cocoon Sales	Expenses on Mulberry Production, Rearing Houses and Eggs	Cash Flow
1	3,325.6	8,085.0	- 4,759.4
2	7,483.8	3,011.0	4,472.8
3	10,070.3	2,479.0	7,591.3
4	10,541.2	3,039.0	7,502.3
5	13,464.0	3,500.0	9,964.0
6	15,422.4	4,143.0	11,279.4
7	16,621.2	3,719.0	12,902.2
8	18,348.3	4,368.0	13,980.3
9	22,800.0	3,980.0	18,820.0
10	22,800.0	4,515.0	18,285.0
11	24,000.0	3,980.0	20,020.0
12	24,000	4,515.0	19,485.0
13	24,000	3,980.0	20,020.0
14	24,000	4,515.0	19,485.0
15	24,000	3,980.0	20,020.0

NOTE: This Table is being used in calculation of the Financial Rate of Return in Appendix E1.

Appendix E2

Sericulture/Settlements Project Evaluation: Data for Economic Analysis

Internal Rate of Return: Prasat Land Settlement (฿1,000)

Year	Costs (-)	Benefits (+)	Net Benefits
0	-2,014.1	-	-2,014.1
1	-1,195.2	262.1	- 933.1
2	- 544.4	564.7	20.3
3	- 515.2	513.8	1.4
4	- 548.4	569.3	20.9
5	- 732.8	668.9	- 63.9
6	-1,096.8	890.3	- 206.5
7	-1,163.3	1 384 5	221.2
8	- 703.7	2,004.5	1,300.8
9	- 719.9	2,360.0	1,640.1
10	- 733.3	2,400.0	1,666.7
11	- 746.8	2,400.0	1,653.2
12	- 761.8	2,400.0	1,638.2
13	- 777.5	2,400.0	1,622.5
14	- 786.8	2,400.0	1,613.2
15	- 796.2	2,400.0	1,603.2

IRR = 14.28

Appendix E3

Sericulture/Settlements Project Evaluation: Data for Economic Analysis

Internal Rate of Return: Lam Dom Noi Land Settlement (฿1,000)

Year	Costs (-)	Benefits (+)	Net Benefits
0	-1,964.0	-	-1,964.0
1	- 994.8	235.7	- 759.1
2	- 607.9	407.5	- 200.4
3	- 465.4	382.9	- 82.5
4	- 451.7	429.7	- 22.0
5	- 687.3	504.9	- 182.4
6	- 990.4	741.9	- 248.5
7	-1,321.3	1,211.4	- 109.9
8	- 606.3	2,004.5	1,398.2
9	- 548.3	2,360.0	1,811.7
10	- 626.7	2,400.0	1,773.3
11	- 635.1	2,400.0	1,764.9
12	- 644.6	2,400.0	1,755.4
13	- 653.9	2,400.0	1,746.1
14	- 660.4	2,400.0	1,739.6
15	- 667.0	2,400.0	1,733.0

IRR = 14.15

Appendix E4

Sericulture/Settlements Project Evaluation: Data for Economic Analysis

Internal Rate of Return: Lam Dom Yai Land Settlement (฿1,000)

Year	Costs (-)	Benefits (+)	Net Benefits
0	- 1,837.3	-	-1,837.3
1	- 902.7	113.1	- 789.6
2	- 401.7	284.9	- 116.8
3	- 387.3	302.3	- 85.0
4	- 452.7	322.2	- 130.5
5	- 441.2	378.7	- 62.5
6	- 692.7	445.2	- 247.5
7	- 729.5	692.3	- 37.2
8	- 503.0	1,002.2	499.2
9	- 515.0	1,180.0	665.0
10	- 525.4	1,200.0	674.6
11	- 535.8	1,200.0	664.2
12	- 547.8	1,200.0	652.2
13	- 560.5	1,200.0	639.5
14	- 566.3	1,200.0	633.7
15	- 572.1	1,200.0	627.9

IRR = 4.18

Appendix E5

Sericulture/Settlements Project Evaluation: Data for Economic Analysis

Internal Rate of Return: Kham Soi Land Settlement (฿1,000)

Year	Costs (-)	Benefits (+)	Net Benefits
0	-2,008.6	-	-2,008.6
1	-1,032.1	291.3	- 740.8
2	-1,626.3	549.0	-1,077.3
3	-1,619.6	695.2	- 924.4
4	-1,095.3	1,149.3	54.0
5	-1,368.5	1,603.1	234.6
6	-1,487.3	2,255.3	768.0
7	-1,368.8	3,115.4	1,746.6
8	- 936.1	4,009.0	3,072.9
9	- 957.1	4,720.0	3,762.9
10	- 970.6	4,800.0	3,829.4
11	- 984.3	4,800.0	3,815.7
12	- 999.6	4,800.0	3,800.4
13	-1,015.5	4,800.0	3,784.5
14	-1,025.0	4,800.0	3,775.0
15	-1,034.5	4,800.0	3,765.5

IRR = 22.68

Appendix E6

Sericulture/Settlements Project Evaluation: Data for Economic Analysis

Internal Rate of Return: Kuchinarai Land Settlement (฿1,000)

Year	Costs (-)	Benefits (+)	Net Benefits
0	- 2,309.3	-	-2,309.3
1	- 985.2	134.0	- 851.2
2	- 549.7	399.2	- 150.5
3	- 528.2	503.8	- 24.4
4	- 529.6	537.1	7.5
5	- 543.4	631.1	87.7
6	- 518.5	741.9	223.4
7	- 580.3	865.3	285.0
8	- 1,111.9	1,403.1	291.2
9	- 627.4	1,652.0	1,024.6
10	- 640.8	1,680.0	1,039.2
11	- 654.2	1,680.0	1,025.8
12	- 669.1	1,680.0	1,010.9
13	- 684.7	1,680.0	995.3
14	- 693.9	1,680.0	986.1
15	- 703.2	1,680.0	976.8

IRR = 8.40

Appendix E7

Sericulture/Settlements Project Evaluation: Data for Economic Analysis

Internal Rate of Return: Lam Pao Land Settlement (฿1,000)

Year	Costs (-)	Benefits (+)	Net Benefits
0	-2,275.7	-	-2,275.7
1	-1,032.7	295.0	- 737.7
2	- 468.1	552.7	- 84.6
3	- 515.6	483.6	- 32.0
4	- 539.7	537.1	- 2.6
5	- 821.3	631.1	- 190.2
6	-1,086.7	890.3	- 196.4
7	-1,152.9	1,384.5	231.6
8	- 692.8	2,004.5	1,311.7
9	- 709.5	2,360.0	1,650.5
10	- 722.8	2,400.0	1,677.2
11	- 736.2	2,400.0	1,663.8
12	- 751.2	2,400.0	1,648.8
13	- 766.7	2,400.0	1,633.3
14	- 775.9	2,400.0	1,624.1
15	- 785.2	2,400.0	1,614.8

IRR = 13.86

Appendix E8

Sericulture/Settlements Project Evaluation: Data for Economic Analysis

Internal Rate of Return: Ubonrat Dam Land Settlement (฿1,000)

