付　属　資　料

1．討議議事録(R／D)

2．ミニッツ(PDM、PO、プロジェクト・ドキュメントを含む)

3．事業事前評価表(プロジェクト方式技術協力)(案)

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5．CSBと３州DOS間の覚書

RECORD OF DISCUSSIONS
BETWEEN THE JAPAN INTERNATIONAL COOPERATION AGENCY
AND
THE AUTHORITIES CONCERNED OF THE GOVERNMENT OF INDIA
ON JAPANESE TECHNICAL COOPERATION
FOR THE PROJECT FOR
STRENGTHENING EXTENSION SYSTEM FOR
BIVOLTINE SERICULTURE IN INDIA

With regard to the Minutes of Discussions of the Preparatory Study signed on December 21 2001, which is given in Annex Ⅰ, the Japan International Cooperation Agency (hereinafter referred to as "JICA") had a series of discussions through the Resident Representative of JICA in India with the Indian authorities concerned on measures to be taken by both Governments for successful implementation of the Project for Strengthening Extension System for Bivoltine Sericulture in India.

As a result of the discussions, JICA and the Indian authorities concerned agreed to recommend to their respective Governments the matters referred to in the document attached hereto.

30 April 2002
New Delhi, India

酒井 利文.

Mr. Toshifumi SAKAI
Resident Representative
India Office
Japan International Cooperation Agency

Dhingra

Ms. Kiran DHINGRA
Joint Secretary
Ministry of Textile
Government of India

Mr. ~~S. BEHURA~~ AJAY SETH
~~Joint Secretary~~, DEA
Ministry of Finance
Government of India

Mr. P. Joy OOMMEN
Member Secretary
Central Silk Board
Government of India

THE ATTACHED DOCUMENT

I. COOPERATION BETWEEN BOTH GOVERNMENTS

1. The Government of India will implement the Project for Strengthening Extension System for Bivoltine Sericulture (hereinafter referred to as "the Project") in cooperation with the Government of Japan.

2. The Project will be implemented in accordance with the Master Plan, which is given in Annex Ⅱ.

II. MEASURES TO BE TAKEN BY THE GOVERNMENT OF JAPAN

In accordance with the laws and regulations in force in Japan, the Government of Japan will take, at its own expense, the following measures through JICA according to the normal procedures under the Colombo Plan Technical Cooperation Scheme.

1. DISPATCH OF JAPANESE EXPERTS

The Government of Japan will provide the services of the Japanese experts as listed in Annex Ⅲ.

2. PROVISION OF MACHINERY AND EQUIPMENT

The Government of Japan will provide such machinery, equipment and other materials (hereinafter referred to as "the Equipment") necessary for the implementation of the Project as listed in Annex Ⅳ. The Equipment will become the property of the Government of India upon being delivered C.I.F. (cost, insurance and freight) to the Indian authorities concerned at the ports and/or airports of disembarkation.

3. TRAINING OF INDIAN PERSONNEL IN JAPAN

The Government of Japan will receive the Indian personnel connected with the

Project for technical training in Japan.

III. MEASURES TO BE TAKEN BY THE GOVERNMENT OF INDIA

1. The Government of India will take necessary measures to ensure that the self-reliant operation of the Project will be sustained during and after the period of Japanese technical cooperation, through full and active involvement in the Project by all related authorities, beneficiary groups and institutions.

2. The Government of India will ensure that the technologies and knowledge acquired by the Indian nationals as a result of Japanese technical cooperation will contribute to the economic and social development of India.

3. The Government of India will grant in India privileges, exemptions and benefits to the Japanese experts referred to in II-1 above and their families, which are no less favorable than those accorded to experts of third countries working in India under the Colombo Plan Technical Cooperation Scheme.

4. The Government of India will ensure that the Equipment referred to in II-2 above will be utilized effectively for the implementation of the Project in consultation with the Japanese experts referred to in Annex Ⅲ.

5. The Government of India will take necessary measures to ensure that the knowledge and experience acquired by the Indian personnel from technical training in Japan will be utilized effectively in the implementation of the Project.

6. In accordance with the laws and regulations in force in India, the Government of India will take necessary measures to provide at its own expense:

   (1) Services of the Indian counterpart personnel and administrative personnel as listed in Annex Ⅴ;

(2) Land, buildings and facilities as listed in Annex VI; and

(3) Supply or replacement of machinery, equipment, instruments, vehicles, tools, spare parts and any other materials necessary for the implementation of the Project other than the Equipment provided through JICA under II-2 above;

7. In accordance with the laws and regulations in force in India, the Government of India will take necessary measures to meet:

(1) Expenses necessary for transportation within India of the Equipment referred to in II-2 above as well as for the installation, operation and maintenance thereof;

(2) Customs duties, internal taxes and any other charges, imposed in India on the Equipment referred to in II-2 above;

(3) Running expenses necessary for the implementation of the Project.

(4) Means of transport for the Japanese experts for official travel within India; and

(5) Assistance to find suitably furnished accommodation for the Japanese experts and their families.

IV. ADMINISTRATION OF THE PROJECT

1. Joint Secretary of the Ministry of Textile will bear overall responsibility for the supervision, monitoring and evaluation of the Project.

2. Member Secretary of Central Silk Board, Ministry of Textile, as the Project Manager / Project Director, will be responsible for the administration, implementation and execution of the Project.

3. Head of Bivoltine Cell, Central Silk Board, Ministry of Textile, as the Deputy Project Manager, will be responsible for coordination and monitoring of overall project activities and day to day coordination and monitoring with States and concerned CSB units.

4. Directors of CSR&TI, SSTL, NSSP and CSTRI will have responsibility for the managerial and technical matters related to the activities of each function.

5. Commissioner / Director of Department of Sericulture (DOS) of the concerned states will have responsibility for the managerial matters related to the activities within each state.

6. Head of Bivoltine Cell of each DOS, under the commissioner / director of DOS, will have responsibility for monitoring the activities in respective sate and coordinate with CSB.

7. The Japanese Team Leader will provide necessary recommendations and advice to the Project Director / Project Manager on any matters pertaining to the implementation of the Project.

8. The Japanese experts will give necessary technical guidance and advice to the Indian counterpart personnel on technical matters pertaining to the implementation of the Project.

9. For the effective and successful implementation of technical cooperation for the Project, a Joint Coordinating Committee will be established whose functions and composition are described in Annex Ⅶ.

V. JOINT EVALUATION

Evaluation of the Project will be conducted jointly by the two Governments

through JICA and the Indian authorities concerned, at the middle and during the last six months of the cooperation term in order to examine the level of achievement.

VI. CLAIMS AGAINST JAPANESE EXPERTS

The Government of India undertakes to bear claims, if any arises, against the Japanese experts engaged in technical cooperation for the Project resulting from, occurring in the course of, or otherwise connected with the discharge of their official functions in India except for those arising from the willful misconduct or gross negligence of the Japanese experts.

VII. MUTUAL CONSULTATION

There will be mutual consultation between the two Governments on any major issues arising from, or in connection with this Attached Document.

VIII. MESURES TO PROMOTE UNDERSTANDING OF AND SUPPORT FOR THE PROJECT

For the purpose of promoting support for the Project among the people of India, the Government of India will take appropriate measures to make the Project widely known to the people of India.

IX. TERM OF COOPERATION

The duration of the technical cooperation for the Project under this Attached Document will be five years from the date of arrival of the first Japanese expert.

Annexe I

Minutes of Discussions
of the Preparatory Study Team for The Project
for Strengthening Extension System for Bivoltine Sericulture

The Japanese Preparatory Study Team (hereinafter referred to as "the Team"), which was organized by the Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Mr. Noriaki NIWA, visited India for the purpose of clarifying the feasibility of the project and formulating a master plan of the proposed project entitled "The Project for Strengthening Extension System for Bivoltine Sericulture" (hereinafter referred to as "the Project").

During its stay in India, the Team conducted a field survey as well as a series of discussions with the authorities concerned of the Government of India.

As a result of these discussions, the Team and the Indian authorities concerned agreed to report to their respective governments the matters referred to in the document attached hereto.

Delhi, December 21, 2001

Mr. Noriaki NIWA
Team Leader
Japanese Preparatory Study Team
Japan International Cooperation Agency

Ms. Kiran Dhingra
Joint Secretary
Ministry of Textile

ATTACHMENT

I. Introduction

In India, the present production of silk is 16000mt against an estimated requirement of 22000mt. The supply gap is met by import, which is mainly for warp. Since over 98% of raw silk produced in India is of multivoltine variety which is not suitable for warp, the Government of India is according high priority for improving the productivity and quality of Indian Silk and also to enhance production.
Under this plan, the Central Silk Board (hereinafter referred to as "CSB") implemented the Bivoltine Sericulture Technology Development Project (BSTDP) to improve bivoltine sericulture technology in the research institutes of the CSB through project-type technical cooperation from the Japan International Cooperation Agency (hereinafter referred to as "JICA") from June 1991 to March 1997.

Based on the achievement of the BSTDP, the Project for Promotion of Popularising Practical Bivoltine Sericulture Technology (PPPPBT) was initiated from April 1997 for the period of 5 years for verification of technology developed in BSTDP under field conditions and to demonstrate the improved technology to the selected farmers and reelers. Adopting this new proven technology, farmers could increase their yield and income by two to three times as the quality improvement to 4A grade with a renditta of 5.5 to 7.

With the success of PPPBST, and mounting pressure from the farmers and reelers, the State Governments of Karnataka, Andhra Pradesh and Tamil Nadu have prepared ambitious plans for large-scale expansion of bivoltine sericulture. Since expansion and promotion of bivoltine sericulture demands proper planning, systematic approach for training, and organized system of extension, the Ministry of Textile submitted a proposal to JICA for a technical cooperation project for Strengthening Extension of Bivoltine Sericulture (hereinafter referred to as "the Project") with aiming at developing functional extension system for bivoltine sericulture. In response, JICA dispatched the Preparatory Study Team to study the feasibility of the proposed project and formulating a master plan through field survey as well as series of discussion with the Indian officials concerned.

II. Basic Understandings on the Project

Through the series of discussions, the Indian authorities and the Team attained a mutual understanding in the following points.

1. Areas to be Strengthened

At present, most of the production and processing system of silk in India is groomed for multivoltine silk production. Multivoltine sericulture can withstand low rearing management and simple seed production and processing. Therefore, in order to promote bivoltine sericulture, the followings are needed: 1) maintenance and multiplication of bivoltine breeds without loosing the original characters; 2) production of quality silkworm seed cocoons and large-scale production of bivoltine eggs; 3)

improvement of the knowledge and skills of staff of the Department of Sericulture (hereinafter referred to as "DOS") of the State Governments and farmers through practical training; and 4) strengthening of the existing extension system for bivoltine sericulture. Moreover, coordination mechanism between CSB and DOS is essential for the success of promotion of bivoltine sericulture.

2. Basic Concept of the Project

Based on the above recognition, the both sides agreed that the Project will aim at developing functional system for the promotion of bivoltine sericulture. While extension activity itself will be conducted by DOS with its own responsibility, the Project will focus on formulating action plan, establishing a system for mass production of quality seed, strengthening training system, and establishing a extension model by working with limited number of target institutions. Recognizing also that this project would run simultaneously with the states programme for extension of bivoltine sericulture, and the system established through this project would be extremely useful for that larger project. Both sides agreed that training and experience gained by the counterparts of DOSs and strengthening of the institutions through the implementation of the Project would be used by DOSs to simultaneously disseminate bivoltine sericulture technology in other parts of the states concerned without affecting the quality, pace and conditions of the Project.

3. Coordination/Cooperation Mechanism between CSB and DOS

In the Project, DOSs are mainly responsible for extension of bivoltine sericulture, while CSB provides necessary training and guidance, coordination, and monitoring function. Therefore, it is essential to set up an effective coordination /cooperation mechanism between CSB and DOSs to implement the Project. While the Member Secretary of the Central Silk Board will be Project Manager and chief coordinator for the Project, Bivoltine Cell established at the CSB Head Quarter will be a secretariat to promote bivoltine sericulture in the targeted states and to cooperate with the Bivoltine cells set up at each DOS. The mechanism for monitoring and coordination is mentioned in III.

It is also agreed that the Memorandum of Understanding addressing the role and responsibility of each party and coordination mechanism will be signed before the signing of the Record of Discussion (hereinafter referred to as "R/D").

4. Role and Responsibility of CSB and DOS

CSB is in charge of race maintenance, seed multiplication, seed production, training of DOS staff, and technical advice to the staff of Technical Service Centers (hereinafter referred to as "TSC"). Moreover, CSB is responsible for coordinating with DOS in formulating plan and monitoring project activities. On the other hand, DOS is responsible for extension activity, including strengthening targeted TSCs, Training Schools and seed farms, supporting farmers technically and financially, and allocating capable staffs to the targeted institutions.

5. Role of CSB counterparts

CSB counterparts who have been trained through the past Indo-Japanese cooperation have enough capability and technical competence and, therefore, they will play a role as experts who will give technical advice/guidance to DOS staff in the Project. Technical transfer will be done from CSB counterparts to the implementing staff of DOS. JICA Experts will support and assist the CSB counterpart.

6. Target TSCs, Training Schools and Grainages

It is agreed that some TSCs would be selected to establish a model functional unit of extension for bivoltine sericulture. The CSB will set up teams consisting of staffs specialized in different fields, and the team will visit the targeted TSCs for technical advice/guidance, and then TSC will give guidance to selected farmers. Since the target TSCs are new for bivoltine sericulture, frequent visit to TSC is required at the initial stage, however, the frequency will be reduced in the course of the Project as TSC staff acquire enough knowledge and skills to teach farmers through technical guidance by CSB counterparts as well as training program. The idea is also shared that unlike the PPPBST, frequency c visit and intensity of support from CSB and Japanese experts would be much reduced in the Project and the DOSs would play a major role instead.

During the discussion, the Indian side reviewed the proposal already submitted to Japan and proposed following institutions to be covered by the Project:

1) TSCs
   8 TSCs(hybrid) in Karnataka, 6 in Andhra Pradesh, and 4 in Tamil Nadu respectively were proposed to be covered in the Project. Each TSC is supposed to select 50 farmers every year to start bivoltine sericulture. It is estimated that each TSC will cover 200 farmers during the Project period, and accordingly, total number of farmers would be 3600. To achieve the goal, these TSCs will be specialized in bivoltine, and 10 staffs will be assigned to each TSC in Karnataka and Andhra Pradesh and 7 in Tamil Nadu. In addition, 2 reeling TSCs were proposed in Karnataka;
2) Grainages
   Besides 3 grainages of National Silkworm Seed Project (NSSP), 5 grainages in Karnataka, 2 Andhra Pradesh and 1 in Tamil Nadu were proposed;
3) Basic Seed Farms (BSF)
   4 BSF in Karnataka, 1 each in Andhra Pradesh and Tamil Nadu as well as 3 NSSP BSF were proposed; and
4) Training Schools
   4 training schools in Karnatka, 1 each in Andhra Pradesh and Tamil Nadu were proposed.

The Team requested Indian side to prepare the detailed paper to investigate the feasibility of the above target. It is agreed that the Indian side will submit papers showing the location, condition, and equipment

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and technical matters related to the activities of each function as described in the tentative Plans of Operations.

(4) Commissioner / Director of Department of Sericulture of the concerned states will have overall responsibility for the managerial and technical matters related to the activities within the states. Bivoltine cells of each state will monitor the project activities in respective state and coordinate with CSB.

The organizational chart of the Project is shown in ANNEX 1.

2. Coordination Mechanism

The following arrangement will be made for coordination of the Project. Coordination mechanisms both at the decision making and operational level will be further strengthen in the course of the Project.