Year	Costs (-)	Benefits (+)	Net Benefits
0	-2,275.7	-	-2,275.7
1	- 865.8	262.1	- 353.5
2	-2,163.7	512.3	-1,651.4
3	-1,579.9	715.3	- 864.6
4	- 686.4	1,149.3	462.9
5	-1,542.8	1,350.6	- 192.2
6	-1,436.3	2,032.8	596.5
7	-1,877.9	2,803.6	925.7
8	- 995.5	4,009.0	3,013.5
9	-1,016.7	4,720.0	3,703.3
10	-1,030.5	4,800.0	3,769.5
11	-1,044.5	4,800.0	3,755.5
12	-1,060.1	4,800.0	3,739.9
13	-1,076.3	4,800.0	3,723.7
14	-1,086.1	4,800.0	3,713.9
15	-1,095.9	4,800.0	3,704.1

IRR = 20.67

Appendix E9

Sericulture/Settlements Project Evaluation: Data for Economic Analysis

Internal Rate of Return: Chiang Phin Land Settlement (฿1,000)

Year	Costs (-)	Benefits (+)	Net Benefits
0	-1,705.5	-	-1,705.5
1	- 824.8	133.2	- 691.6
2	- 516.4	252.6	- 263.8
3	- 416.5	231.7	- 184.8
4	- 463.8	247.1	- 216.7
5	- 721.4	290.3	- 431.1
6	- 633.8	489.6	- 144.2
7	- 746.0	692.2	- 53.8
8	- 520.0	1,002.2	482.2
9	- 532.5	1,180.0	647.5
10	- 543.6	1,200.0	656.4
11	- 554.8	1,200.0	645.2
12	- 567.1	1,200.0	632.9
13	- 580.0	1,200.0	620.0
14	- 589.0	1,200.0	611.0
15	- 598.1	1,200.0	601.9

IRR = 2.89

Appendix E10

Sericulture/Settlements Project Evaluation: Data for Economic Analysis

Internal Rate of Return: PhonPhisai Land Settlement (฿1,000)

Year	Costs (-)	Benefits (+)	Net Benefits
0	-2,080.0	-	-2,080.0
1	- 707.4	335.3	- 372.1
2	- 396.4	480.7	84.3
3	- 465.9	302.3	- 163.6
4	- 527.6	322.2	- 205.4
5	- 735.2	378.7	- 356.5
6	-1,046.2	563.8	- 482.4
7	-1,434.3	1,003.8	- 430.5
8	- 671.4	1,804.0	1,132.6
9	- 684.7	2,124.0	1,439.3
10	- 701.0	2,160.0	1,459.0
11	- 714.4	2,160.0	1,445.6
12	- 729.4	2,160.0	1,430.6
13	- 745.0	2,160.0	1,415.0
14	- 754.2	2,160.0	1,405.8
15	- 763.5	2,160.0	1,396.5

IRR = 11.49

Appendix E11

Sericulture/Settlements Project Evaluation: Data for Economic Analysis

Internal Rate of Return: Ban Kruat Land Settlement (฿1,000)

Year	Costs (-)	Benefits (+)	Net Benefits
0	-2,228.2	-	-2,228.2
1	-1,448.5	366.1	-1,003.4
2	- 397.4	665.4	268.0
3	- 439.9	769.0	329.1
4	- 511.0	429.7	- 81.3
5	- 509.2	504.9	- 4.3
6	- 476.1	593.6	117.5
7	- 492.4	692.2	199.8
8	- 513.8	801.8	288.0
9	- 525.9	944.0	418.1
10	- 537.1	960.0	422.9
11	- 548.3	960.0	411.7
12	- 560.6	960.0	399.4
13	- 573.7	960.0	386.3
14	- 582.8	960.0	377.2
15	- 591.5	960.0	368.5

IRR = 2.01

APPENDIX - F

SERICULTURE/SETTLEMENTS PROJECT

PROGRESS OF SERICULTURE FROM 1977 TO DECEMBER 1980

Year	Raw Silk Cocoon Produced		Value ฿
1977	9,927.9	kgs.	513,403.00
1978	24,158.6	"	1,348,503.07
1979	37,404.3	"	2,627,429.07
1980	36,294.7	"	2,604,120.70
Total	107,785.5	"	7,093,455.84

Source: Sericulture Subcommittee Meeting No.1/1981 Jan.21,1981

APPENDIX G

Actual Cocoon Production Compared with Revised Plan by Settlement, by Year

Unit: kg

Land Settlement	1977			1978			1979			1980			1977-1980 Combined		
	Planned	Actual	%	Planned	Actual	%	Planned	Actual	%	Planned	Actual	%	Planned	Actual	%
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Prasat	6,318	1,732	27.41	11,583	2,410	20,81	12,636	3,289	26.03	16,848	2,247	13.34	47,385	9,678	20.42
Lam Dom Noi	6,318	127	2.01	16,005	1,566	9.78	18,954	1,695	8.94	25,272	1,887	7.47	66,549	5,275	7.93
Lam Dom Yai	6,318	423	6.69	8,424	2,064	24.5	8,424	2,081	24.7	10,530	1,787	16.97	33,696	6,355	18.86
Kham Soi	6,318	99	1.57	23,587.2	4,852	20.57	29,484	8,227	27.9	35,802	12,738	35.58	95,191	25,916	27.23
Kuchinarai	6,318	96	1.52	11,583	3,717	32.10	16,848	5,782	34.32	24,219	4,956	20.46	58,968	14,551	24.68
Lam Pao	6,318	-	-	9,477	2,625	27.70	16,848	2,236	13.27	27,378	2,100	7.67	60,021	6,961	11.6
Ubonrat Dam	6,318	560	8.86	20,217.6	5,927	29.32	29,484	7,816	26.51	42,120	4,341	10.31	98,139	18,644	19.0
Chiang Phin	5,054	322	6.37	6,318	1,320	20.89	8,424	1,807	21.45	10,530	2,856	27.12	30,326	6,305	20.79
Phon Phisai	6,318	309	4.89	15,795	1,193	7.55	15,795	2,484	15.73	21,060	3,049	14.48	58,968	7,035	11.93
Ban Kruat	6,318	1,577	24.96	15,163.2	519	2.42	15,163.2	1,680	11.08	21,060	1,517	7.2	57,704	5,293	9.17
Combined	63,180	5,245	8.30	138,153.6	26,193	18.95	169,954.2	37,124	21.84	234,819	37,482	15.96	606,946	106,013	17.47

APPENDIX H

Selected Statistics on Cocoon Production in 10 Land Settlement$ 1977-1981

Items	Sericulture Production Year			
	1977-78	1978-79	1979-80	1980-81
1. Average gross income/ farmer/year ฿	4,805.00	8,270.79	12,213.30	12,477.51
2. No. of farmers rearing silkworm/cycle				
Average ฿	62	183	214	231
Range ฿	22-88	50-276	48-334	31-370
Median ฿	76	205	262	245
3. No. of cycles in rearing silkworms				
Average Cycles	2.7	5.5	5.5	5.4
Range	0-5	4-7	4-8	4-7
Median	2	5.5	5	5.5
4. Cocoon Production/box				
Average kg.	17.30	15.68	17.69	15.54
Range	4.2-30.3	8.3-22.1	10.05-28.28	9.95-19.51
Median	17.50	15.81	18.71	15.02
5. Price of cocoon/kg. (old & new price)				
Average ฿	54.77	64.20	76.06	83.96
Range ฿	45.96-76.71	51.26-78.28	61.60-85.65	73.59-95.82
Median	55.0	64.12	77.20	82.50
6. Amount of silkworm rearing/farmer/cycle				
Average Boxes	1.08	1.35	1.36	1.50
Range	0.94-1.09	1.02-1.65	0.86-1.61	1.13-1.94
Median	1.01	1.45	1.39	1.45

APPENDIX I

Revised Plan and Actual Number of Member of Sericulture Settlements Project, by settlement as of March 1981

Land Settlement	1977 - 1978		1979		1980		1981		1977 - 1980		
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Percentag
PRASAT	55	51	5	-	20	2	20	na	80	53	66
LAM DOM NOI	76	32	4	6	30	2	30	na	120	40	33
LAM DOM YAI	40	30	-	-	10	-	-	na	50	30	60
KHAM SOI	112	45	28	24	30	38	30	na	170	107	63
KUCHINARAI	55	46	25	4	35	-	35	na	115	50	43
LAM PAO	45	45	35	3	50	-	50	na	130	48	37
UBONRAT DAM	96	44	44	27	60	36	60	na	200	107	53
CHIANG PHIN	24	23	10	-	16	-	-	na	50	23	46
PHON PHISAI	75	20	-	-	25	23	-	na	100	43	43
BAN KRUAT	72	30	-	-	28	-	-	na	100	30	30
COMBINED	652	366	151	64	304	101	225	na	1,115	531	48

APPENDIX J

PLANNED AND ACTUAL NUMBER OF PROJECT PERSONNEL AS OF MARCH 1981 (PWD)

Land Settlement	Sericulture Supervisor		Agricultural Extension Worker			
			Permanent		Tempory ***	
	Planned	Actual	Planned	Actual	Planned	Actual
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Prasat	1	1	3	3	1	-
Lam Dom Noi	1	1*	3	2**	1	-
Lam Dom Yai	1	1*	2	2	1	-
Kham Soi	1	1	3	4**	1	1
Kuchinarai	1	1	3	3	1	-
Lam Pao	1	1	3	3	1	-
Ubonrat Dam	1	1	3	4**	1	1
Chiang Phin	1	1*	2	1	1	2
Phon Phisai	1	1	3	3	1	-
Ban Kruat	1	1	2	2	1	-
Combined	10	10	27	27	10	3

NOTE: * They are agricultural extension workers who have been assigned as "acting supervisor" due to the resignation/transfer of supervisors. The assignment is likely to be permanent.

** One out of these extension agents have not had training in sericulture.

*** Each of the 10 settlements is allowed to hire 1 extension agent on the temporary basis, however, only 3 of of ten settlements is doing this. It is possible for the other 7 settlements that either they do not need or could not find one.

APPENDIX K

Personnel of Sericulture Division, MOAC FY 1977-1981

CATEGORY	F Y				
	1977	1978	1979	1980	1981
Office of Director					
Director	1	1	1	1	1
Sericulturist (6)	1	1	1	1	1
Administrative Officer	1	1	1	1	1
Clerk and typist	7	7	7	7	7
Korat Center					
Sericulturist (7)	1	1	1	1	1
Sericulturist (5-6)	14	14	14	14	14
Sericulturist (3-4)	18	18	18	18	18
Sericulturist (1-2)	6	6	6	6	6
Non-techical staff	7	7	7	7	7
Udon Sub-station					
Sericulturist (7)	1	1	1	1	1
Sericulturist (3)	4	5	5	5	5
Sericulturist (1-2)	3	3	3	3	3
Non-technical staff	1	1	2	2	2
Khon Kaen Sub-station					
Sericulturist (7)	1	1	1	1	1
Sericulturist (3-4)	5	5	5	5	6
Sericulturist (2)	1	1	1	1	1
Non-technical staff	1	1	1	1	1
Ubon Sub-station					
Sericulturist (7)	1	1	1	1	1
Sericulturist (5)	1	1	1	1	1
Sericulturist (3)	4	4	4	4	4
Sericulturist (2)	1	1	1	1	1
Non-technical staff	-	-	1	1	1
Mukdahan Sub-station					
Sericulturist (6)	1	1	1	1	1
Sericulturist (3-4)	5	5	5	5	5
Sericulturist (2)	2	2	2	2	2
Non-technical staff	2	2	2	2	2

Note: Figures in parentheses indicate level of Post Classification

APPENDIX L

CENTRAL MULBERRY PLANTATION OF 10 LAND SETTLEMENTS AS OF MARCH 1981

Land Settlement	Area Planted during 1977-1979 (rai)		Area Planted In 1980	Total
	Total Area	Area Under Loan Funds		
Prasat	100	60	-	100
Lam Dom Noi	110	60	-	110
Lam Dom Yai	100	60	-	100
Kham Soi	100	60	30*	100
Kuchinarai	90	60	-	90
Lam Pao	90	60	-	90
Ubonrat Dam	130	60	-	130
Chiang Phin	90	60	-	90
Phon Phisai	100	60	-	100
Ban Kruat	110	60	-	110
Combined	1,020	600	30	1,020

* Replacing the original plantation planted in 1977.

APPENDIX M

ORIGINAL PLAN OF CONSTRUCTION OF CENTRAL YOUNG SILK WORM REARING HOUSES

Land Settlements	1977-1978		1979		1980		1981		Total 1977-1981	
	No. Constructed Under Present Project	No. Constructed Under PWD's Sericulture Project	Planned	Actual	Planned	Actual	Planned	Actual 1/	Planned	Actual
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Prasat	1	1	-	-	-	-	-	-	2	2
Lam Dom Noi	1	1	-	-	-	-	1	-	3	2
Lam Dom Yai	1	-	-	-	-	-	-	-	1	1
Kham Soi	1	1	1	1	-	-	1	-	4	3
Kuchinarai	1	1	-	-	-	-	1	-	3	2
Lam Pao	1	1	-	-	-	-	1	-	3	2
Ubonrat Dam	1	1	1	1	1	-	1	-	5	3
Chiang Phin	1	-	-	-	-	-	-	-	1	1
Phon Phisai	1	1	-	-	-	-	-	-	2	2
Ban Kruat	1	1	-	-	-	-	-	-	2	2
Combined	10	8	2	2	1	-	5	-	26	20

1/ No plan for construction within this year because of less number of new participating farmers.