(1) Bivoltine Cell Meeting

CSB Bivoltine Cell will formulate action plan, monitor activities and discuss matters relating to the project implementation including problems and countermeasures and hold/organize coordinati meetings when necessary.

(2) Group Meeting

Group meetings will be held according to the areas of the project activities. The following areas need to have regular meetings;

1) Group meeting on egg production attended by CSB counterparts in charge of egg production and staff of BSF and grainage;
2) Group meeting on Training attended by CSB counterparts in charge of training and staff of Sericulture Training Schools; and
3) Group meeting on Extension attended by CSB counterparts in charge of extension and staff of TSC.

(3) Joint Meeting

Joint Meetings will be held before and/or after each crop and attended by staff in charge of CSB and DOS units, CSB counterparts associated with the Project, directors of participating institutions, JICA experts, the heads of bivoltine cells of CSB and DOS. Plan of actions is drafted and progress of implementation is reviewed in the joint meetings.

(4) Quarterly Meeting

Under the leadership of Member Secretary of CSB, the heads of DOS, CSR&TI, NSSP, SSTL, CSTRI, Bivoltine Cells and JICA experts will meet quarterly to review the progress of action and draft action plan for next quarter.

(5) Joint Coordinating Committee

Function and membership of the JCC is shown in ANNEX 2.

IV. Project Cycle Management (PCM) Workshop

PCM workshop was held on December 14, 2001, at Bangalore to share information and opinion among stakeholders. Reflecting the result from PCM workshop, the Team and Indian authorities concerned discussed the tentative Project Design Matrix (PDM) and Plan of Operations(PO) as shown in ANNEX 3 and 4. The PDM and PO will be reviewed and modified, if necessary, during the first half year of the Project, when the Consultation Study Team from Japan visits India.

V. Master Plan of the Project

Based on the series of discussion, both sides reached an agreement on the following. The details could be modified in the course of future discussions before signing the "R/D", on the basis of which the design of cooperation project will be decided.

1. Title of the Project

The title of the Project will be "the Project for Strengthening Extension System for Bivoltine Sericulture".

2. Purpose of the Project

(1) Overall goal

Enhancing production and quality of bivoltine raw silk and thereby raising the income levels of farmers and reelers.

(2) Project Purpose

Extension system for bivoltine sericulture will be functional.

In other words, the project aims to strengthen extension system including mass production of eggs and training for bivoltine sericulture in three states.

Outputs and Activities of the Project

The Project will conduct five main activities as shown in PDM and PO to attain the following outputs.

(1) Action plan for promotion of bivoltine sericulture will be formulated.

Feasible and practical action plan for promotion of bivoltine sericulture (CSR race) will be formulated by each state in consultation with CSB. Based on the results from baseline survey as well as regular monitoring, modification will be made annually to make it practical. In doing so, necessary policy measures such as introduction of cocoon marketing system with quality assessment will also be taken.

(2) Coordination / collaboration mechanism among CSB and DOSs for extension of bivoltine sericulture will be established.

For the smooth implementation of the Project, Bivoltine Cells at CSB and DOSs to monitor and coordinate activities will be established. Bivoltine Cells will also be strengthened during the Project.

(3) System for mass production of quality seed will be established.

Based on a practical plan for mass production of quality seeds, one-way system and quality control guidelines will be established. CSB will formulate guidance plan and provide technical guidance to BSF staffs, DOS staffs and seed farmers. At the same time, seed production facilities will be strengthened by NSSP and DOS.

(4) DOS staffs will be equipped with necessary skills and knowledge for extension of bivoltine sericulture and training facilities will be improved for bivoltine sericulture.

Based on a master plan, training for trainers' and DOS staff with field oriented curriculum will be conducted by CSR&TI/CSTRI and thereafter DOS will conduct training for farmers / reelers. To achieve this, training curriculum and materials in each field will be devised by CSB institutions while DOS strengthen training facilities.

(5) Extension model for bivoltine sericulture will be established.

A few TSCs will be selected to establish a model extension system. Trained TSC staff will extend technical package of bivoltine sericulture to selected farmers with the support of CSR&TI, while DOS will strengthen TSC. Monitoring and feedback from field activities are reflected in the Acti Plan.

4. Sites of the Project

(1) Central Silk Board, HQ, Bangalore
(2) Central Sericulture Research & Training Institute, Mysore
(3) National Silkworm Seed Project, Bangalore
(4) Silkworm Seed Technological Laboratory, Bangalore
(5) Central Silk Technological Research Institute, Bangalore
(6) Department of Sericulture, Karnataka, Bangalore
(7) Department of Sericulture, Andhra Pradesh, Hyderabad
(8) Department of Sericulture, Tamil Nadu, Salem

5. Term of Cooperation

Term of the Project is five (5) years from the date of arrival in India of the first Japanese experts.

6. Measures to be taken by both Governments

When the Project is approved, the necessary measures listed below will be taken by the Government concerned.

6-1 Measures to be taken by the Government of Japan

(1) Dispatch of Japanese experts

Long-term experts:

1) Chief Advisor

2) Coordinator
3) Race maintenance/seed production
4) Training
5) Extension

Short-term experts will be considered by the Government of Japan based upon request of the Government of India for the smooth implementation of the Project.

(2) Acceptance of counterpart personnel for training in Japan

Proposed list of counterparts is shown in ANNEX 5.

(3) Provision of Machinery and Equipment

Necessary machinery, equipment and other materials (hereinafter referred to as "the Equipment") for the Project will be provided according to the budget. So far, the equipment as shown in ANNEX 6 have been requested by the Indian side.

6-2 Measures to be taken by the Government of India

(1) Provision of land, buildings and facilities

The Government of India will provide:

1) Land, buildings and facilities necessary for the Project
2) Rooms and space necessary for installation and storage of the equipment
3) Office space and necessary facilities for experts
4) Electricity, water supply and necessary telecommunication facilities including telephone, facsimile and e-mail services
5) Other facilities mutually agreed upon, if necessary

(2) Assignment of counterpart personnel

Counterpart personnel will be appointed from the organizations concerned at ANNEX 6.

(3) Assignment of administrative and technical staff

Sufficient number of administrative and technical staff members will be assigned for the smooth implementation of the Project.

(4) Budget Allocation

The Indian side will secure the budget for the following items.

1) Expenses necessary for domestic transportation of the equipment provided through JICA under the Project within India, as well as for installation, operation and maintenance.
2) Expenses necessary for customs, duties, internal taxes and other charges imposed on the Equipment provided through JICA under the Project in India.
3) Supply or replacement of machinery, equipment, instruments, vehicles, tools, spare parts and any other materials necessary for the Project, other than the Equipment provided through JICA under the Project.
4) Running expenses necessary for the Project, including travel allowance for the counterpart

personnel.

(5) Others

1) The Government of India will grant in India privileges, exemptions and benefits to the Japanese experts and their families no less favorable than those accorded to experts of third countries working in India under the Colombo Plan Technical Cooperation Scheme.

2) The Government of India will ensure that Equipment provided through the Project will be utilised effectively for the implementation of the Project in consultation with the Japanese experts.

3) In accordance with laws and regulations in force in India, the Government of India will take necessary measures to meet:

a) Means of transport for the Japanese experts for official travel within India;

b) Assistance to find suitably furnished accommodations for the Japanese experts and their families;

c) Expenses necessary for the transportation within India of the Equipment as well as for the installation, operation and maintenance thereof;

d) Customs duties, internal taxes and any other charges, imposed in India on the Equipment;

e) Running expenses necessary for the implementation of the Project.

of each institution as well as the capacity of CSB counterparts to support and monitor the above areas by the end of January, 2002. The number of the target institutions will be decided by the time of R/D, and selection will be done after the commencement of the Project in consultation with Japanese experts based on the preparatory survey conducted by DOS and CSB on the basis of a criteria of selection jointly decided.

7. Target Race

It is agreed that CSR2, CSR4, CSR5, CSR18 and CSR19 will be utilized for the Project and entire seed supply for the Project will be met by NSSP.

8. Allocation of Counterpart personnel

The Indian side will continuously assign the necessary number of counterpart personnel to the Project upon the commencement of the Project. It is agreed that the counterpart personnel who had trained during PPPBST will be utilized at both CSB and DOS to the extent possible. Both CSB and DOS also agreed that counterpart personnel assigned for the Project will be retained during the project period except special cases such as promotion.

9. Preparation of the Project

If the necessary documents referred to II. 3 and 6 are provided before the end February, 2002, the R/D would be signed during March, 2002 and the Project would start from July, 2002,

Indian side requested the Team that the expert support may be extended in the period between the end of the PPPBST, March 31, and the commencement of the Project for the preparation of the Project.

III. *Administration of the Project*

For the purpose of ensuring the smooth Project implementation, the following necessary arrangements will be taken.

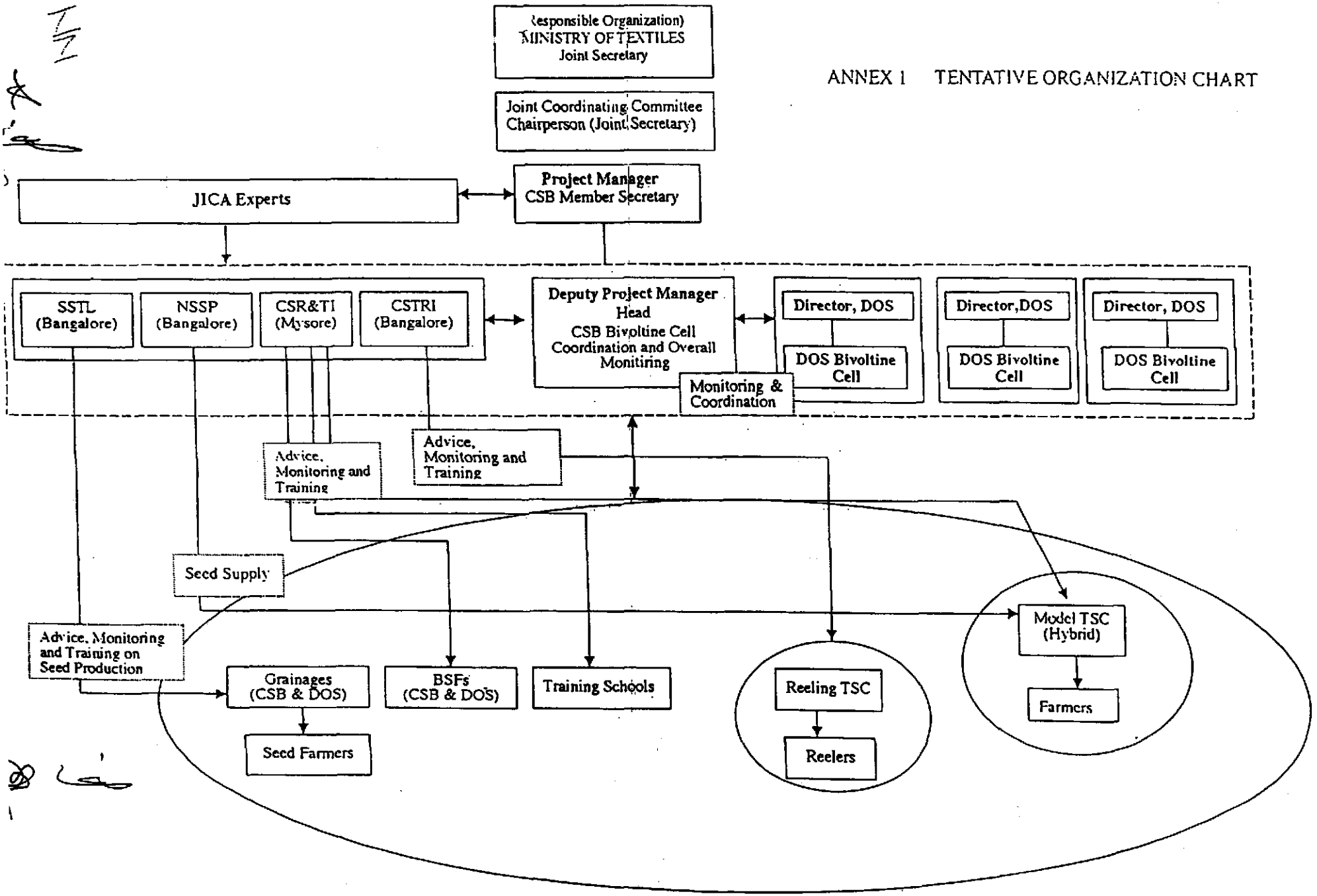
1. Project Management

(1) Ministry of Textile will supervise the Project. Joint Secretary of Ministry of Textile will the Project Director, who will bear overall responsibility for coordination, monitoring and evaluation of the Project.

(2) Central Silk Board will have general responsibility for administration and execution of the Project. The Member Secretary of CSB will be appointed as the Project Manager, who will be responsible for administration and implementation of the Project. The head of the Bivoltine Cell of CSB will be the Deputy Project Manger, who will be in charge of day to day activities of the Project and coordinating with the concerned states.

(3) Directors of CSR&TI, SSTL, NSSP and CSTRI will have overall responsibility for the managerial

ANNEX 1 TENTATIVE ORGANIZATION CHART



ANNEX 2 Joint Coordination Committee

For the effective and successful implementation of technical cooperation for the Project, a Joint Coordinating Committee will be established whose functions and composition are described as below.

1. Function

(1) To formulate the Annual Work Plan under the framework of the Record of Discussions.

(2) To review the overall progress of the technical cooperation programme as well as achievements o the Annual Work Plan of the Project.

(3) To review those measures taken by the Government of Japan;

1) Distpatch of experts
2) Acceptance of Indian counterpart personnel in Japan
3) Provision of machinery and equipment

(4) To review those measures taken by the government of India

1) Allocation of necessary budget (including local cost expenditure)
2) Allocation of necessary counterpart personnel
3) Operation and maintenance of machinery and equipment provided by the Government of Japan

(5) To make recommendations to the respective governments on;

1) Budgetary matters
2) Recruitment and appointment of Indian counterpart personnel
3) Selection and effective utilisation of the machinery and equipment
4) Appropriate dispatch of experts
5) Acceptance of Indian counterpart personnel in Japan
6) Others

2 Composition of the Committee

The Joint Coordinating Committee will be composed by the following members.