APPENDIX N

FARMERS' MULBERRY PLANTATION BY SETTLEMENT, 1978 - 1979

Unit:Rai

Land Settlement	1978			1979		
	Average	Median	Range	Average	Median	Range
Prasat	3.42	4	1-4	n.a	n.a	n.a
Lam Dom Noi	6.02	6	4-9.5	4.99	5	0.3-9.2
Lam Dom Yai	4.59	4	3-6	4.41	4	3-6
Kham Soi	5.73	5	2-12	5.51	5	2-12
Kuchinarai	4.90	4	4-8	4.84	4	4-8
Lam Pao	4.42	4	3-9	4.49	4	3-9
Ubonrat Dam	4.31	4	2.5-9	4.38	4	2.5-9
Chiang Phin	6.62	6	4-14	5.81	5	4-10
Phon Phisai	4.00	4	2-6	3.88	4	2-6
Ban Kruat	n.a	n.a	n.a	n.a	n.a	n.a
Combined	4.89	-	-	4.78	-	-

APPENDIX O

NUMBER OF SILKWORM RAISERS, WHO HAD AND HAD NOT RECEIVED FORMAL TRAINING IN 1979 - 80 PRODUCTION YEAR

Land Settlement	Total Raisers	Raisers who received formal training		Raisers who did not receive formal training	
		Number	Percent	Number	Percent
Prasat	48	38	79.17	10	20.83
Lam Dom Noi	22	16	72.73	6	27.27
Lam Dom Yai	22	16	72.73	6	27.27
Kham Soi	44	34	77.27	10	22.73
Kuchinarai	45	41	91.11	4	8.89
Lam Pao	48	44	91.67	4	8.33
Ubonrat Dam	66	53	80.30	13	19.70
Chiang Phin	14	11	78.57	3	21.43
Phon Phisai	20	14	70.00	6	30.00
Ban Kruat	NA	NA	NA	NA	NA
Combined	329	267	81.16	62	18.84

APPENDIX P

Distribution of Annual Income Among Sericulture Project's Farmers by Settlement, 1977

Land Settlement	Income brackets (Baht)							Annual family income (Baht)		
	<3,000	3,000-5,000	5,001-7,000	7,001-9,000	9,001-11,000	>11,000	all brackets	mean	median	range
PRASAT	15 (40	7 (19)	5 (13)	1 (3)	1 (3)	8 (22)	37 (100)	6,311	4,481	241-32,692
LAM DOM NOI	18 (45)	9 (23)	8 (20)	4 (10)	-	1 (2)	40 (100)	3,764	3,175	182.5-11,909
LAM DOM YAI	6 (16)	9 (24)	7 (18)	6 (16)	1 (3)	9 (24)	38 (100)	8,170	6,187	1,162-47,844
KHAM SOI	12 (27)	10 (22)	7 (15)	4 (9)	1 (2)	11 (24)	45 (100)	9,509	6,057	239-74,310
KUCHINARAI	11 (22)	11 (22)	5 (10)	5 (10)	5 (10)	14 (27)	51 (100)	9,061	5,600	10-57,928
LAM PAO	12 (27)	6 (13)	9 (20)	1 (2)	3 (7)	14 (31)	45 (100)	11,616	6,626	40-51,575
UBONRAT DAM	19 (43)	5 (11)	5 (11)	3 (7)	1 (2)	11 (25)	44 (100)	8,182	4,464	113-56,926
CHIANG PHIN	1 (6)	4 (23)	3 (18)	-	3 (18)	6 (35)	17 (100)	12,124	9,306	329-30,991
PHON PHISAI	12 (54)	5 (23)	-	1 (5)	2 (9)	2 (9)	22 (100)	4,732	2,834	86-20,050
BAN KRUAT	11 (44)	3 (12)	1 (4)	3 (12)	1 (4)	6 (24)	25 (100)	7,166	3,561	36-34,826
COMBINED	117 (32)	69 (19)	50 (14)	28 (8)	18 (5)	82 (22)	364 (100)	8,123	-	-

Note: Figures in parenthesis are percentages.

APPENDIX F (Continued)

Distribution of Income Among Sericulture Project Farmers by Size of Mulberry Plot and by Settlement, 1979

Mulberry Plot Size	Income (Baht)								
	Under 3,000	3,000-5,000	5,001-7,000	7,001-9,000	9,001-11,000	Over 11,000	Combined	Average Income	Range of Income
4 rai	53 (28)	52 (28)	37 (20)	23 (13)	12 (7)	7 (4)	184 (100)	4,940	472-16,034
5-6 rai	12 (12)	17 (17)	16 (15)	19 (19)	19 (19)	18 (18)	101 (100)	7,556	875-31,179
7-9 rai	1 (4)	3 (10)	5 (16)	8 (27)	5 (16)	8 (27)	30 (100)	8,458	2,952-19,844
over 9 rai	-	-	1 (11)	3 (33)	-	5 (56)	9 (100)	11,685	6,925-24,637
Combined	66 (20)	72 (22)	59 (18)	53 (16)	36 (11)	38 (12)	324 (100)	6,269	472-31,179

Note: Figures in parentheses are percentages

APPENDIX P1

Distribution of Annual Income Among Sericulture Project's Farmers who grow 4 rai of mulberry tree by Settlement, 1979

Land Settlement 1/	Income brackets (Baht)						Annual family income (Baht)			
	<3,000	3,000-5,000	5,001-7,000	7,001-9,000	9,001-11,000	>11,000	all brackets	mean	median	range
LAM DOM NOI	4 (36)	6 (55)	1 (9)	-	-	-	11 (100)	3,338	3,910	472-5,202
LAM DOM YAI	7 (54)	4 (30)	1 (8)	1 (8)	-	-	13 (100)	3,205	2,709	867-7,733
KHAM SOI	3 (21)	4 (29)	3 (21)	2 (15)	1 (7)	1 (7)	14 (100)	6,034	5,460	1,840-16,034
KUCHINARAI	1 (4)	2 (8)	10 (40)	8 (32)	3 (12)	1 (4)	25 (100)	7,053	6,997	2,589-14,565
LAM PAO	8 (30)	11 (40)	4 (15)	4 (15)	-	-	27 (100)	4,266	3,842	608- 8,496
UBONRAT DAM	24 (40)	11 (18)	10 (17)	5 (8)	6 (10)	4 (7)	60 (100)	4,917	3,820	638-13,113
CHIANG PHIN	1 (14)	3 (43)	2 (29)	-	-	1 (14)	7 (100)	5,641	4,733	2,498-12,858
PHON PHISAI	5 (19)	11 (41)	6 (22)	3 (11)	2 (7)	-	27 (100)	5,068	4,602	1,807- 9,608
COMBINED	53 (28)	52 (28)	37 (20)	23 (13)	12 (7)	7 (4)	184 (100)	4,940	-	472-16,034

1/ No data were available for Prasat and Ban Kruat Settlements

Note: Figures in parenthesis are percentages

APPENDIX P2

Distribution of Annual Income Among Sericulture Project's Farmers who grow 5-6 rai of mulberry tree by Settlement, 1979