(1) Chairperson

Joint Secretary, Ministry of Textile

(2) Indian side

Project Manager (Member Secretary, Central Silk Board)
Deputy Project Manager (Head, Bivoltine Cell, Central Silk Board)
Director, Central Sericulture Research and Training Institute
Director, National Silkworm Seed Project
Director, Silkworm Seed Technology Laboratory
Director, Central Silk Technological Research Institute

Commissioner / Director, Department of Sericulture, Karnataka
Head, Bivoltine Cell, Department of Sericulture, Karnataka
Commissioner / Director, Department of Sericulture, Andhra Pradesh
Head, Bivoltine Cell, Department of Sericulture, Andhra Pradesh
Commissioner / Director, Department of Sericulture, Tamil Nadu
Head, Bivoltine Cell, Department of Sericulture, Tamil Nadu
Representatives of Department of Economic Affairs, Ministry of Finance

(3) Japanese side
Chief Advisor
Coordinator
Experts
Representatives of JICA India Office
Team concerned dispatched by JICA HQ

(4) Observers
Official(s) of the Embassy of Japan
Persons who are nominated by the Chairperson

Tentative Project Design Matrix

Dec. 21,2001

Project Title : The Project for Strengthening Extension System for Bivoltine Sericulture (tentative title) Target Group : bivoltine sericulture farmers in target areas

Target Areas: Karnataka, Andra Pradesh, Tamil Nadu Terms of Cooperation : July, 2002 ~ June, 2007

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
(Overall Goal) Enhancing production and quality of bivoltine raw silk and thereby raising the income levels of farmers and reelers.	1 Bivoltine sericulture farmers in target areas will increase income from sericulture. 2 The production of quality raw silk (above 2A level) in target areas will be increased.	· Reports/documents of CSB/DOS · Baseline Survey · Monitoring Survey on farmers and reelers · Data from cocoon market	· Policy of CSB and DOS for promoting bivoltine sericulture will not be changed.
(Project Purpose) Extension system for bivoltine sericulture will be functional.	1 The number of bivoltine sericulture farmers will be increased. 2 The production of viboltine seed cocoon in target areas will be increased. 3 The number of bivoltine cocoon transaction in cocoon markets in target states will be increased. 4 Production and supply of quality bivoltine seed will be increased. 5 Condition of facilities will be improved for bivoltine sericulture.	· Baseline Survey · Reports of CSB/DOS	· Price of quality bivoltine raw silk will not drastically fall. · Demand for quality bivoltine raw silk will not decreased.
(Outputs) 1 Action plan for promotion of bivoltine sericulture will be formulated. 2 Coordination/collaboration mechanism among CSB and DOSs for extension of bivoltine sericulture will be established. 3 System for mass production of quality seed will be established. 4 DOS staff will be equipped with necessary skills and knowledge for extension of bivoltine sericulture and training facilities will be improved for bivoltine sericulture. 5 Extension model for bivoltine sericulture will be established.	1-1 CSB and DOS will jointly formulate action plan with necessary budget allocation. 1-2 Facility development/improvement plan for extension of bivoltine sericulture will be formulated with necessary budget allocation. 2-1 Information/data regarding bivoltine sericulture will be compiled at Bivoltine Cells in each states. 2-2 CSB and DOS will share plan and challenges. 3-1 Quality control guidelines will be introduced at P3 level and below. 3-2 Defective cocoon rate will be decreased at BSFs. 3-3 Mixing of different races and sex will not occur. 3-4 Pupation rate will be over 90% at BSFs. 3-5 Recovery rate of seed production will be over 25% at BSFs (egg recovery). 3-6 Seed farms will increase the production of seed cocoon.	· Baseline survey · Quarterly reports · Reports/documents of CSB/DOS · Monitoring Survey on farmers and reelers · Minutes of meetings · Annual reports of CSB/DOS	· New disease will not breakout.

ANNEX 3

	3-7 Training program will be conducted for BSF/grainage staff and seed farmers 4-1 The number of TSC and STS staff trained by CSR&TI will be increased. 4-7 CSR&TI and DOS will formulate field oriented trainingcurriculum/materials. 4-8 Utilization of improved training manuals. 4-9 The number of DOS staff trained at Sericulture Training School will be increased. 4-10 Farmers' confidence on trained extension staff will be improved. 4-11 The number of facilities equipped for bivoltine sericulture training will be increased. 5-1 Extension manuals in local languages will be utilized. 5-2 Cooperative activities (i.e. management of Chawki rearing house) will be conducted in targeted areas. 5-3 Sericulture related tools such as rotary mountage will be locally produced.		
[Activities] 1. Formulation of Action Plan for Promotion of Bivoltine Sericulture 1-1 Baseline Survey (survey on target farmers, current extension system, current extension plan, and government policy to support small sericulture farmers and to strengthen farmers' group, etc.) 1-2 Promotion of full introduction of cocoon marketing system with quality assessment 1-3 To examine the needs for modification on current extension system, extension plan, government policy to support small sericulture farmers. 1-4 Action Plan for promotion will be formulated with close coordination of CSB and DOS. 2 Establishment of Coordination/Collaboration Mechanism among CSB and DOSs 2-1 To formulate plan of activities for Bivoltine Cells 2-2 To monitor project activities through regular joint meetings	[Inputs] (Japanese side) 1. Dispatch of long-term experts Chief Advisor Coordinator Seed Production Training Extension 2. Dispatch of short-term experts 3. Acceptance of Indian personnel for training in Japan 4. Provision of machinery and equipment Training tools Others	· Counterpart personnel of the Project will not be shifted. · Trained CSB/DOS staff will be fully utilized. · Law and order in the target areas will not get worse. (Pre-condition) · Bivoltine cells will be established in CSB and target states. · Memorandum of Understanding among CSB and DOSs on coordination/collaboration mechanism for the Project will be signed. · Counterpart personnel of CSB and DOS who had trained during PPPBST will be utilized to the extent possible.

3 Strengthening of System of Seed Production 3-1 To formulate plan for mass production of quality seed 3-2 To establish one-way system at CSB and DOS 3-3 To establish quality control guidelines and checkpoints at P3 level and below 3-4 To formulate guidance plan to BSF staff, DOS staff and seed farmers 3-5 Strengthening of seed production facilities 4 Strengthening of Training 4-1 To formulate training master plan for bivoltine sericulture 4-2 To formulate facility development plan 4-3 Strengthening of training facilities 4-4 To revise training curriculum to be field oriented 4-5 To conduct trainers' training 4-6 To conduct farmers' training (by DOS) 4-7 To devise training curriculum and materials in each field 4-7-1 Silkworm race maintenance/ seed production 4-7-2 Mulberry cultivation 4-7-3 Silkworm rearing/ disease control 4-7-4 Reeling 4-8 To conducts training course for extension staff 5 Establishment of Model for Bivoltine Sericulture Extension 5-1 To select target TSCs 5-2 To plan and implement model extension activities in the target areas 5-3 To tune up technical package developed by PPPBST 5-4 To prepare method of monitoring and evaluation for extension activities 5-5 Strengthening of TSC	(Indian side) 1. Assignment of counterpart personnel Project Manager Deputy Project Manager Director of CSB Institutions and DOSs Subject Matter Specialist (In necessary field) 2. Administrative personnel 3. Land, buildings and facilities necessary for the Project 4. Budgetary allocation for local costs	

n of operations (Tentative)

Activities	Outputs	Schedule (Japanese FY) 2002	2003	2004	2005	2006	Under Responsibility of	Mainly implemented by	supported by
Formulation of Action Plan for Promotion of Bivoltine culture							CSB, DOS	CSB BC, DOS	EX(L) (E)
Baseline Survey (on target farmers, current extension m, current extension plan, and government policy to ort small sericulture farmers and to strengthen farmers' p, etc.)								CSB BC, DOS BC, CSR&TI	EX(L)(E)
Promotion of full introduction of cocoon marketing m with quality assessment								DOS	EX(L), CSTRI
To examine the needs for modification on current sion system, current extension plan, government policy mall sericulture farmers and to strengthen farmers'								CSB BC, DOS BC, CSR&TI	EX(L)(E)
Action plan for promotion will be formulated with coordination of CSB and DOSs								CSB BC, DOS BC, CSR&TI	EX(L)(E)
Establishment of Coordination Collaboration anizm among CSB and DOSs							CSB, DOS	CSB BC, DOS BC	EX(L)(C)
To formulate plan of activities for Bivoltine Cells								CSB BC, DOS BC	EX(L)(C)
To monitor project activities through regular joint ings								CSB BC, DOS BC	EX(L)(C)
trengthening of System of Seed Production							NSSP	NSSP, DOS	EX(S)
To formulate plan for mass production of quality seed								NSSP, DOS	EX(S)
To establish one-way system at CSB and DOS								NSSP, DOS	EX(S), SSTL, CSR&TI
To establish quality control control guidelines and points at P3 level and below								NSSP, DOS	EX(S), SSTL, CSR&TI
To formulate guidance plan to BSF staff, DOS staff ed farmers								NSSP, DOS, SSTL, CSR&TI	EX(S)
trengthening of seed production facilities								NSSP, DOS	
engthening of Training							CSR&TI	CSR&TI	EX(T)
o formulate Training Master Plan for bivoltine ture								CSR&TI, DOS	EX(T)
o formulate facility development plan								DOS	EX(T)
trengthening of training facilities (by DOS)								DOS	
o revise training curriculum to be field oriented								CSR&TI, DOS	EX(T)
conduct trainers' training								CSR&TI	EX(T)
conducts farmers' training (by DOS)								DOS	

ANNEX

o devise training curriculum and materials in each			CSR&TI	EX(T)
Silkworm Race Maintenance Seed Production			CSR&TI, SSTL, NSSP	EX(S)
! Mulberry cultivation			CSR&TI	EX(T)
· Silkworm rearing Desease Control			CSR&TI	EX(T)
· Reeling			CSTRI	EX(T)
o conducts training course for extension staff			CSR&TI	
iblishment of Model for Bivoltine Sericulture Extension		CSB, DOS	CSB BC, DOS BC, CSR&TI	EX(L)(E)
· select target TSCs			CSB BC, DOS BC, CSR&TI	EX(L)(E)
o plan and implement model extension activities in the d areas			CSB BC, DOS BC, CSR&TI	EX(L)(E)
o tune up technical package developed by PPPHST			CSB BC, DOS BC, CSR&TI	EX(L)(E)
o prepare method of monitoring and evaluation for on activities			CSR&TI, DOS	EX(L)(E)
'rengthening of TSC (DOS)			DOS	

ANNEX 5 Proposed List of Indian Counterpart and Administrative Personnel

1. Project manager
2. Deputy Project Manager of CSB
3. Coordinator of CSR&TI
4. Coordinator of SSTL
5. Coordinator of CSTRI
6. Coordinator of NSSP
7. Coordinator of the concerned States, i.e. DOS, Karnataka, Andhra Pradesh, and Tamil Nadu

Counterpart Personnel in the Following Fields

1. Mulberry Cultivation
2. Maintenance of Silkworm Race
3. Silkworm Seed Production and Management
4. Silkworm Rearing
5. Silk Reeling
6. Silkworm Disease Control
7. Sericulture Extension
8. Other necessary fields mutually agreed upon
9. Training Schools
10. Extension Centers (TSCs)
11. Grainages
12. Basic Seed Farms

Administrative Personnel

1. Clerical and Administrative Staff
2. Secretaries
3. Technical Assistants
4. Drivers
5. Other necessary supporting staff

LIST OF EQUIPMENTS REQUIRED FOR FIRST YEAR

MC EQUIPMENT, 3RD PHASE3.xls

#	Name of Equipment	Total nos. required	Nos. required (1st year)	NECESSITY/JUSTIFICATION	REMARKS
1	Heater with Thermostart	204	80	For organising chawki rearing and Production of loose eggs	CRC-72, GRAINAGE-4, NSSP-4
2	Humidifier with Humidistart	204	80	-do-	CRC-72, GRAINAGE-4, NSSP-4
3	Power Sprayer	88	31	-do-	CRC-18, GRAINAGE-3, NSSP-5, CSR&TI-5
4	Mask	172	62	-do-	CRC-36, GRAINAGE-16, CSR&TI-10
5	Generator	79	27	-do-	CRC-18, GRAINAGE-6, CSR&TI-1, NSSP-2
6	Room Cooler	69	23	-do-	-do-
7	Rotary Mountage	90000	45000	For good quality cocoon yield at farmers level	TSC-45000
8	O.H P	9	5	For providing training to DOS staff and selected farmers	STS-3, CSR&TI-1, CSTRI-1
9	L.C.D. Projector	4	2	-do-	SSTL-I, CSTRI-1
10	T.V.	9	4	-do-	STS-3, CSR&TI-1
11	VCR	9	4	-do-	STS-3, CSR&TI-1
12	Vehicle (Jeep)	28	12	Staff mobility for Extension	TSC-8, CSR&TI-2, CSTRI-1, SSTL-1
13	Computer	28	8	For database	TSC-8
14	Motorcycle	40	10	Staff mobility for Extension	TSC-10
15	Incubation chambers	10	5	Incubation of silkworm seed	GRAINGAE-2, NSSP-3
16	Cold storage with stablizer – 5 chambers	2	-	-	-
17	Phase Contrast Binocular microscope	20	10	For testing of Disease and Organising Trg.	STS-5, GRAINAGE-5
18	R_{22} centrifuge	20	10	-do-	GRAINAGE-8, NSSP-2
19	Acid treatment units (Celluloid) Loose eggs	24	8	For loose egg production	GRAINGE-4, NSSP-4
20	Loose egg weighing machine	10	5	-do-	GRAINGAE-2, NSSP-3

ANNEX

#	Name of Equipment	Total nos. required	Nos. required (1st years)	NECESSITY/JUSTIFICATION	REMARKS
21	Loose egg preparation equipment i) Losse egg washing tray ii) Loose eggs drying chamber iii) Winnowing machine iv) Loose egg cases v) Loose egg incubation frames/brushing frames vi) Loose egg preapration starch coated sheets	20 sets	5 sets	-do-	GRAINAGE-2, NSSP-3
22	Cocoon cutting machine	10	4	-do-	GRAINAGE-2, NSSP-2
23	Cocoon deflosing machine	10	4	-do-	GRAINAGE-2, NSSP-2

ANNEX II MASTER PLAN

1. Overall Goal

Enhancing production and quality of bivoltine raw silk and thereby raising the income levels of farmers and reelers.

2. Project Purpose

Extension system for bivoltine sericulture will be functional.

It aims to strengthen extension system including mass production of eggs and training for bivoltine sericulture in three States.

3. Outputs

(1) Action plan for promotion of bivoltine sericulture will be formulated.
(2) Coordination / collaboration mechanism among CSB and DOSs for extension of bivoltine sericulture will be established.
(3) System for mass production of quality seed will be established.
(4) DOS staffs will be equipped with necessary skills and knowledge for extension of bivoltine sericulture and training facilities will be improved for bivoltine sericulture.
(5) Extension model for bivoltine sericulture will be established.

4. Activities

(1) Formulation of action plan for promotion of bivoltine sericulture
(2) Establishment of coordination / collaboration mechanism among CSB and DOSs
(3) Strengthening of system of seed production
(4) Strengthening of training
(5) Establishment of model for bivoltine sericulture extension

ANNEX Ⅲ LIST OF JAPANESE EXPERTS

1. Long-term Experts (maximum five (5) persons)

(1) Chief Advisor

(2) Coordinator

(3) Experts in the following fields

i) Race Maintenance / Seed Production

ii) Training

iii) Extension

2. Short-term Expert(s)

Short-term expert(s) in related field will be dispatched, when necessary, during implementation of the Project according to requirements within the framework of the Project.

ANNEX Ⅳ LIST OF MACHINERY AND EQUIPMENT

Machinery, equipment and other materials necessary for the implementation of the Project will be provided by the Government of Japan within budgetary limitations,

1. Machinery and equipment necessary for Technical Service Centers
2. Machinery and equipment necessary for Training Schools
3. Machinery and equipment necessary for Basic Seed Farms and Grainages
4. Machinery and equipment necessary for the Project offices
5. Vehicles
6. Other equipment and materials necessary for the implementation of the Project

ANNEX V LIST OF INDIAN COUNTERPART AND ADMINISTRATIVE PERSONNEL

1. Project Director / Project Manager
   Member Secretary, Central Silk Board (CSB), Ministry of Textile

2. Deputy Project Manager (Bivoltine)
   Head, Bivoltine Cell, CSB, Ministry of Textile

3. Other Responsible Person
   Directors of CSR&TI, SSTL, NSSP and CSTRI
   Commissioner / Director of Department of Sericulture (DOS) of the concerned states
   Head of Bivoltine Cell of each DOS

4. Counterpart Personnel in the following fields;
(1) Seed Production
(2) Training
(3) Extension

5. Implementing Staff
   DOS staff at TSC, Training School, Grainage, and Basic Seed Farm

6. Administrative Personnel
(1) Secretaries / Typists
(2) Drivers
(3) Other necessary support staff

ANNEX VI LIST OF LAND, BUILDINGS AND FACILITIES

1. Land, buildings and facilities necessary for the implementation of the Project

2. Rooms or space necessary for installation and storage of the Equipment

3. Office space and the necessary facilities for the Japanese Experts

(1) In CSB Headquarters, Bangalore

(2) In CSR&TI, Mysore

4. Other necessary land, buildings and facilities mutually agreed upon.

ANNEX Ⅶ JOINT COORDINATING COMMITTEE

For the effective and successful implementation of technical cooperation for the Project, Joint Coordinating Committee will be established whose functions and composition are described below.