Land Settlement 1/	Income brackets (Baht)						Annual family income (Baht)			
	<3,000	3,000-5,000	5,001-7,000	7,001-9,000	9,001-11,000	>11,000	all brackets	mean	median	range
LAM DOM NOI	4 (40)	2 (20)	3 (30)	1 (10)	-	-	10 (100)	4,268	3,821	875-7,899
LAM DOM YAI	-	2 (18)	4 (36)	4 (36)	1 (10)	-	11 (100)	6,655	6,927	3,853-9,286
KHAM SOI	2 (8)	4 (16)	3 (12)	6 (24)	5 (20)	5 (20)	25 (100)	8,807	7,919	2,305-31,179
KUCHINARAI	-	1 (6)	2 (11)	3 (17)	4 (22)	8 (44)	18 (100)	10,047	10,488	3,214-14,197
LAM PAO	3 (27)	3 (27)	2 (18)	2 (18)	1 (10)	-	11 (100)	5,132	4,481	2,119-9,517
UBONRAT DAM	4 (20)	4 (20)	2 (10)	1 (5)	5 (25)	4 (20)	20 (100)	7,626	7,423	950-16,497
CHIANG PHIN	-	-	-	2 (40)	2 (40)	1 (20)	5 (100)	10,232	10,757	7,269-14,267
PHON PHISAI	-	1 (50)	-	-	1 (50)	-	2 (100)	7,692	7,692	4,959-10,425
COMBINED	13 (12)	17 (17)	16 (15)	19 (19)	19 (19)	18 (18)	102 (100)	7,556	-	875-31,179

1/ No data were available for Prasat and Ban Kruat Settlements.

Note: Figures in parenthesis are percentages.

APPENDIX P 3

Distribution of Annual Income Among Sericulture Project's Farmers who grow 7-9 rai of mulberry tree by Settlement, 1979

Land Settlement 1/	Income brackets (Baht)						Annual family income (Baht)			
	<3,000	3,000-5,000	5,001-7,000	7,001-9,000	9,001-11,000	>11,000	all brackets	mean	median	range
LAM DOM NOI	-	2 (29)	2 (29)	3 (44)	-	-	7 (100)	6,290	6,668	3,895-8,26
KHAM SOI	1 (8)	-	-	3 (25)	3 (25)	5 (42)	12 (100)	10,853	10,395	2,952-16,6
KUCHINARAI	-	-	1 (20)	1 (20)	-	3 (60)	5 (100)	14,394	18,378	5,931-19,8
LAM PAO	-	1 (50)	-	1 (50)	-	-	2 (100)	5,452	5,452	3,706-7,19
UBONRAT DAM	-	-	1 (33)	-	2 (67)	-	3 (100)	8,490	9,225	6,703-9,54
CHIANG PHIN	-	-	1 (100)	-	-	-	1 (100)	5,271	5,271	5,271-5,271
COMBINED	1 (4)	3 (10)	5 (16)	8 (27)	5 (16)	8 (27)	30 (100)	8,458	-	2,952-19,84

1/ No data were available for Prasat and Ban Kruat Settlements

Note: Figures in parenthesis are percentages.

APPENDIX P4

Distribution of Annual Income Among Sericulture Project's Farmers who grow more than 9 rai of mulberry tree Settlement, 1979

Land Settlement	Income brackets (Baht)							Annual family income (Baht)		
	<3,000	3,000-5,000	5,001-7,000	7,001-9,000	9,001-11,000	>11,000	all brackets	mean	median	range
LAM DOM NOI	-	-	-	1 (100)	-	-	1 (100)	8,114	8,114	8,114- 8,11
KHAM SOI	-	-	1 (20)	1 (20)	-	3 (60)	5 (100)	13,712	11,496	6,925-24,6
CHIANG PHIN	-	-	-	1 (33)	-	2 (67)	3 (100)	13,228	12,262	7,612-19,8
COMBINED	-	-	1 (11)	3 (33)	-	5 (56)	9 (100)	11,685	-	6,925-24,6

Note: Figures in parenthesis are percentages

Appendix Q

Mulberry and Silkyarn Production, Thailand, 1977-1979

CHANGWAT	1977			1978			1979		
	Mulberry Plantation ('000 rais)	Number of Household Rearing Silkworm ('000)	Silkyarn Produced ('000 kg)	Mulberry Plantation ('000 rais)	Number of Household Rearing Silkworm ('000)	Silkyarn Produced ('000 kg)	Mulberry Plantation ('000 rais)	Number of Household Rearing Silkworm ('000)	Silkyarn Produced ('000 kg)
Surin	52.91	81.55	86.07	47.94	64.67	80.75	85.46	77.86	111.33
Khon Kaen	66.65	80.38	146.86	63.06	76.99	109.72	57.68	81.76	105.49
Buriram	50.33	57.84	162.72	52.07	60.13	92.57	52.18	63.92	97.13
Si Saket	15.63	36.43	30.25	20.36	40.96	58.79	21.92	41.17	76.19
Maha Sarakham	27.94	39.66	90.71	27.52	40.16	124.12	30.23	61.48	82.06
Roi Et	29.31	54.96	54.96	27.61	49.18	61.03	25.82	48.12	76.15
Chaiyaphum	25.80	41.19	55.07	28.95	44.13	56.90	32.94	48.08	209.97
Nakhon Ratchasima	15.21	21.04	19.82	15.52	21.21	22.28	14.65	21.31	44.50
Kalasin	54.97	11.91	13.79	5.83	15.25	7.86	6.21	12.67	14.48
Udon Thani	7.76	17.00	20.21	7.37	15.70	7.98	7.74	17.66	20.15
Ubon Ratchathani	7.49	15.25	8.96	7.42	15.89	10.20	7.93	20.31	42.73
Nakhon Pranum	3.90	4.48	9.13	3.92	4.51	10.50	4.02	4.39	7.51
Yasothon	3.68	7.00	5.01	3.33	6.37	6.40	1.07	8.33	10.21
Loei	0.59	0.77	1.19	0.99	1.31	1.75	0.72	0.74	0.95
Nong Khai	2.55	1.22	2.59	1.50	1.48	3.74	1.02	1.63	3.28
Phetchabun	2.77	0.62	1.61	3.69	0.66	2.11	3.52	0.61	70.71
Others	4.23	5.54	12.82	4.74	6.66	10.53	-	-	-
Combined	322.24	476.84	721.77	321.83	465.25	667.21	329.18	515.69	985.62

Appendix R

AVERAGE NET CASH INCOME OF SILKWORM REARING SETTLERS OF 10 LAND SETTLEMENTS 1978 - 1980

	Land Settlement	Average Net Cash Income (Baht)		
		1978	1979	1980
1.	Prasat	2,611	5,343	4,437
2.	Lam Dom Noi	3,504	3,379	4,034
3.	Lam Dom Yai	3,973	4,931	5,127
4.	Kham Soi	4,260	8,843	8,914
5.	Kuchinarai	4,629	8,117	6,719
6.	Lam Pao	2,693	3,452	3,749
7.	Ubonrat Dam	8,038	7,395	5,804
8.	Chiang Phin	3,182	5,459	8,926
9.	Phon Phisai	2,802	5,704	8,240
10.	Ban Kruat	1,878	3,517	4,014
	Combined	3,680	6,124	6,382

APPENDIX S

SILK PRICING

By

Mr. Chote Suvipakit
Director, Sericulture Division, MOAC

The program to rear hybrid silkworms at land settlements began at the Phimai Land Settlement in 1971 under the auspices of the Sericulture Division. The Sericulture Division received a revolving fund from the Government for the purpose of purchasing cocoons from the farmers, reeling and finally marketing the warp filament.