1. Function

(1) To formulate and approve the Annual Work Plan under the framework of the Record of Discussions

(2) To review the overall progress of the technical cooperation programme as well as achievement of the Annual Work Plan of the Project

(3) To review those measures taken by the Government of Japan.

1) Dispatch of Experts

2) Acceptance of Indian counterpart personnel in Japan

3) Provision of machinery and equipment

(4) To review those measures taken by the Government of India

1) Allocation of necessary budget (including local cost expenditure)

2) Allocation of necessary counterpart personnel

3) Operation and maintenance of machinery and equipment provided by the Government of Japan

(5) To make recommendations to the respective governments on;

1) Budgetary matters

2) Recruitment and appointment of Indian counterpart personnel

3) Selection and effective utilization of the machinery and equipment

4) Appropriate dispatch of Experts

5) Acceptance of Indian counterpart personnel in Japan

6) An other relevant matter if necessary

2. Composition of the committee

The Joint coordinating committee will be composed by the following members.

(1) Chairperson

Joint Secretary, Ministry of Textile

(2) Members

1) Indian side

Project Manager (Member Secretary, Central Silk Board)

Deputy Project Manager (Head, Bivoltine Cell, Central Silk Board)

Director, Central Sericulture Research and training Institute

Director, National Silkworm Seed Project

Director, Silkworm Seed Technology Laboratory

Director, Central Silk Technological Research Institute

Commissioner / Director, Department of Sericulture, Karnataka

Head, Bivoltine Cell, Department of Sericulture, Karnataka

Commissioner / Director, Department of Sericulture, Andhra Pradesh

Head, Bivoltine Cell, Department of Sericulture, Andhra Pradesh

Commissioner / Director, Department of Sericulture, Tamil Nadu

Head, Bivoltine Cell, Department of Sericulture, Tamil Nadu

Representatives of Department of Economic Affairs, Ministry of Finance

2) Japanese side

Chief Advisor

Coordinator

Experts

Representatives of JICA India Office

Team concerned dispatched by JICA HQ

3) Observers

Official(s) of the Embassy of Japan

Persons who are nominated by the Chairperson

MINUTES OF DISCUSSIONS
BETWEEN THE JAPAN INTERNATIONAL COOPERATION AGENCY
AND
THE AUTHORITY CONCERNED OF THE GOVERNMENT OF INDIA
FOR THE PROJECT FOR
STRENGTHENING EXTENSION SYSTEM FOR
BIVOLTINE SERICULTURE IN INDIA

The Japan International Cooperation Agency (hereinafter referred to as "JICA") had a series of discussions through the Resident Representative of JICA in India with the Indian authorities concerned for the purpose of working out the details of the Project for Strengthening Extension System for Bivoltine Sericulture in India (hereinafter referred to as "the Project").

As a result of discussions, JICA and the Indian authorities concerned agreed to recommend to their respective Governments the matters referred to in the Record of Discussions (hereinafter referred to as "R/D") signed on April 30, 2002.

Both sides also agreed to make this Minutes of Discussions in order to confirm the mutual understandings reached through the discussions as attached hereto.

New Delhi, July 5, 2002

酒井利文

Mr. Toshifumi SAKAI
Resident Representative
India Office
Japan International Cooperation Agency

Mr. P. Joy OOMMEN
Member Secretary
Central Silk Board
Government of India

ATTACHMENT

1. PROJECT DOCUMENT

JICA and the Indian authorities concerned have jointly prepared the attached Project Document for the implementation of the Project. The Project Document is important to share ideas on any issues related to the Project, such as its background, strategy, activities, outputs, inputs and expected impacts.

Project Design Matrix (PDM) and Plan of Operation (PO), which are shown in ANNEX 2 and 3 of the Project Document, will be reviewed, if necessary, during the first half year of the Project, when the Consultation Study Team from Japan visits India.

Project Document for the Project for Strengthening Extension System for Bivoltine Sericulture in India

March 2002

TABLE OF CONTENTS

1. Introduction

In India, the present production of silk is 16,000 mt against an estimated requirement of 22,000 mt. The supply gap is met by import, which is mainly for warp. Since over 96 % of raw silk produced in India is of multivoltine variety, which is not suitable for warp, the Government of India is according high priority for improving the productivity and quality of Indian Silk and also to enhance production. Under this plan, the Central Silk Board (hereinafter referred to as "CSB"), Ministry of Textiles, implemented the Bivoltine Sericulture Technology Development Project (BSTDP) (hereinafter referred to as "the Phase 1 Project") to improve bivoltine sericulture technology in the research institutes of the CSB through project-type technical cooperation from the Japan International Cooperation Agency (JICA) from June 1991 to March 1997.

Based on the achievement of BSTDP, the Project for Promotion of Popularizing Practical Bivoltine Sericulture Technology (PPPBST) (hereinafter referred to as "the Phase 2 Project") was initiated from April 1997 for a period of five years for verification of technology developed in BSTDP under field conditions and to demonstrate the improved technology to selected farmers and reelers. Adopting this new proven technology, farmers could increase their yield and income by two to three times as the quality improvement to 4A grade with a renditta of 5.5 to 7.

With the success of PPPBST, and mounting pressure from the farmers and reelers, the State Governments of Karnataka, Andhra Pradesh and Tamil Nadu have prepared ambitious plans for large-scale expansion of bivoltine sericulture. Since expansion and promotion of bivoltine sericulture demands proper planning, systematic approach for training, and organized system of extension, the Ministry of Textiles submitted a proposal to JICA for technical cooperation project for Strengthening Extension System for Bivoltine Sericulture (hereinafter referred to as "the Phase 3 Project") aiming at developing functional extension system for bivoltine sericulture.

In response to the request, JICA dispatched the Preparatory Study Team to study feasibility of the proposed project and formulating a master plan through field survey and series of discussion as well as PCM workshop with the Indian officials concerned.

2. Overall Background

2-1 Overview of Socio-economic Development in India

In India, industrial development policy for import substitution has been adopted under mixed economy since the independence. The Indian economy, however, came to a standstill at the end of the 1980s due to continuous trade deficit as well as huge financial deficit. In 1991, the Government of India decided to launch an economic reform and actively promoted economic liberalization such as deregulation, cut-down of exchange rate, liberalization of trade, promotion of foreign investment. This change of policy resulted in drastic increase of foreign investment, recovery of economic growth rate, reduction of trade deficit caused by the increase of export, and increase of foreign currency reserves. The following administrations have kept the same line and Indian economy has been growing steadily as shown in the fact that the annual economic growth rate during the 8th 5 years plan (fiscal year 1992 to 96).

Although the macro economy has been going on well, the GDP per capita is only 440 US $ (1999) and issues of poverty and expanding gap between social classes are still severe. The population of the people living below the poverty line, which accounted for 65% of the total population in the 1950s, decreased to 36% in 1993/94. However, given its huge population base, 320 to 350 million people live under such conditions.

Regarding the share of agricultural sector in GDP, the percentage decreased from 41.8 in 1980/81 to 27.5 in 1999/2000. However, agriculture is still critical for Indian economy and about 60% of workforce are employed by this sector. In order to maintain stable economic growth, stable agricultural production is an indispensable factor. Promotion of agricultural development is recognized as an important issue for the improvement of rural life and alleviation of poverty. Moreover, promotion of sericulture has been given priority as an important sector for creating job opportunity and increasing income in rural areas.

Table 1 : Basic Development Index

Population (urban Population) (1998)	Increasing Rate of Population (1975-98)	GDP per head (1998)	Population under poverty line	Literacy Rate of Adult (1998)	Population without safe water (1990-98)	Population without primary health care service (1981-93)	Expected Life Span (1998)	Mortality rate of Children under 5 (per 1000 birth) (1998)
980 mil. 27.7 %	2.0 %	440 US $	35.0 %	44.3 %	19 %	25 %	62.9	105.0

Data source :UNDP Human Development Report, 2000

Table 2: Index of States (Targeted three states)

	Population (1991 Census) (thousand)	State Domestic Product (Rs. Crore) (1996/97)	Literacy Rate (above 7 years old) (%) (1991)	Infant Mortality Rate (per 1000 birth) (1997)	Expected Life Span (1991-95)
Karnataka	44980	50262	56.04	53	62.5
Andhra Pradesh	66510	72195	44.09	63	61.8
Tamil Nadu	55860	69042	62.66	53	63.3
Average in India			52.20	71	60.3

Data source : Government of India, Economic Survey 1998-99.

2-2 Current Situation of Sericulture

India, the world's second largest silk producing nation after China, produces some 16,000 tons of raw silk annually. Although the quantity of silk production is declining in amount world-wide, India is the only nation in the world where silk production has been increasing in recent years. Over the last ten years, India's silk production has increased 50%. India has a foundation of sericulture such as big-scale and developing domestic raw silk market, good climate for sericulture, cheap labour force and long history of sericulture. The production of raw silk in south India, namely Karnataka, Andhra Pradesh and Tamil Nadu, covers more than 90% of that of all India. In addition, West Bengal and Kashmir are traditional sericulture areas. About 90 % of Indian raw silk are made of mulberry
silkworm and this is the most popular in market. Tasar, Eri and Muga silk are produced as well and India monopolizes world market of Muga silk.

The sericulture in India brings opportunity of good profits especially cash income for the farmers compared with most of the other agriculture sector although the current overall productivity of sericulture remains low. Sericulture is labor intensive industry and it is said that 1 ha of sericulture farmer create thirteen job opportunities every year including mulberry cultivation, silkworm rearing, reeling and twisting of silk, weaving and cloth production sector, etc. Even a quarter of ha can sustain a small-scale sericulture farmer and it is said that profitability of sericulture per manpower or land is the highest among the other sector of agriculture in India. In addition, raw silk is non-perishable and high value commodity and therefore sericulture has a few demerit of marketing in remote areas and can be a stable cash income source compared with most of other agricultural sectors. Moreover, 60% of workforce in sericulture and reeling sector is supposed to be covered by women and most of reeling industry is born by Muslims. Therefore, significance of sericulture is realized from the point of employment and income generation for the vulnerable groups of the society.

However, 96% (2000-2001) of raw silk produced in India is multivoltine or hybrid of multi and bivoltine which is inferior in yield and quality. Therefore, its competitiveness in world market is not necessarily high. Furthermore, the quality of Indian raw silk is not suitable to meet the demand of high quality bilvoltine silk which can be used as a warp of silk weavings like sari, and as a result, approximately 4713 tons (2000-2001) (some say 8,000 tons) of bivoltine silk is imported mainly from China. In order to meet the requirement of raw silk for warp, the Indian Government considers it urgent to introduce and disseminate bivoltine sericulture technologies to produce quality silk. The Indian Government expects that the introduction of bivoltine will not only be effective for the income generation of sericulture farmers but also provide more opportunity for women in rural areas. According to economic analysis conducted by the Central Silk Board (CSB) in recent years, bivoltine cocoons developed under the Phase 1 and Phase 2 projects are superior to existing varieties both in yield and quality. In recent years, many farmers who were not engaged in sericulture have come to rear silk worms, indicating the emerging awareness among Indian farmers of the great profitability of bivoltine sericulture.

2-3 Government Policies for Promoting Sericulture

(1) Overview of Sericulture Promotion Policies

Sericulture development projects have been given a high priority in India's development projects. The attempt to produce quality bivoltine raw silk was started in 1981 under the Karnataka Sericulture Development Project supported by the World Bank. The target of this project was to increase the domestic production of bivoltine raw silk from 150 to 1,000 tons, however, the target of production of bivoltine raw silk did not meet its objective in full. Given this situation, the Indian Government in 1990 started the five-year National Sericulture Project (NSP), with financial support from the World Bank and the Swiss Government. This project, intended to strengthen research facilities to promote R & D and to develop dissemination systems and was targeted not only at the crossbreed but also at bivoltine sericulture. Although, the NSP was one of the most important projects in the Indian sericulture, this aimed primarily at introduction, development and promotion of bivoltine sericulture, but in absence of appropriate technologies and breed, the bivoltine production did not catch up to the desired extent. Under this situation, the Government of India requested JICA to implement the Phase 1 Project (1991-1997) and, based on its achievement, the JICA Phase 2 Project have been implemented as a part of technological transfer of bivoltine sericulture.

There is a need to have sharper distinction between cross breed and bivoltine sericulture. Therefore, to extend bivoltine sericulture technologies, it is necessary to evolve workable model in the area of extension/facilities as well as financial support to farmers that are specifically targeted for bivoltine sericulture, and to integrate them into a consistent "package" for promoting bivoltine sericulture.

(2) Bivoltine Sericulture Promotion Policies

Based on the success in verification of bivoltine sericulture through the Phase 2 Project, the Indian Government has developed strategies for a quantum jump in silk production – 2001/2007, an ambitious long-term plan to increase the bivoltine silk production to 6,700 tons by 2007. The tenth five-year economic development plan also includes a plan that focuses on the promotion of bivoltine
sericulture. Of the 6,700 ton target for bivoltine silk production, 4,500 tons are to be produced in Karnataka, 1,500 tons in Andhra Pradesh and 400 tons in Tamil Nadu alone.

Meanwhile, the State Government of Karnataka, major State of sericulture in India, prepared in 2001 the Integrated Sericulture Development Project – "Reshme Sampathu Yojane", which sets the targets for the upcoming five years as follows: (1) to increase the silk production in Karnataka (the production should double in the next 10 years), (2) to increase cocoon production per unit of 100 dfls from 42 to 65 kg, and (3) to introduce multiend reeling machinery to produce quality raw silk that meets international standards (2A or higher). It should be noted, however, that this project does not target bivoltine sericulture but intends to promote sericulture development in general.

Moreover, besides the CSB, the Departments of Sericulture (DOS) of the Karnataka, Andhra Pradesh and Tamil Nadu State have established the bivoltine

sericulture promotion office ("Bivoltine Cell") to strengthen administrative support for the promotion of bivoltine sericulture. The DOS of Karnataka State has a plan to increase the number of bivoltine sericulture farmers from the current 30,000 to 50,000 households in five years, Andhra Pradesh State from 5,220 to 9,220 and Tamil Nadu from 952 to 7500.

Table 3 : Promotion Plan of Sericulture in the Three States

			No. of Sericulture farmers	Production of Cocoon (MT)	Cocoon Yield per 100 dfls (kg)	Production of Raw Silk (MT)
Karnataka	Year 2000/01	BV	30,000	2,761	50	394
		CB	225,941	63,756	40	7,806
		Total	255,941	66,517		8,200
	Numeri-cal target at the end of 5 coming year	BV	50,000	25,550	60	3,650
Andhra Pradesh	Year 2000/01	BV	5,220	179	40	25
		CB	125,505	37,651		4,185
		Total	130,725	37,830		4,208
	Numeri-cal target at the end of 5 coming year		9,220	1,440	60	206
Tamil Nadu	Year 2000/01	BV	952	52	27	7
		CB	40,434	5,057		560
		Total	41,386	5,109		567
	Numeri-cal target at the end of 5 coming year		7,500	3202100	50	300

Note - BV = bivoltine CB = cross breed (multivoltine x bivoltine)
Source - Documents of the DOS of the three State Governments

(3) Financial Support for Sericulture Farmers

For the promotion of sericulture in the fiscal year of 2001, CSB provided support for establishing rearing facilities, mulberry plantations, rearing equipment, Multi-end Reeling Machine, etc. under Catalytic Development Project (CDP). In addition to the above, credit flow to the tune of Rs 150 crore. for replanting mulberry variety, as well as rearing and irrigation facilities, were made available. Since these subsidies and loans did not necessarily distinguish between conventional multi-bivoltine and bivoltine variety, there is a need to have clear cut support for exclusive promotion of bivoltine sericulture under CDP.