At that time imported warp silk sold for approximately 1,000 - 1,200 Baht per kilo and showed tendencies to rise even higher as a result of increasing labor costs in the producing nations. The volume of domestically reeled silk at that time was small and domestic textile mills were not willing to purchase it. It was therefore necessary to sell the domestically reeled silk at a price much below that for the imported variety.

The Sericulture Division determined the price for the farmers silk cocoons using the "cocoon layer percentage" as a standard. The Sericulture Division set the price of fresh cocoons at fifty baht per kilogram for fresh cocoons having a seventeen percent (17%) shell weight. If a percentage of the cocoons were spoiled the price would be reduced accordingly to the established standard. Experience showed that farmers who reared silkworms were generally satisfied with the price. Moreover, it was also found that private reelers who began operating about the same time employed the pricing system of the Sericulture Division in determining the price paid to their own rearing members.

Subsequently, around 1975, the domestic warp silk market become quite unstable. Following Thailand's approval to importers to order silk from the Peoples' Republic of China the price of domestic warp silk dropped considerably. Indications were that the market would fall further because of the competition among an increased number of importers, as well as because of increased stocks of warp silk within the country resulting from import orders of warp silk much in excess of domestic demand.

Reverberations from this market situation threatened to adversely affect the production of domestically produced silk. Specifically, when the textile mills were able to obtain cheap imported warp silk they turned to this rather than supporting the use of domestic warp silk, in turn causing the price to fall. As a result of this the domestic reelers of warp silk joined together to request assistance from the State. They claimed that without such help they could not stay in business. The Thai Silk Promotion Board, the Department of Industrial Promotion and the Ministry of Commerce, which had already considered raising the import tax on warp silk, stipulated that importers would have to purchase a specified amount of domestic warp silk before being able to place orders for foreign warp.

In order to determine the price of domestic warp silk consultations were held among the silkworm rearers, the importers, the Thai Silk Association and concerned government agencies, namely, the Ministry of Commerce, the Ministry of Agriculture and Cooperatives and the Ministry of Industry. The commercial silk producers and reelers agreed with the importers to set the price of domestic warp silk at seven hundred baht per kilogram (at that time the ratio of purchases of domestic warp silk to imported warp was set at 1:4). Warp silk then being imported from the Peoples' Republic of China sold for five hundred to six hundred baht per kilogram.

The price of seven hundred baht per kilogram set by the producers and importers was seen by the Sericulture Division to be acceptable to the farmers while permitting the reelers to make a satisfactory profit. The Division, therefore, made no substantial change in the original price. The Division simply specified that the value of the raw materials (cocoons) needed to produce one kilogram of warp silk was four hundred baht. It also established a more equitable method of pricing spoiled cocoons.

Subsequent to the specification of the standards just discussed the private silk producers were able to operate successfully. However, because of the rising costs of various production factors the investment required of farmers and private companies in order to produce warp silk increased.

At the same time the price obtained for domestic warp filament started at seven hundred baht per kilogram. This is now ฿1,175 per kg. This situation prompted the silk rearers to petition the Department of Industrial Promotion to review the price of domestic warp silk and to raise the price sufficiently to cover their increased costs.

A related problem also arose about the same time. Dried cocoons were being exported to Japan because a better price could be obtained there than could be gotten by reeling and selling warp silk domestically. Government officials were concerned that silk reeling plants might reduce their production due to a shortage of raw materials, a situation which would adversely affect the rearing of silkworms for the production of domestic warp silk. Accordingly, the Government arrange numerous discussions in 1978 among the silk producers, the importers, the Thai Silk Association and the government agencies involved. As a result of these discussions it was decided in 1978 to revise the domestic versus import ratio to 1:20 (initially this ratio was set at 1:4 and later revised to 1:5). It was also decided to establish a two grade pricing system for silk filament with the Department of Industrial Promotion responsible for determing the grades. Grades 1 and 2 had prices in 1978 of 1,000 Baht and 850 Baht per kilogram respectively and it is now ฿1,175 and ฿1,000 per kilogram for the aforementioned grades.

The Government in 1978 felt that since the price of silk filament had already been increased the price for fresh cocoons purchased from farmers should also be raised to bring it into accord with the price of filament. The Sericulture Division considered this matter and decided that if the raw material content of one kilogram of silk filament was set at six hundred fifty baht the farmers would realize a sufficiently higher price for their fresh cocoons and the reeling plants would also continue to make a profit because the price of silk filament had been raised to one thousand baht per kilogram. The specified schedule of prices is as follows:

Silk Cocoon Prices as of December, 1978

Percent of Shell Weight	Baht per Kilogram
24	113.9
23	109.1
22	99.6
21	99.6
20	94.9
19	90.2
18	85.4
17	80.7
16	75.9
15	71.2

These new prices are those which the Sericulture Division has directed the Nakorn Ratchasima Sericulture Research and Training Center to pay farmers for cocoons in the Sericulture Projects with which the Division is involved, for example, the Accelerated Silk Production Project in Self-Help Land Settlements. These prices are not compulsory for general private sector dealings. Therefore, if a reeling plant chose to arrange purchases at prices different from these, it would be free to do so.

Postscript

In 1979, the price of silk filament was changed from ฿1,000 to ฿1,175 per kilogram for Grade 1 silk and from ฿850 to ฿1,000 per kilogram for grade 2 silk. However, the ratio of domestic versus imported filament still remains at a ratio of 1 to 20 with the price of fresh cocoon unchanged.

Nevertheless, the new price of silk filament does not maintained the ratio of the price of filament to fresh cocoons at the 35 to 65% level. The Sericulture Division has proposed to the Department of Industrial Promotion, Textile Division, the need for revising of the pricing scale of fresh cocoon. This is under review by the Department and it is expected that it will be approved in 1981.

Proposed pricing scale versus the existing scale is shown below:

% of Shell Weight	Existing Price	฿/Kg. Proposed Priced
24	113.90	113.60
23	109.10	128.10
22	104.40	122.50
21	99.60	116.90
20	94.90	111.40
19	90.20	105.80
18	85.40	100.20
17	80.70	94.70
16	75.90	89.10

APPENDIX T

Public Welfare Department, Financial Status
Showing the Remaining loan funds at the ned of FY 1981

Baht

Items	Project Plan for FY 77 -81	Actual				Proposed FY 81 1/	Total Expenditure FY 77-81	Remaining funds at the end of FY 81
		FY 77	FY 78	FY 79	FY 80			
1. Central Young Silk Worm Rearing Homes	11,585,000	3,300,000	-	1,580,000	-	-	4,880,000	6,705,000
2. Central Mulberry Production	1,224,000	360,000	360,000	-	100,250	105,000	925,250	298,750
3. Equipment for the CYSWRH	1,346,400	385,110	41,500	235,160	40,240	-	702,010	644,390
4. Farmer Training	1,740,000	216,280	136,163	51,000	-	200,000	603,443	1,136,557
5. Road Improvement	6,840,400	3,366,000	2,280,000	1,485,365	-	1,728,125	8,959,490	(2,119,090)
6. Cocoon Drying Plant Establishment	1,306,200 2/	-	-	989,160	260,000 3/	-	1,249,160	57,040
7. Management Consultants	3,300,000	-	-		525,942 3/	488,800	1,014,742	2,285,258
Total	27,342,000	7,627,390	2,917,663	4,340,685	926,432	2,521,925	18,334,095	9,007,905

1/ Estimated figure. The plan has been sent to USAID for approval since March 11, 1981

2/ Transferred from AID loan to BAAC.

3/ Reimbursement was not made to USAID

Appendix U

Suriculture Division, MOAC:Financial Status

'000฿

Year	RTG Contribution	
	Planned	Actual
FY 1977	3,141.0	2,323.6
FY 1978	36.0	19.1
FY 1977	36.0	21.2
FY 1980	25.0	25.9
FY 1981	25.0	18.9 1/
Total	3,273.0	2,408.7

1/ Actual figure for up until March, 1981; estimated figure from March to the end of FY 81

APPENDIX V

SERICULTURE/SETTLEMENTS PROJECT

BAAC, Financial Status

FY	BAAC Contribution			AID Loan Thru BAAC			Total BAAC/AID Loan		
	Revised Plan	Actual	%	Revised Plan	Actual	%	Revised Plan	Actual	%
1977	6,022.0	0	0	6,022.0	1,743.32	25.9	12,044.0	1,743.32	13.0
1978	6,055.2	0	0	6,056.4	4,781.24	78.9	12,111.6	4,781.24	35.8
1979	4,346.4	0	0	4,346.4	2,179.38	50.1	8,692.8	2,179.38	25.1
1980	4,345.2	1,672.17	38.5	4,346.4	982.06	22.6	8,691.6	2,654.23	30.5
1981	4,770.2	1,098.19 1/	23.0	3,922.6	898.52 2/	22.5	8,692.8	1,996.71	23.0
Total	25,539.0	2,770.36	10.8	24,693.8	10,584.52	42.9	50,232.8	13,354.88	26.6

1/ The funds for cocoon drying plant establishment have been transferred to PWD.

2/ This figure includes the estimated expenditure from March to the end of FY 81. Actual figure of loan to the farmers as of March 1981 was ฿646,710 which BAAC contributed ฿355,690 and USAID Loan ฿291,020. Estimated figure from March to the end of FY 81 is ฿1,350,000.

Bank for Agriculture and Agricultural Cooperatives (BAAC)
Financial Status, Showing the Remaining Loan Funds At the End of FY 1981

'000 Baht

FY	Plan	Actual*	Remaining Funds
1977	6,022.00	1,743.32	4,278.68
1978	6,056.40	4,781.24	1,275.16
1979	4,346.40	2,179.38	2,167.02
1980	4,346.40	888.62	3,457.79
1981	3,922.60	991.96	2,930.64
Total	24,693.8	10,584.52	14,109.28

* From March - September, 1981, estimated reimbursement figure was ฿607,500.

Appendix W

Summary Table on the Total Project Cost for 5 Years of the Project

'000Baht

r	PWD				Sericulture Div.		BAAC				Total					
	RTG Contribution		AID's Loan		RTG Contribution		RTG Contribution		AID's Loan		RTG Contribution			AID's Loan		
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planed	Actual	%	Planned	Actual	%
977	7,121.0	7,121.0	9,852.1	7,627.4	3,141.0	2,323.6	6,022.0	0	6,022.0	1,743.3	16,284.0	9,444.6	58	15,874.1	9,370.7	59
978	4,664.4	7,720.3	6,871.1	2,917.7	36.0	19.1	6,055.2	0	6,056.4	4,781.2	10,755.6	7,739.4	72	12,927.5	7,698.9	60
979	6,168.0	5,561.0	5,189.2	4,340.7	36.0	21.2	4,346.4	0	4,346.4	2,179.4	10,550.4	5,582.2	53	9,535.6	6,520.1	68
980	7,078.8	7,171.4	359.8	926.4	25.0	25.9	4,345.2	1,513.1	4,346.4	888.6	11,449.0	8,710.4	76	4,706.2	1,815.0	39
981	7,564.8	9,710.1	5,069.8	1/ 2,521.9	35.0	1/ 18.9	4,770.2	1/ 1,257.3	3,922.6	1/ 992.0	12,370.0	10,986.3	89	8,992.4	3,513.9	39
al	32,597.0	37,283.8	27,342.0	18,334.1	3,273.0	2,408.7	25,539.0	2,770.4	24	93.8	10,584.5	61,409.0	42,462.9	69	2/ 52,035.8	28,918.6	56

1/ Actual figure for up until March, 1981; estimated figure from March to the end of FY 81.

2/ Total AID's Loan is only $2.6 million, equivalent to about ฿52 million. The amount shown in the Table is over ฿52 million, due to roundings.

APPENDIX X

SERICULTURE PROJECT (Period)
Implementation Status Summary

Settle-ment	Accepted by PWD But Producing Mul.	In Process of Plant-ing MUL.	Building OSWRH	Producing Cocoon	Income from Selling Cocoon	# Farmers Who Dis-continued in Period	# New BAAC Loans in Period For		AMT. New BAAC Loans in Period For		Total # BAAC Loans Outstand-ing	Total AM BAAC Loa Outstand-ing
							MUL	OSWRH	MUL	OSWRH		

3. In this family, there are_____laborers to work in the farm. If the implementator can not work for the project, there will be /__/ or will not be /__/ the replacement to continue working on the project. If there will be, specify Name_____ age____ years who is _____. From interview of the replacement, it was found that the replacement had an intention and ability to implement the project /__/ [illegible] /__/ moderate.

4. Interest intension, follow the instruction and desires to implement the project for:

Settler who applied for the loan

/__/ Good /__/Moderate /__/Bad

Implementor:

/__/ Good /__/Moderate /__/Bad

Other settler members:

/__/ Good /__/Moderate /__/Bad

B. Location

1. This settler has land within the settlement for_____rai. This is utilized for_____ in the amount of _____rai. Non-utilize land of_____ rai. Return from land estimated at about ฿_____ per year.

2. Amount of land to be used for mulberry plantation is_____ rai. Now this plot is being used for _____ in the amount of _____ rai. Return is about ฿_____/year. This plot is away from the closest /__/ other, /__/ settlement project member about _____ metre/kilometer.

3. The closest mulberry plot has been planted mulberry trees for about_____months in the area of _____rai. The condition of the mulberry plot is:

☐ Good ☐ Moderate ☐ Bad.

There is a problem of root rot disease for ☐ the whole, ☐ main portion, ☐ half, ☐ little, ☐ None

4. Condition of land to be used in planting the mulberry trees required:

- Manure at the rate of_____kg/rai, cost ฿_____to be applied_____ times/year.

- Chemical fertilizer at the rate of ____ kg/rai to be applied _____ time/year.