For promotion of bivoltine, State also provides subsidy for drip irrigation for mulberry plantations, equipment for disinfection, replanting of mulberry variety, chawki rearing centers, rearing houses and shoot rearing facilities aiming at the promotion of bivoltine sericulture. There are, however, some enthusiastic farmers who have constructed silkworm-rearing houses with their own financial resources without counting on the governmental support.

These supporting programs are indispensable to popularize bivoltine sericulture, which require some initial investment, such supports are necessary particularly for small-scale farmers to start bivoltine sericulture.

2-4 Related Projects

(1) Major Projects Related to Sericulture Carried out by other Donors

The Swiss Development Cooperation (SDC)

SDC is on the process of carrying out SERI 2000 (1997/98 to 2001/02) in Karnataka, Andhra Pradesh, Tamil Nadu and West Bengal (the total project out lay is approximately Rs.32.5 Crore). With the aim set at social development and sericulture as one of the components of its project, SDC gives subsidies to small-scale farmers, and women for training opportunities and the organization of Quality Club and to a common Chawki rearing center.

(2) Other Japanese Cooperation Projects

1) In-Country Training Programme of Bivoltine Sericulture

In-Country Training Programme is underway continuing for five years from 1999. The CSB counterpart assumes the role of instructors and is carrying out training on bivotline sericulture for the extension staff of sericulture states (Karnataka, Andhra Pradesh, Tamil Nadu, Madhya Pradesh, West Bengal and Jammu & Kashmir) as well as to the staff of CSB. These include race maintenance, silkworm rearing, pest control, mulberry cultivation and extension.

2) Japanese Bank of International Cooperation (JBIC)

A. "Chattisgarh State Sericulture Project"

This project has been carried out with the aim of enhancing the productivity in Tasar industry and systematically introducing the Mulberry Sericulture practices, which in turn will create jobs and improve the living standard of the poorest strata, mainly tribals in Chattisgarh. The project is to formulate detailed plan, upgrade sericulture infrastructure, and support sericulture farmers and silk manufacturers.

B. "Manipur State Sericulture Project"

This project also aims at creating jobs through the expansion of the productivity of sericulture (Eri silkworm, Mulberry silkworm) in order to improve the living standard of the poorest strata in Manipur, which is located in the Northeast of India. The project includes detailed design, upgradation of sericulture farm, sericulture infrastructure and aid to sericulture farmers and silk manufacturers.

(3) Possibility of the Collaboration with other Relating Projects

Since the target area of SDC overlaps with that of Phase 3 Project, the Project may be able to utilize the common Chawki Rearing Center, Quality Club and other support under SDC. In addition, it will be effective to continue offering training for DOS staff by combining in-country training into the Phase 3 project. In the future, it is also anticipated that the result of the Project can be used in training of the third country carried out with the base set up at CSR&TI., Mysore.

3. Current Status and Issues of Bivoltine Sericulture

3-1. Sericulture Related Organizations and Extension System

(1) Central Silk Board (CSB)

The Central Silk Board, founded in 1949, has some 5,000 staff nationwide. This CSB promotes various measures for the development of sericulture, by serving as a coordinator between the central and state governments and by offering technical and financial support for projects relating to the development of sericulture. Facilities and organizations affiliated with the CSB include the Central Sericultural Research and Training Instutite (CSR&TI), the Central Silk Technological Research Institute (CSTRI), the National Silkworm Seed Project (NSSP), the Silkworm Seed Technology Laboratory (SSTL) and other organizations established for the dissemination of sericulture technologies. These organizations are involved in various activities, including planning and support of R & D projects, breeding of quality silkworm races, egg production and distribution and improvement of reeling technologies. In the head quarter of CSB, Bivoltine Cell was established in 2001 for the promotion of bivoltine sericulture and it is in charge of planning, monitoring and collection of information on bivoltine sericulture as well as coordination with DOSs. Overviews of major CSB affiliates are as follows :

1) CSR&TI

The CSR&TI was founded in 1961 as the largest sericulture research institute in India. Head quartered in Mysore, the institute consists of a mulberry breeding and cultivation section, Mulberry protection Section, Silkworm genetics and breeding, Rearing technology, Silkworm pests and disease management and Sericulture Engineering Section, Dissemination and management Section and a Training Section. It also has five Regional Sericultural Research Stations (RSRS), two each in Karnataka and Tamil Nadu and one in Andhra Pradesh. The CSR&TI has some 200 staff in total, who conduct extensive research activities, from basics to application, in the above mentioned fields. This institute has served as the core research center for the JICA project (Phase 1 and 2), playing an important role in promoting the project. Twenty-nine (29) CSR&TI staff took training courses under the Phase 2 Project, mastering expertise necessary to serve as instructors at

training sessions and for state government officials. On the CSR&TI premises, the Rearing Houses and the Training Center were constructed as model facilities with support from JICA. These facilities are expected to serve as core training facilities in the Phase 3 project. Maximizing its experienced staff and research facilities, the CSR&TI offers training on technologies such as : (1) Chawki rearing, (2) silkworm rearing and silkworm mounting, (3) bivoltine silkworm rearing technology, (4) silkworm race maintenance and multiplication and (5) re-education (Refresher Courses), as well as special training targeting (6) farmers and (7) trainers. It also supports diverse dissemination activities and dispatches its staff to actual production sites.

2) NSSP

The NSSP, founded in 1975 to fill the gap between supply and demand on quality silkworm seed, has 134 offices nationwide and 1,164 staff (134 researchers, 552 technical staff, 195 administrative staff and 280 workers). The NSSP is responsible for the maintenance and multiplication (P3, P2 and P1) and for the production of basic seed for distribution. The NSSP deals with almost all silkworm races commercially raised in India. The NSSP supervises egg production for which Zonal offices, centering around Bangalore, Malda and Dehradun have been established and by establishing Egg Production Centers called Silkworm Seed Production Centres (SSPC), Basis Seed Farms (BSF) and a training center in each of these blocks. The CSR races bred by the CSR&TI are delivered at K.R. Pet and C.R.Patna to seed cocoon farmers of each area. Specifically, P4, P3 and P2 are delivered in Hassan, Nagamangala, Gavimata and Dharmapura farms respectively. Using these races, hybrid dfls are produced at different locations including Bangalore and Mysore. The NSSP with SSTL and other research institutes join in offering training courses to the staff of the Department of Sericulture (DOS) on seed maintenance, management and production technologies. The NSSP also instructs seed cocoon farmers on technologies for mulberry field management and silkworm rearing. In the Phase 2 project, 9 staff have been trained under NSSP as counterparts.

Three of the SSPC staff were trained in Japan and they are now involved in technical training programs and in seed production. Because, the production of

bivoltine seed requires special care (e.g. not to mix stocks, to produce healthy lines not infected with pebrine, to use black boxing techniques in consideration of the timing of the cocooning of the silkworm). SSPCs could be utilised to support training programmes for the staff of DOS.

3) SSTL

The SSTL conducts research in seed cocoon production, pebrine disease control, silkworm seed production and development of technologies related to seed production. The SSTL also has a training center with accommodation facilities. The SSTL conducts research on development of technology suitable to silkworm egg production and handling pebrine prevention methods, and mass production methods for silkworm seed. The SSTL also offers grainage staff and seed farmers training programs to instruct technologies such as: 1) chawki rearing 2) bivoltine seed 3) sex separation and 4) rearing (for seed farmers). Five scientists trained in Japan, are stationed at SSTL. The SSTL should endeavor to improve its training programs by establishing training courses focused on seed production technologies.

4) CSTRI

The CSTRI, which conducts research in reeling, processing and training in post cocoon areas was founded in 1983, and it is India's only research institute in the post cocoon sector. From this institute, four JICA counterparts were sent to Japan in the Phase 2 Project. The CSTRI is responsible for laying down standards for reeling bivoltine cocoons in India and criteria for the evaluation of raw silk quality. It has developed simple evaluation methods in cocoon trading practices, so that the cocoon quality will be reflected in its price. In Tamil Nadu, the CSTRI has succeeded to reflect the percentage of cocoon shell weight in its price. The CSTRI promotes, in cooperation with private companies, the commercialization of machinery developed by the CSTRI itself, such as multi-end reeling machinery, cocoon cooking machinery, re-reeling machinery, cocoon sorting machinery, cocoon drying machinery. The CSB plans to increase the number of the multi-end

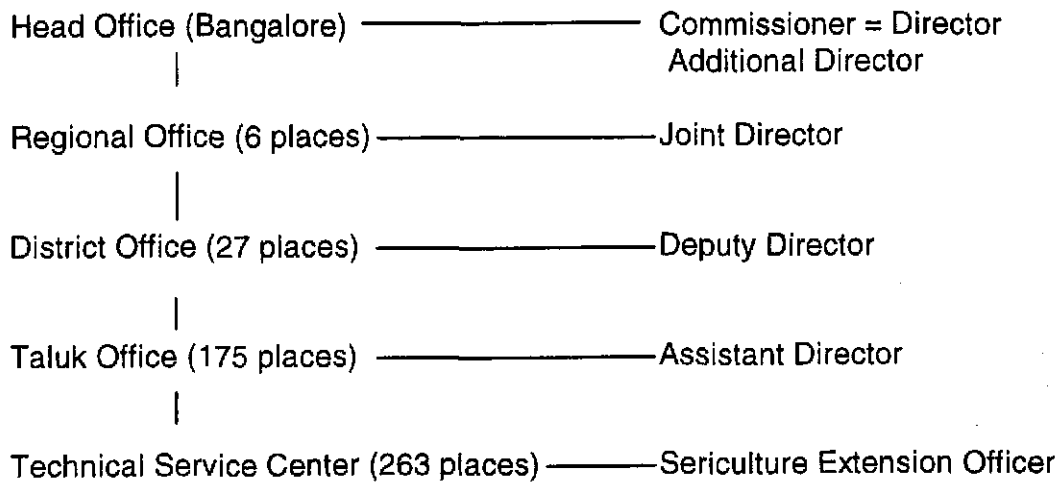
reeling machinery to 300. Some of the Technical Service Centers (TSC) have already introduced the machinery and are using it at training sessions. The CSTRI conducts reeling training for its officials and technicians, as well as for reelers. To promote exchange of ideas amongst producers and consumers, the CSTRI has created a forum of silkworm rearers, reelers and weavers.

(2) Overview of Sericulture Extension System in the three States

1) Overview

India has a federal system and extension activities are under the jurisdiction of the State Governments. Organizational structure for sericulture extension shown below is almost same in the three states. The extension system under the Ministry of Agriculture does not cover sericulture sector in India.

Chart 1: Organization of the DOS, Karnataka



The sericulture extension units called TSC (Technical Service Center) is a specialized institution for sericulture extension, which is located in villages where concentration of farmers is more. The number of TSC and sericulture farmers of each state is as follows, though it varies in their maintenance conditions, names, and the number of staff.

Table 4 Number of sericulture farmer and TSC in the targeted states

	No. of sericulture farmers	No. of TSC
Karnataka State	256,000	263
Andhra Pradesh State	126,000	176
Tamil Nadu State	41,000	110

TSC is categorized into 3 according to the specific task: TSC (Seed) in charge of seed cocoon generation, TSC (Reeling) in charge of reeling technology, and TSC (Commercial) in charge fo commercial cocoon production.

TSC is generally headed by the SEO (Sericulture Extension Officer) in Karnataka and Andhra Pradesh or IP (Inspector) in Tamil Nadu, and the extension staff like AI (Assistant Inspector), Demonstrator, and FF (Farm Foreman). The work of the extension staff is to promote adoption of sericulture technologies by visiting sericulture farmers, advising them on various aspects of sericulture which include farm management, disinfection and rearing besides other activities. The TSC staff is primarily support the farmers in all possible areas. TSC staff obtain technical

information through monthly periodicals published by DOS, training schools, and training programs held by CSB institutions. The mobility of the TSC staff is presently less because there is no provision of government vehicles. The staff, therefore, use all mode of transportation to visit farmers.

2) Extension of Bivoltine Sericulture

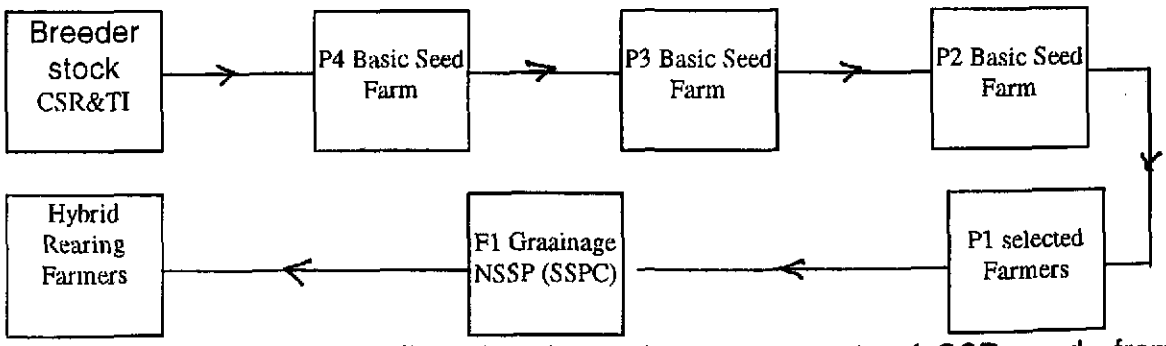
In order to promote expansion of bivoltine sericulture, CSB and the three states have established Bivoltine Cells. The Bivoltine Cells in the three states are in charge of the planning and monitoring of programmes related to bivoltine sericulture as well as coordination with CSB. Karnataka State has six staff under the Deputy Director, Andhra Pradesh State has six staff under the Joint Direcctor, and Tamil Nadu State has four staff under the Joint Director, respectively..

Bivoltine Cells have just been established, and their tangible activity plan is to be drawn up in the future. Since Bivoltine Cells will be an administrating organization that has to play an important role for the Phase 3 Project, it is critical to establish a system that can put its functions into full use. Besides, Bivoltine Cells, the extension systems of DOS are not exclusively meant for bivoltine sericulture. Some of TSCs pockets suitable for bivoltine sericulture are selected to implement bivoltine sericulture programme. DOSs of three states are planning to strengthen the extension activity by upgrading necessary facilities and carrying out staff training. The staff of TSCs who covered JICA farmers under the Phase 2 Project, have obtained knowledge and experience through frequent visits by JICA experts and counterparts. However, there were fewer opportunities for other TSC staff to have such exposure. At present, DOSs take initiative in conducting a study visit by which other TSC staff and bivoltine rearing farmers visit JICA farmers to share their experience in bivoltine sericulture. Thus, there is a need to gear up exclusive training of identified TSC staff in 3rd phase of the project on promotion of bivoltine sericulture.

3) Silkworm Seed Farm

In the Phase 2 project, a system called one-way system has been established for the maintenance and multiplication of silkworm races.

Chart 2: One-Way System



Andhra Pradesh and Tamil Nadu rely on the direct supply of CSR seed from NSSP. Karnataka owns the line of the silkworm seed production. For the fiscal year 2001

the amount of 7.2 million dfls was estimated to be necessary. Of these 7.2 million dfls, 4 million dfls were to be purchased by DOS from NSSP at a rate of Rs.350/100 dfls and 3.2 million dfls is produced by the state. However, with respect to the CSR seed that was produced in Karnataka State in 2001, due to insufficient training offered to the staff, there was a problem in the quality of seed. Therefore, in Phase 3 Project, all of the silkworm seed shall be produced and supplied by NSSP. However, DOS grainages will be strengthened in hybrid seed production by way of upgrading the infrastructure and meeting the training needs of technical personnel.