OPINION

I, Mr./Ms._____ have checked in detail and certified that:

A. For the Implementor Implementing the Project has Ability to:

- Plant mulberry trees successfully:

☐ Good ☐ Moderate ☐ Not Sure

- Maintain the mulberry plot as recommended by the technician:

☐ Good ☐ Moderate ☐ Not Sure

- Produce mulberry leaves as wanted:

  ☐ Surplus ☐ Adequate ☐ Inadequate

- Rearing silkworm according to the assigned cycles:

  ☐ Every Cycle ☐ Half ☐ Less Than Half

- Disease protection and care of the silkworm rearing house:

  ☐ Good ☐ Moderate ☐ Not Sure

B. For Land Utilization Under the Project:

- Land condition is able to plant mulberry:

  ☐ Good ☐ Moderate ☐ Bad

- Area for planting mulberry as needed:

  ☐ Surplus ☐ Adequate ☐ Inadequate

C. For Mulberry and Silk Worm Egg Supply to be Used in the Project:

- Possibility of root rot disease occur to mulberry trees:

  ☐ High ☐ Moderate ☐ Less

- Amount of silk worm egg supply:

  ☐ Surplus ☐ Adequate ☐ Not Sure

Signature: _____
Position: _____
Sericulture Division
Department of Agriculture

Signature: _____ Witness
Position: _____
BAAC Branch Staff

APPENDIX Z

SERICULTURE/SETTLEMENTS PROJECT[1]

Schedule for the Evaluation Team
February 24 - April 4, 1981

Tuesday, February 24 : Agricultural Economist on duty at USAID.

Wednesday, February 25 : Anthropologist on duty at USAID

Monday, March 2 : Team Leader arrived Bangkok

Wednesday, March 11 : Sericulturist arrived Bangkok

	Team Leader	Ag. Economist	Seri-culturist	Anthropologist
Feb. 24-26	-	On duty at USAID	-	-
Feb. 25-27	-	On duty at USAID	-	On duty at USAID
Mar. 1	-	Leave of absence	-	" "
Mar. 2	Arrive Bangkok	Leave of absence	-	" "
Mar. 3	On duty at USAID	On duty at USAID	-	At USAID and left Bangkok for Ubol Province.
Mar. 4-6	"	" "	-	Field trip in Lam Dom Noi, Lam Dom Yai & Kham Soi.
Mar. 7-8 (Weekend)	—	—	-	-Same-
Mar. 9-12	Field trip to Ubolrat Dam, Kuchinarai and Kham Soi Settlements.		Arrived Bkk Mar. 11	Leave of Absence.
Mar. 13	On duty at USAID and Team Meeting.			
Mar. 14 (Weekend)	-	-	—	—

1 - The Pathologist was unable to join the Team. The report of the Team will therefore be subject to the findings of the Pathologist who is expected to be in Thailand in June 1981.

	Team Leader	Ag. Economist	Seri-culturist	Anthropologist
Mar.15-17	Field trip to Lam Dom Noi and Lam Dom Yai settlements in Ubol Province.		Fitle trip to Korat Center, Buriram Seri. Station. Lam Dom Yai & Lam Dom Noi	Field trip to Ubolrat Dam settlement in Khon Kaen.
Mar. 18-20	Report Preparation		Field trip to Kham Soi, Kuchinarai & Ubolrat	Report preparation
Mar. 23	"	"	Report preparation	"
Mar. 24	"	"	Submission of draft report to Team Leader	Submission of draft report to Team Leader
Mar. 25-26	"	"	Report Preparation	-
Mar. 27	Report preparation and oral presentation to USAID Representatives.			
Mar. 28-30	Report Preparation			-
Mar. 31	Completion of draft report			-
April 1	Submission of draft report to USAID and distributed to RTG Representatives.			
April 3	Review of draft report with USAID and RTG Representatives.			
April 4	Finalized report			
April 5	Team Leader plans to leave Bangkok for Seattle, U.S.A.			

APPENDIX Z1

I. EVALUATION TEAM 1/

1. Mr. Kyaw Myint - Team Leader
   Agricultural Economist Senior IBRD Loan Officer (on leave)

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3. Dr. Chavivun Prachuabmoh - Member
   Anthropologist, Lecturer, Department of Sociology
   and Anthropology, Thammasat University

4. Mr. Masamichi Takatori - Member
   Silkworm Rearing Expert, retire from Japanese
   Ministry of Agriculture and Forestry

II. PARTICIPANTS

RTG

1. Mr. Chamlong Savetavong, PWD
2. Mr. Inson Chompoo, PWD
3. Ms. Panee Sribantao, PWD
4. Mr. Chote Suvipakit, Sericulture Division, MOAC
5. Mr. Sompoti Akapanthu, " " "
6. Mr. Chamlong Tothong, BAAC
7. Mr. Piroj Lattaphiphat, BAAC

USAID

1. Mr. Donald D. Cohen, Mission Director
2. Mr. Robert S. Queener, Assistant Mission Director
3. Mr. David D. Bathrick, Dir., Office of Rural Development
4. Mr. Bruce J. Odell, Dir., Office of Program and Project Development

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1/ The Pathologist was unable to join the Team. The report of the Team will therefore be subject to the findings of the Pathologist who is expected to be in Thailand in June 1981.

5. Dr. Raymond W. Hooker, Program Economist,
   Office of Program and Project Development

6. Mr. Jack Williamson, Evaluation Officer,
   Office of Program and Project Development

7. Ms. Supanee Artachinda, Economic Specialist
   Office of Program and Project Development

8. Mr. John W. Coughlin, Accountant/Financial Analyst,
   Office of Finance

9. Ms. Thongkorn Hiranraks, Project Officer
   Office of Rural Development (Coordination)

III. INTERVIEWS AND VISITS

1. Mr. Chamlong Savetavong, Director of Land Settlement
   Public Welfare Department

2. Dr. Virach Arromdee, Deputy General-Manager
   Bank for Agriculture & Agricultural Cooperatives

SUPERINTENDENTS

1. Mr. Bunyad Visetsri, Ubolrat Dam Resettlement

2. Mr. Prasong Somkid, Kuchinarai Settlement

3. Mr. Suthee Bunyaphiphat, Kham Soi Settlement

4. Mr. Pracha Visuthyothin, Lam Dom Yai Settlement

5. Mr. Chajornsak Sridabhan, Asst. Superintendent,
   Lam Dom Yai Settlement

6. Mr. Thawee Rienthong, Lam Dom Noi Resettlement

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1. Ms. Ratchanee Sudjit, Ubolrat Dam Resettlement

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3. Mr. Witaya Kulsujarit, Kham Soi Settlement

4. Mr. Kasem Pothngam, Lam Dom Yai Settlement

5. Mr. Yongyuth Sodsai, Lam Dom Noi Settlement

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2. Ms. Vallapa Ngamprasidh, Korat

3. Mr. Vinai Hongthongdaeng, Korat

4. Mr. Pirapong Chaosetakul, "

5. Mr. Narongrit Vichitchan, Mukdahan

6. Mr. Narachai Sithikarn, Mukdahan

7. Mr. Sathid Chanjaroen, Khon Kaen

8. Ms. Apirom Kaewpraserd, " "

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10. Mr. Banchob Hanthongchai, Udon

11. Mr. Samak Korvanich, Udon

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