Furthermore, when Phase 3 Project starts, Andhra Pradesh and Tamil Nadu are planning to produce F1 seed. Andhra Pradesh aims to produce half of hybrid seed by itself. Tamil Nadu aims the production in state seed production centre around 1.5 to 2 million dfls annually.

(1) Cocoon Market

The cocoon market is managed by the state government. Based on Karnataka Silkworm Seed and Silk Yarn Act (1959), cocoon markets were established at 4 places of Chamarajanagar, T. Narasipura, Ramanagaram, Chickballapura in 1961 and later to other silk growing areas. Sericulture farmers and reelers have the license granted by DOS for the transaction of cocoons. Cocoon price is determined in public auction. One per cent of the total amount transacted is collected as the market fee from both sericulture farmers and reelers. Payment to the farmers is paid in cash on the same day. The market are formed of reelers and sericulture farmers to ensure fair transaction and meeting is held once a month. Due to establishment of large number of reeling unit in the near vicinity of the Ramanagaram market, which is the largest market in Karnataka State, transaction is always heavy including cocoons from other two states which is primarily brought for a better price. There are 11 silk exchanges in Karnataka, 1 in Andhra Pradesh and 1 in Tamil Nadu. There are 6 Government Silk Reeling factories in Karnataka, 15 in Andhra Pradesh and 22 in Tamil Nadu.

3-2 Current Status of Bivoltine Sericulture

It can be said that the JICA Phase 1 Project has prompted the Indian Government to implement the technological development for bivoltine sericulture. Before that, bivoltine silkworms were primarily NB4D2, raised as a seed cocoon to be used for the production of multivoltine-bivoltine hybrids, and almost no bivoltine races for commercial cocoons were raised. Since no full-scale attempts were made to improve bivoltine races or to develop rearing technologies, their productivity was not necessarily high.

The total silk production of three states accounts for more than 90% of the nation's production. However, even in these states bivoltine silk production is considerably small; it was only 300 tons nationwide, of which 200 tons was produced in Karnataka. According to recent statistics, India's annual cocoon production has been 1,24,600 tons, of which bivoltine cocoons account for about 4%. According to recent surveys, the total production of bivoltine cocoons of the above mentioned three states is 2,992 tons, of which approximately 92 % are produced in Karnataka.

However, the production of bivoltine cocoons per 100 Dfls is far below (70 kg – the average yield under the Phase 2 Project) and is almost the same as that of multivoltine-bivoltine hybrid cocoons. The difference in productivity is not only due to silkworm races but also for various factors, such as the varieties of mulberry and cultivation methods. It also suggests problems relating to the feasibility of irrigation, thorough disinfection, chawki rearing and silkworm mounting equipment, etc. Therefore, to promote the dissemination of bivoltine technologies in India, it is important to introduce the bivoltine sericulture technologies as a package.

As a result of demonstration/verification under the Phase 2 Project, it was reported that the income of the selected farmers rose two to four times due to the improved cocoon yields, and higher prices fetched by the farmers due to quality of bivoltine cocoons of these farmers fetched a price of Rs.180 to 240/- per kg, while that of multivoltine-bivoltine hybrid cocoons was Rs.100 to 150/- per kg. (1 Re. = approximately 2.6 yen). In the Ramanagaram Cocoon Market, the largest cocoon market in Karnataka, the volume of dealings of bivoltine cocoons has increased. Currently bivoltine cocoon trade occurs throughout the year. These demonstrate that both the supply and demand of bivoltine cocoons have steadily increased, besides, it has now been possible to rear bivoltine silkworm round the year which includes CSR 2 x 4 and CSR 2 x 5 in favourable seasons and CSR 18 x 19 during the summer months.

At present, the price difference between the multivoltine-bivoltine hybrid raw silk and the bivoltine raw silk is slight (the former is Rs.1,300/- per kg and the latter is Rs.1,400/- per kg). Nonetheless, raw silk reeled from bivoltine cocoons has higher productivity than that from multivoltine-bivoltine hybrid cocoons, because the former is superior to the latter in the length of cocoon filament and in reelability percentage. Because of this, farmers can increase income by producing more bivoltine cocoons. To promote the production of bivotline cocoons, it is also necessary to foster reelers who can handle bivoltine cocoons. Thus, the CSB has introduced multiend reeling machinery and established cocoon cooking and silk reeling conditions suitable for India. Through these measures, raw silk production systems using practical technologies have been established in India, enabling the nation to produce 2A- to 4A-size raw silk of international standard.

(2) Future Challenges in the Promotion of Bivoltine Sericulture

The Phase 2 project saw evolution of high yielder V-1 and S36 varieties (which are suited to India's weather conditions), standardizing fertilization methods, improving sowing methods, introducing rotary mountage under shoot rearing, conducting thorough disinfection and installing multiend reeling machinery. Through this project, bivoltine sericulture technologies have been established as a package and verified at selected farmers/ reelers.

The technological transfer to the CSB counterparts through the Phase 2 project has been almost completed. To disseminate and develop the packaged technologies, the Phase 3 project will strengthen the extension system for bivoltine sericulture. The Phase 3 project, therefore, needs to address not only technological issues but also managerial and administrative issues that may hinder the extension of bivoltine sericulture.

1) Action plan for the promotion of bivoltine sericulture

To promote the dissemination of sericulture technologies among farmers and reelers, it is necessary to review the current set up of sericulture administration, including extension systems and financial support for farmers. Currently, in response to the mounting pressure from farmers and reelers, the Departments of Sericulture (DOS) of Karnataka, Andhra Pradesh and Tamil Nadu have prepared ambitious plan for large-scale expansion of bivoltine sericulture. It should be noted, however, that introducing bivoltine technologies without sufficient knowledge and well-organised extension systems, might invite undesirable outcomes. Thus, it is critical to establish realistic action plans at first. Related policies, such as cocoon auction system and financial support to farmers, should also be considered and reflected in action plans. In doing so, close coordination / cooperation between CSB and DOS is to be established.

2) Strengthening mass production of quality silkworm seed

Through the Phase 2 project, one way system for the maintenance and multiplication of silkworm races have been established, making it possible to maintain basic stocks. Four Basic Seed Farms (BSFs) were selected for multiplication of silkworm races. These farms also take care of egg production technologies, such as batch selection and cocoon sorting methods suited to basic stocks and egg preservation. Thus, seed production technologies have been transferred to the Indian counterparts to a satisfactory extent, however, there are rooms for improvement in some technologies such as sex separation, sanitation hygiene, silkworm disease control, egg preservation and avoid mixing of silkworm races. It is particularly important to conduct quality controls at P3 level and below by improving checking and monitoring systems. It is highly appropriate to strengthen CSB and DOS institutions that are dealing with seed production.

3) Establishment of training facilities and curricula exclusive to bivoltine sericulture

In the Phase 2 project, the CSR&TI and other organizations conducted training on bivoltine technologies for CSB and DOS staff, farmers and reelers. Training curricula were revised in consideration of actual needs of farmer and reelers and the new curricula contained instruction on how to use rotary mountages, silkworm mounting methods, shoot harvesting methods and mulberry training methods.

Meanwhile, training programs provided by the DOS have much room for improvement. Although under the Phase 2 project training facilities were to be strengthened, training schools of Karnataka have not fully strengthened, practical training has not been fully realised; most of the lessons are class-room oriented and staffs are not sufficiently equipped with bivoltine sericulture technology. To disseminate bivoltine sericulture technologies at the local level, it is necessary to reinforce the role and capacities of training facilities of the states, to enable them to function as effective training institutes for TSC staff and farmers. To this end, it is indispensable to establish practical training programs, improve training facilities and nurture instructors.

4) Establishment of dissemination systems for bivoltine sericulture

Conventional sericulture technologies are based on the hybrid of multivoltine and bivoltine and thus require not much of advanced breeding technologies or conditions. To promote bivoltine technologies in India, it is important to disseminate bivoltine sericulture technologies among farmers as a package. The mobility in TSCs is rather poor with inadequate transportation and fuel allowances. The immediate issue is the necessity to hold job training for extension staff to improve their skills, to prepare the facilities for practical technical instruction and to secure communication methods with the work front. It is necessary as well to enhance instruction skills of extension staff, to work out an extension plan that is suitable for local environment and to provide timely information to farmers and reelers.

5) Project strategy

(1) Guidance/Advice on formulating action plans

In order to establish a system that enables the three states to expand their extension programmes even after completing the project, it becomes necessary not only to establish a technological package and to improve facilities but also to review sericulture administration itself. Therefore, the Phase 3 project focuses on the importance of formulation of feasible action plan for bivoltine sericulture extension with close coordination/collaboration between CSB and DOS. Consistent plan including improvement of extension system and programmes to support farmers are necessary in order to make the field level activities effective and thus to achieve the goal of the project. The coordination between CSB and DOS are indispensable for drawing up a realistic action plan since the actual extension activity is under the jurisdiction of the state government. The experts will support the DOS and CSB to establish the coordination/cooperation system as well.

(2) CSB counterparts as experts

CSB counterparts who have already been trained under JICA have enough capability and technical competence and therefore, they will play a role as experts who will provide technical advice/guidance to DOS staff in the Phase 3 project. Technical transfer will be done from CSB counterparts to the implementing staff of DOS. JICA experts will support and assist CSB and DOS counterparts in planning, monitoring and evaluation.

(3) Establishment of sustainable model extension system

The Phase 3 project aims to establish a model extension system that is replicable and sustainable even after the termination of the project. In this context, the project refrain from providing equipment abundantly and inputs from Japanese side will be kept to the extent that other TSC can replicate. In addition, local procurement of the equipment will be promoted.

(1) Cluster approach

In selection of TSCs, care would be taken to ensure that they are within easy reach of Grainages, Cocoon markets and Reeling units.

(5) Master plan of the project
(5-1) Target group

"Bivoltine sericulture farmers in Karnataka, Andhra Pradesh and Tamil Nadu"

According to the statistics of the DOSs of the three states, it is estimated that total number of sericulture farmers, both of bivoltine and of hybrid of bivoltine and multivoltine, in Karnataka, Andhra Pradesh and Tamil Nadu are 255000, 125000 and 41000 respectively. Out of which, the numbers of bivoltine sericulture farmers are 30000 in Karnataka, 5220 in Andhra Pradesh and 952 in Tamil Nadu. Each state is planning to increase the number of bivoltine farmers to 50000, 9220 and 7500 in coming five years.

Sericulture farmers are categorized in 4 groups according to land holdings; marginal farmers (0.4 ha and below), small farmers (0.4 to 1 ha), medium farmers (1 to 2 ha) and big farmers (2 ha and above). In Karnataka, percentage of each group is 48%, 39%, 8%, 4% respectively. Landless farmer is estimated around 5% of the total sericulture farmers. Sericulture farmers generally hold agricultural land for cultivating vegetable, coconut and beans besides mulberry, although it varies depending on natural environment.

The main target of the Phase 3 project will be small farmer who have 1 to 2 acres of mulberry field with irrigation facility and some of medium farmers. It is reasonable to target these farmers in the initial stage since that they can rather easily expand mulberry area by converting land under other crops and can meet initial investment to start bivoltine sericulture. However, targetted farmers should be carefully selected through the baseline survey or other activities conducted in the initial stage of the Phase 3 project.

Regarding the background of sericulture farmers in Karnataka, most of sericulture farmers are Hindu which account 84%. Percentage of SC and ST is 11% and 3.5% respectively. Other minority such as Muslim and Buddhist, is estimated around 1.5%, however, reelers are predominantly Muslim.

Currently, it is difficult to clearly distinguish farmers who rear bivoltine and those who rear crossbreed, since even bivoltine farmers tend to rear crossbreed during summer season. However, in the Phase 2 project, CSR&TI succeeded in developing summer resistant races, namely CSR18 and CSR19 and verification in the field condition shows that it is possible to rear CSR race throughout the year. Therefore, the Phase 3 project will recommend to rear CSR races throughout the year with utilizing CSR18 x CSR19 during the summer season.

(5-2) Overall Goal of the project

"Enhancing production and quality of bivoltine raw silk and thereby raising the income levels of farmers and reelers"

Based on the realistic action plan for the promotion of bivoltine sericulture, system of seed production will be strengthened, DOS staff will be trained, facilities will be strengthened and model extension system will be established. This will lead to the increase of production of quality bivoltine raw silk and thereby increase the income levels

of farmers and reelers. Given the fact that selected farmers who adopting CSR race in the Phase 2 project actually increased their income, it is feasible to achieve the overall goal if the comprehensive package is extended under the appropriate extension system.

(5-3) Project purpose

"Extension system for bivoltine sericulture will be functional"

Current extension system is based on the sericulture using multivoltine or cross-breed. DOS of each state is preparing to strengthen the current system, so that it can promote bivoltine sericulture in a large scale. However, bivoltine sericulture requires care, technology, facilities that are different from multivoltine or cross-breed, it is necessary to strengthen sericulture extension system for bivoltine extension. The project will strengthen extension systems in which DOS will be able to plan and implement bivoltine promotion programme with the support of CSB.

(5-4) Outputs and activities of the project

The project will conduct five main activities as shown in Project Design Matrix and Plan of Operation to attain the following outputs.

(1) Action plan for promotion of bivoltine sericulture will be formulated

Feasible and practical action plan for promotion of bivoltine sericulture (CSR race) will be formulated by each state in consultation with CSB. Formulation of such action plan must involve activities such as tuning up of technical package of bivoltine sericulture, formulating facility development plan, reviewing extension methodology and examining appropriate measures to support farmers. Based on the results from baseline survey as well as regular monitoring, modification will be made to make it practical. In doing so, necessary policy measures such as introduction of cocoon marketing system with quality assessment will also be taken.

(2) Coordination/ collaboration mechanism among CSB and DOSs for extension of bivoltine sericulture will be established

For the smooth implementation of the project, bivoltine cells at CSB and DOSs as a secretariat of the project, will monitor and coordinate activities as well as collect related information. Moreover, coordination/collaboration mechanism will further be strengthened through the regular joint meeting at various levels. Memorandum of Understanding (MoU) concerning role of responsibility of CSB and DOS will be signed between CSB and DOSs before the commencement of the project.

(3) System for mass production of quality seed will be established

Based on practical plan for mass production of quality seeds, one-way system will be followed and quality control measures, particularly at P3 level and below, will be vigorously practiced. The project will utilize CSR races (CSR 2,4,5,18 and 19).

In the later stage of the project when DOS grainages will be strengthened, it will be considered for DOS to produce and supply seed, however, entire seed supply for the project will be met by NSSP from the viewpoint of quality control.

SSTL, with resource person from NSSP and CSR&TI will provide technical guidance as well as training to DOS staff. NSSP and DOSs will strengthen Basic Seed Farms and Grainages.

(4) DOS staff will be equipped with necessary skills and knowledge for extension of *bivoltine sericulture and training facilities* will be improved for bivoltine sericulture

Based on the training master plan that will be formulated jointly by CSB, mainly CSR&TI and DOSs, training for trainers' and DOS staff with field oriented curriculum will be conducted by CSR&TI/CSTRI and thereafter DOS will conduct training for farmers/reelers. To achieve this, training curriculum and materials in each field will be devised by CSR&TI and DOSs with support of other CSB institutions while DOS strengthen training facilities.

(5) Extension model for bivoltine sericulture will be established

Some TSCs will be selected to establish a model extension system. DOS staff will conduct extension work in selected TSCs, whereas CSB institutions, mainly CSR&TI, will support DOS, Japanese experts will support CSB and DOS in planning, monitoring and evaluation. It should be noted that extension activities at model TSCs would be the one that can be sustained by DOS. Therefore, the project will recommend the extension activities that DOSs can sustain themselves and then, DOS will implement it at model TSCs. Feedback from model TSCs will be reflected to the action plan to establish sustainable extension system for bivoltine sericulture.

For the purpose, baseline survey will be conducted at the first year to investigate conditions and environment of TSCs as well as sericulture farmers and decide model TSCs of the Phase 3 project. While DOS will strengthen model TSCs, CSB institutions, mainly CSR&TI, will set up a team consisting of experts in each field and provide guidance to TSC staff in extending technical package for bivoltine sericulture to farmers. Trained TSC staff will do guidance to farmers. Since the model TSCs are new for bivoltine sericulture, CSB counterparts may need to visit frequently at the initial stage. However, the frequency will be reduced in the course of the project as TSC staffs acquire enough knowledge and skills to teach farmers through technical guidance by CSB counterpart as well as training programme. Given the fact that staff of TSC covered by the Phase 2 project got confidence after having experience of two to five crops, it is possible to reduce the frequency of visit of CSB counterparts and Japanese experts for giving advice/guidance.

(5-5) Target TSCs, training schools and grainages

The project will cover Grainages,TSCs and training schools to establish a model extension system. It should be noted that target TSCs will be selected as a model for

establishing practical extension system. Therefore, keeping sustainability in mind, the Phase 3 project will not provide intensive support to farmers and Indian side, particularly DOS, will be main actors in implementing extension activities. The selection of model TSCs will be done after the commencement of the project in consultation with Japanese experts based on the preparatory survey conducted by DOS and CSB on the basis of criteria of selection jointly decided.

Table 5: Target institutions

State	TSC		Grainage	Basic Seed Farm	Training School
	Commercial	Reeling			
Karnataka	8	2	5	4	4
Andhra Pradesh	6	-	2	1	1
Tamil Nadu	4	-	1	1	1
CSB (NSSP)	-	-	3	3	-

Regarding commercial TSC, each TSC is supposed to select 50 farmers every year to start bivoltine sericulture. It is estimated that each TSC will cover 200 farmers during the project period and accordingly, total number of farmers would be 3600. To achieve the goal, DOS will establish Chawki Rearing Centers, two to three CRC per TSC.

It is considered that TSC will identify target farmers based on existing data and form 5 groups of farmers, 10 farmers in each group, per TSC. These model TSCs will be specialized for bivoltine and 10 staff will be assigned to each TSC in Karnataka and Andhra Pradesh and 7 in Tamil Nadu. Model TSCs are supposed to rear CSR race five times a year, namely CSR 2,4,5 in good season and CSR 18, 19 in summer season.

The Project will cover two reeling TSC in Karnataka. Model reeling TSC will be selected where reelers are concentrated and provide technical advice/ guidance to reelers.

Regarding Grainage and BSF, seed supply for the Project will be met by NSSP, however, DOSs will strengthen their Grainages and BSFs in the mean time to make them gradually produce CSR seed in the states.

5-6 Inputs by both Governments

(1) Input by Japanese side

Unlike the Phase 2 Project, the Phase 3 Project will aim at developing functional system for the promotion of bivoltine sericulture while extension activity itself will be conducted by DOS with its own responsibility. Japanese experts, therefore, will provide advice/guidance to DOS through CSB counterparts, and direct support from Japanese experts to farmers, including provision of bivoltine related materials and frequent visit, would be limited to a minimum extent. Rather, Japanese experts will focus on formulating action plan, establishing a system for mass production of quality seed, strengthening training system, and establishing an extension model. In addition, from the view point of sustainability, bivoltine related rearing materials should be purchased locally to an extent possible.

Details of inputs will be considered after the arrival of Japanese experts.

1) Long-term experts

Long-term experts will be attached to CSB, and giving advice/ guidance on strengthening training, seed production, and extension system with close collaboration/ cooperation among CSB and DOS. Japanese experts are also expected to enhance in establishing collaboration/ cooperation mechanism for the successful implementation of the Project.

Table 6 Long-term experts

Japanese Experts	Attached institutions	Terms of Reference
Chief Advisor	CSB HQ (Bivoltine Cell) and CSR&TI	To provide necessary recommendations and advice to the Project Director (Joint Secretary, Ministry of Textile) and Project Manager (Member Secretary, CSB) on any matters pertaining to implementation of the Project, including management of the Project, coordination / cooperation among institutions concerned, sericulture administration.
Coordinator	CSB HQ (Bivoltine Cell) and CSR&TI	To support Chief Advisor for the smooth implementation of the Project.
Race Maintenance/ Seed Production	CSR&TI and NSSP	To provide advice/ guidance on the matters related to mass production of quality seed.
Training	CSR&TI	To provide advice/ guidance on the matters related to training.
Extension	CSR&TI	To provide advice/ guidance on the matters related to establishing model extension system.

The Phase 3 Project will focus on strengthening extension system based on close collaboration/ cooperation between CSB and DOS, and therefore, Japanese experts will be required to closely communicate with Member Secretary, CSB, who is a chief coordinator, and Bivoltine Cell. At the same time, most of the trained counterparts work at CSR&TI, Mysore, and they will play the important role as experts. Accordingly, the project offices will be set up at CSB HQ and CSR&TI, and Japanese experts will give advice/ guidance to the related institutions depending on the needs of their respective fields.

2) Short-term Experts

Two to Three short-term experts will be dispatched annually depending on the needs.

3) Counterpart training in Japan

Since many CSB counterparts have already been trained through the past Indo-Japanese cooperation, the Project will put priority on DOS staff for counterpart training in Japan. However, as for the areas that still have a need for improvement, particularly seed production, counterpart training will also be considered for CSB staff. In addition, training for the managing staff of DOS will be considered. Training for DOS staff in extension system will also be useful. Training for the staff of Bivoltine Cells may also be taken up for effective coordination and monitoring of the various activities / programme as envisaged in the project.

4) Provision of Equipment

Machinery, equipment and other materials necessary for the implementation of the Project will be provided by the Government of Japan within budgetary limitations. The Indian side will request equipment that DOSs have difficulties in purchasing by themselves and that CSB needs for technical transfer to DOS. What should be kept in mind is that the Phase 3 Project will refrain from providing equipment abundantly in order to assure sustainability and replicability of model extension activities. Regarding vehicles, measures should be considered to share them among several TSCs. Details of the equipment will be discussed after the arrival of the Japanese experts.

5) Local Cost

Local cost support for baseline survey in selecting TSCs, enlightenment activities, field days, and workshops will be considered. Concerning enlightenment programme, it should be noted that DOS and farmers need to bear their own responsibility and cost, given the nature of the Phase 3 Project which is different from the verification activities of the Phase 2 Project.

(2) Input by Indian side

1) Project Administration

Implementing organisations will be CSB and DOSs of three states.

The Joint Secretary of Ministry of Textile will be the Project Director, who will bear overall responsibility for coordination, monitoring, and evaluation of the Project. The Member Secretary of CSB will be appointed as the Project Manager, who will be responsible for administration and implementation of the Project. The head of the Bivoltine Cell of CSB will be the Deputy Project Manager, who will be in charge of day to day activities of the Project and coordinating with the concerned states. The Bivoltine Cell of CSB will also serve as a secretariat in charge of coordination and collection of information as well as monitoring and evaluation of action plans with close collaboration with other CSB institutions. Directors of CSR&TI, SSTL, NSSP and CSTRI will have overall responsibility for the managerial and technical matters related to the activities of each function.

Commissioner / Director of Department of Sericulture of the concerned states will have overall responsibility for the managerial and technical matters related to the activities within the states, and Bivoltine Cell of each state will monitor the project activities in respective state and coordinate with CSB.

The roles of concerned organisations in each activities are described in the ANNEX 3 (Plan of Operations).

Table 7 Main activities and responsible organisations (Ä : implementation, O: support)

	Bivoltine Cell (CSB)	CSR&TI	NSSP	SSTL	CSTRI	DOSs
Formulation of Action Plan	Ä	O	O	O	O	Ä
Establishment of Coordination Mechanism	Ä					Ä
Strengthening of Seed Production System		O	Ä	O		Ä
Strengthening of Training		Ä	O	Ä	O	Ä
Establishment of Model Extension System	O	Ä				Ä

2) Allocation of Counterpart Personnel

Appropriate number of counterpart personnel will be assigned for the Project both at CSB and DOS. CSB counterparts will serve as experts in their specialised fields and give advice/ guidance to DOS staff. DOS counterparts will also be assigned for the Project, so that the project administration of each state will be clarified.

3) Land, Building and Facilities

The Project office for Japanese experts will be set up at the CSB HQ as well as CSR&TI.

4) Running Expenses

The Indian side will meet the necessary recurrent expenses for the Project. This includes the expenses for CSB counterparts and DOS staffs, cost for strengthening TSC and Training Schools, and expenditure to provide financial support to farmers.

5-7 System of Monitoring and Evaluation

(1) Monitoring

It will be mainly five mechanism, i.e., regular meetings of Bivoltine Cells of CSB and DOSs, Topic-wise Group Meetings on training, seed production and extension, Joint Meetings (before and after each crops), Quarterly Review and Joint Coordinating Committee (more than one time per year). Through these mechanisms not only monitoring but also discussion and decision will be done by the members of each level of CSB and DOS concerned and the expert team. In the monitoring, the index of PDM and activity plans including Plan of Operation (PO) will be referred.

(2) Evaluation

Evaluation of the Project will be conducted jointly by the two Governments through JICA and the Indian authorities concerned, at the middle and during the last six months of the cooperation based on the 5 items of evaluation, that is, efficiency, effectiveness, impact, relevance and sustainability.

5-8 Precondition/Important Assumption and Risk of External Factor

(1) Precondition

1) Bivoltine Cells will be established in CSB and target states.
2) Memorandum of Understanding between CSB and DOSs on coordination/ collaboration mechanism for the Project will be signed.
3) Counterpart personnel of CSB and DOS who have been trained during PPPBST (Phase 2 Project) will be utilised to the extent possible.

(1) Important Assumption

1) Important Assumption to Achieve "Output"

A. Counterpart personnel of the Project will not be shifted.
B. Trained CSB/DOS staff will be fully utilised.
C. Law and order in the target areas will not get worse.

A and B are essential requirements for the Project which contains various stakeholders and target fields to make the activities effective to achieve the "output". As for C mentioned above, though there are some skirmishes in each of the three states, no serious potentially dangerous factors to prevent the Project execution have been found until now.

2) Important Assumption to Achieve "Project Purpose"

A. New diseases will not break out.

Project activities include hygienic enhancement to prevent outbreak and spread of disease, and the establishment of a quarantine system. To date, there is no information to alert them to a potential danger that may affect them.

3) Important Assumption to Achieve "Overall Goal"

A. The price of quality bivoltine raw silk will not drastically fall.
B. The demand for quality bivoltine raw silk will not decrease.

The current price of bivoltine raw silk in India is higher than the international market price although the gap of price has been decreasing. In case more pressure of low price of the Chinese raw silk take place, Indian silk industry might be affected, (On the other hand, silk turnover in China is on the decrease.)

Silk imports are permitted today with 34 % customs duty and with nil duty for those who convert yarn in to fabrics and export them. Central government retains the authority to impose Anti-Dumping Duties. Cocoon farmers and weavers do not necessarily share same interests and high duty levels cannot be taken for granted.

Central government would have to balance these interests and take appropriate protection measures to prevent substantial price falls and demand reduction of high quality domestic bivoltine silk due to low cost imports.

6. Validity of the Project

6-1 Impact

(1) Political/Institutional Impact

Project is expected to enhance the capacities of CSB and DOS such as the ability to collect field information, to work out exact and strategic policies based on the field information and future vision, to share information and to coordinate between agencies concerned. Establishment of model extension system could be a model for other extension system in India, where guidance to farmers based on appropriate planning is required.

Moreover, if extension system for bivoltine sericulture will be functional and the income levels of farmers and reelers are improved, it will lead to farmers' and reelers' confidence on CSB and DOS. Such phenomenon has been actually seen as an effect of

the Phase 2 Project and it is expected that such confidence on the extension system will be enhanced by the Project.

(1) Social/Cultural Impact

Increase of income levels of farmers and reelers will lead to the improvement of their living conditions. Grouping is promoted as a part of the extension activities, which may enhance a function of mutual assistance in a community.

On the other hand, the income gap between advanced farmers and others could be widened by the introduction of bivoltine sericulture and it may cause social tension. Therefore, in the baseline survey efforts may be made to comprehend the socio-economic conditions and social relationship in a village and steps taken to avoid expanding the social disparity.

(3) Technical Impact

The Project is expected to enhance the bivoltine sericulture extension system and to make the standardised practical technology consistent throughout central government research institutions to state TSCs. Added to that, The Project will spread bivoltine sericulture and its advantages as well, and to boost the awareness of technical improvement.

(4) Economic Impact

Increase of the production of high quality silk will reduce the dependency on imports. It is also anticipated to increase the income and employment opportunities as a profitable and stable industry in villages. Promotion of the related industry such as reeling and weaving is expected as well.

6-2 Effectiveness

(1) Appropriateness of the plan

The Project activities will cover formulation of action plan, advice on sericulture administration and establishing coordination/ cooperation mechanism as well as technical transfer and strengthening of facilities. This will enable field activities under the Project effectively leading to bigger outputs, that is, establishing functional extension system. Advice and support on the matter of managerial and administrative matters will be made to strengthen extension system for bivoltine sericulture.

(2) Appropriateness of project objectives

The gap between the demand of quality silk, which is mainly for warp, and its supply is currently met by import from China. Government of India is accordingly high priority for improving the productivity and quality of Indian silk and also to enhance production. Therefore, the Project is relevant with regard to the policy of the Government of India.

Now that the State Government of Karnataka, Andhra Pradesh and Tamil Nadu have prepared ambitious plans for large-scale expansion of bivoltine sericulture, what is required is practical action plan, training of staff, strengthening of facilities and improvement of extension system. The Project will tackle these tasks, based on the achievement of the Phase 1 and Phase 2 Project, and outputs of the Project would be used by DOSs for their expansion programme.

(3) Advantage of Japanese Assistance

The target races of the Project, namely CSR race, and technological package of bivoltine sericulture have been developed through the past Indo-Japanese cooperation. Moreover, past cooperation has successfully built confidence between both sides. Therefore, Japan has enough advantage to cooperate for the Project.

6-3 Efficiency

Though the coverage of the Project is rather huge, Indian side will bear responsibility for strengthening target facilities based on their own budget for sericulture promotion. In doing so, local purchase of equipment will be promoted keeping in mind the replication to other areas.

Target TSCs are supposed to cover 3,600 farmers in five years. The experience gained through the Phase 2 Project indicates that demonstration effects will have positive motivational effect amongst other farmers.

6-4 Relevance

(1) Appropriateness as an ODA project

The Project will reduce dependency on import and lead to the increase of income levels of farmers and reelers. It can be said that the Project is appropriate from the view point of improving the economic status of farmers in the villages.

(2) Relevance to JICA's assistance strategy to India

JICA's assistance strategy puts high priority on poverty reduction, and agricultural and rural development is one of the major targets for that purpose. The promotion of sericulture would contribute to the creation of job opportunity and the increase of income in a village, and thus, the Project is relevant to JICA's policy.

(3) Relevance to the policy of the Government of India

Increase of domestic production of bivoltine raw silk is regarded as an important policy agenda of the Indian government, and therefore, the Project is relevant to the policy of Indian government.

(4) Participatory Project Implementation

The PCM workshop was held as a part of the short-term survey and the participants worked out the project plan.

6-5 Sustainability

(1) Appropriateness of implementing organisations

CSB has many trained counterparts who have enough capability and technical competence and they can play a role as experts who will give technical advice/ guidance to DOS staff in the Project. Therefore, CSB is the right organisation to implement the Project.

(2) Administrative Capacity of the Organisation

1) CSB

CSB has enough capable manpower. It should also be noted that given the federal structure of Indian administration, workable coordination/ collaboration mechanism between CSB and DOS need to be established through the Project.

2) The Three States

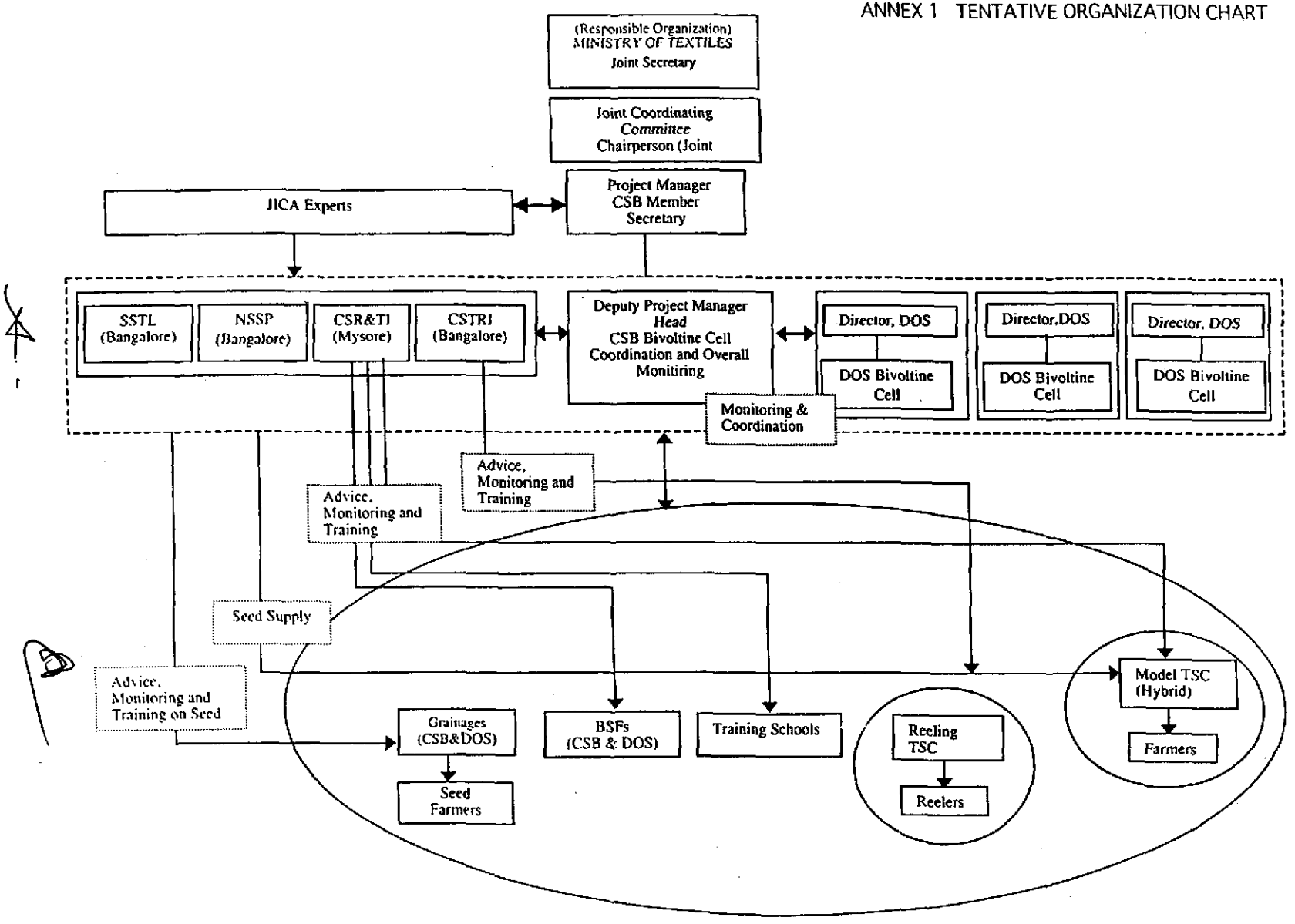
As written in 3-1, DOS of the three States has a consistent extension system and personnel. (Karnataka DOS has 9 counterparts trained at Phase 2 project, and Andhra Pradesh and Tamil Nadu have 1 counterpart). It is reported that the problem confronting the Indian government including DOS is that 80 to 90 % of the total budget is on personnel cost, and sometimes the government offices face difficulties in carrying out the planned activity due to fund constraint. Thus, it is necessary to prioritise and earmark budgetary allocation to meet the cost on improving the extension units specially TSCs and meet the other expenses envisaged in the project.

(2) Social/ Environmental/ Technical Acceptability

Karnataka State has a sericulture history of 250 years, while Andhra Pradesh and Tamil Nadu states have that of 30 years each. Multivoltine sericulture and CB were the mainstay throughout. These facts suggest that there are some base to accept bivoltine sericulture. However, bivoltine sericulture requires different management and inputs, therefore, continuous programme to raise awareness to promote bivoltine sericulture is necessary.

ANNEX 1 Tentative Organisation Chart of the Project
ANNEX 2 Project Design Matrix
ANNEX 3 Plan of Operations

ANNEX 1 TENTATIVE ORGANIZATION CHART



Plan of operations (Tentative)

Activities	Outputs	Schedule (Japanese FY) 2002	2003	2004	2005	2006	Under Responsibility of	Mainly implemented by	supported by
1. Formulation of Action Plan for Promotion of Bivoltine Sericulture							CSB, DOS	CSB BC, DOS	EX(L) (E)
1-1. Baseline Survey (on target farmers, current extension system, current extension plan, and government policy to support small sericulture farmers and to strengthen farmers' group, etc.)								CSB BC, DOS BC, CSR&TI	EX(L)(E)
1-2. Promotion of full introduction of cocoon marketing system with quality assessment								DOS	EX(L), CSTRI
1-3. To examine the needs for modification on current extension system, current extension plan, government policy to small sericulture farmers and to strengthen								CSB BC, DOS BC, CSR&TI	EX(L)(E)
1-4. Action plan for promotion will be formulated with close coordination of CSB and DOSs								CSB BC, DOS BC, CSR&TI	EX(L)(E)
2. Establishment of Coordination/Collaboration Mechanizm among CSB and DOSs							CSB, DOS	CSB BC, DOS BC	EX(L)(C)
2-1. To formulate plan of activities for Bivoltine Cells								CSB BC, DOS BC	EX(L)(C)
2-2. To monitor project activities through regular joint meetings								CSB BC, DOS BC	EX(L)(C)
3. Strengthening of System of Seed Production							NSSP	NSSP, DOS	EX(S)
3-1. To formulate plan for mass production of quality seed								NSSP, DOS	EX(S)
3-2. To establish one-way system at CSB and DOS								NSSP, DOS	EX(S), SSTL, CSR&TI
3-3. To establish quality control control guidelines and checkpoints at P3 level and below								NSSP, DOS	EX(S), SSTL, CSR&TI
3-4. To formulate guidance plan to BSF staff, DOS staff and seed farmers								NSSP, DOS, SSTL, CSR&TI	EX(S)
3-5. Strengthening of seed production facilities								NSSP, DOS	
4. Strengthening of Training							CSR&TI	CSR&TI	EX(T)
4-1. To formulate Training Master Plan for bivoltine sericulture								CSR&TI, DOS	EX(T)
4-2. To formulate facility development plan								DOS	EX(T)
4-3. Strengthening of training facilities (by DOS)								DOS	
4-4. To revise training curriculum to be field oriented								CSR&TI, DOS	EX(T)
4-5 To conduct trainers' training								CSR&TI	EX(T)
4-6. To conducts farmers' training (by DOS)								DOS	
4-7. To devise training curriculum and materials in each field								CSR&TI	EX(T)
4-7-1 Silkworm Race Maintenance/ Seed Production								CSR&TI, SSTL, NSSP	EX(S)
4-7-2 *Murberry cultivation*								CSR&TI	EX(T)

4-7-3 Silkworm rearing/ Desease Control				CSR&TI	EX(T)
4-7-4 Reeling				CSTRI	EX(T)
4-8. To conducts training course for extension staff				CSR&TI	
5. Establishment of *Model for Bivoltine Sericulture* Extension			CSB, DOS	CSB BC, DOS BC, CSR&TI	EX(L)(E)
5-1 To select target TSCs				CSB BC, DOS BC, CSR&TI	EX(L)(E)
5-2. To plan and implement model extension activities in the targeted areas				CSB BC, DOS BC, CSR&TI	EX(L)(E)
5-3. To tune up technical package developed by PPPBST				CSB BC, DOS BC, CSR&TI	EX(L)(E)
5-4. To prepare method of monitoring and evaluation for extension activities				CSR&TI, DOS	EX(L)(E)
5-5. STrengthening of TSC (DOS)				DOS	

Tentative Project Design Matrix

Dec: 21,2001

Project Title : The Project for Strengthening Extension System for Bivoltine Sericulture (tentative title) Target Group : bivoltine sericulture farmers in target areas

Target Areas: Karnataka, Andra Pradesh, Tamil Nadu Terms of Cooperation : July, 2002 ~ June, 2007

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
【Overall Goal】 Enhancing production and quality of bivoltine raw silk and thereby raising the income levels of farmers and reelers.	1 Bivoltine sericulture farmers in target areas will increase income from sericulture. 2 The production of quality raw silk (above 2A level) in target areas will be increased.	・Reports/documents of CSB/DOS ・Baseline Survey ・Monitoring Survey on farmers and reelers ・Data from cocoon market	・Policy of CSB and DOS for promoting bivoltine sericulture will not be changed.
【Project Purpose】 Extension system for bivoltine sericulture will be functional.	1 The number of bivoltine sericulture farmers will be increased. 2 The production of viboltine seed cocoon in target areas will be increased. 3 The number of bivoltine cocoon transaction in cocoon markets in target states will be increased. 4 Production and supply of quality bivoltine seed will be increased. 5 Condition of facilities will be improved for bivoltine sericulture.	・Baseline Survey ・Reports of CSB/DOS	・Price of quality bivoltine raw silk will not drastically fall. ・Demand for quality bivoltine raw silk will not decreased.
【Outputs】 1 Action plan for promotion of bivoltine sericulture will be formulated. 2 Coordination/collaboration mechanism among CSB and DOSs for extension of bivoltine sericulture will be established. 3 System for mass production of quality seed will be established. 4 DOS staff will be equipped with necessary skills and knowledge for extension of bivoltine sericulture and training facilities will be improved for bivoltine sericulture. 5 Extension model for bivoltine sericulture will be established.	1-1 CSB and DOS will jointly formulate action plan with necessary budget allocation. 1-2 Facility development/improvement plan for extension of bivoltine sericulture will be formulated with necessary budget allocation. 2-1 Information/data regarding bivoltine sericulture will be compiled at Bivoltine Cells in each states. 2-2 CSB and DOS will share plan and challenges. 3-1 Quality control guidelines will be introduced at P3 level and below. 3-2 Defective cocoon rate will be decreased at BSFs. 3-3 Mixing of different races and sex will not occur. 3-4 Pupation rate will be over 90% at BSFs. 3-5 Recovery rate of seed production will be over 25% at BSFs (egg recovery). 3-6 Seed farmers will increase the production of seed cocoon.	・Baseline survey ・Quarterly reports ・Reports/documents of CSB/DOS ・Monitoring Survey on farmers and reelers ・Minutes of meetings ・Annual reports of CSB/DOS	・New disease will not breakout.

	3-7 Training program will be conducted for BSF/grainage staff and seed farmers 4-1 The number of TSC and STS staff trained by CSR&TI will be increased. 4-2 CSR&TI and DOS will formulate field oriented trainingcurriculum/materials. 4-3 Utilization of improved training manuals. 4-4 The number of DOS staff trained at Sericulture Training School will be increased. 4-5 Farmers confidence on trained extension staff will be improved. 4-6 The number of facilities equipped for bivoltine sericulture training will be increased. 5-1 Extension manuals in local languages will be utilized. 5-2 Cooperative activities (i.e. management of Chawki rearing house) will be conducted in targeted areas. 5-3 Sericulture related tools such as rotary mountage will be locally produced.		
[Activities] 1. Formulation of Action Plan for Promotion of Bivoltine Sericulture 1-1 Baseline Survey (survey on target farmers, current extension system, current extension plan, and government policy to support small sericulture farmers and to strengthen farmers group, etc.) 1-2 Promotion of full introduction of cocoon marketing system with quality assessment 1-3 To examine the needs for modification on current extension system, extension plan, government policy to support small sericulture farmers. 1-4 Action Plan for promotion will be formulated with close coordination of CSB and DOS. 2 Establishment of Coordination/Collaboration Mechanism among CSB and DOSs 2-1 To formulate plan of activities for Bivoltine Cells 2-2 To monitor project activities through regular joint meetings	[Inputs] (Japanese side) 1. Dispatch of long-term experts Chief Advisor Coordinator Seed Production Training Extension 2. Dispatch of short-term experts 3. Acceptance of Indian personnel for training in Japan 4. Provision of machinery and equipment Training tools Others		• Counterpart personnel of the Project will not be shifted. • Trained CSB/DOS staff will be fully utilized. • Law and order in the target areas will not get worse. (Pre-condition) • Bivoltine cells will be established in CSB and target states. • Memorandum of Understanding among CSB and DOSs on coordination/collaboration mechanism for the Project will be signed. • Counterpart personnel of CSB and DOS who had trained during PPPBST will be utilized to the extent possible.

3 Strengthening of System of Seed Production 3-1 To formulate plan for mass production of quality seed 3-2 To establish one-way system at CSB and DOS 3-3 To establish quality control guidelines and checkpoints at P3 level and below 3-4 To formulate guidance plan to BSF staff, DOS staff and seed farmers 3-5 Strengthening of seed production facilities 4 Strengthening of Training 4-1 To formulate training master plan for bivoltine sericulture 4-2 To formulate facility development plan 4-3 Strengthening of training facilities 4-4 To revise training curriculum to be field oriented 4-5 To conduct trainers training 4-6 To conduct farmers training (by DOS) 4-7 To devise training curriculum and materials in each field 4-7-1 Silkworm race maintenance/ seed production 4-7-2 Mulberry cultivation 4-7-3 Silkworm rearing/ disease control 4-7-4 Reeling 4-8 To conducts training course for extension staff 5 Establishment of Model for Bivoltine Sericulture Extension 5-1 To select target TSCs 5-2 To plan and implement model extension activities in the target areas 5-3 To tune up technical package developed by PPPBST 5-4 To prepare method of monitoring and evaluation for extension activities 5-5 Strengthening of TSC	(Indian side) 1. Assignment of counterpart personnel Project Manager Deputy Project Manager Director of CSB institutions and DOSs Subject Matter Specialist (in necessary field) 2. Administrative personnel 3. Land, buildings and facilities necessary for the Project 4. Budgetary allocation for local costs	

3．事業事前評価表(プロジェクト方式技術協力)(案)

作成日：平成１４年８月２日
担当部課：農業開発協力部・畜産園芸課

案件名：養蚕普及強化計画	
対象国：インド	実施地域：カルナタカ州、アンドラ・プラデシュ州、タミル・ナド州
実施予定期間：2002.8.11～2007.8.10	

1.プロジェクト要請の背景

インドで生産される生糸の大部分は収量・品質の劣る多化性蚕（※1）または二化性蚕（※2）と多化性蚕の交雑種であり、品質の高い二化性生糸については、国内需要のほぼ全量を中国からの輸入に頼ってきた。インド国内における生糸生産量は増加傾向にある一方、生糸輸入も増加しており、1994/95 年には国内生産の３分の１に迫り、国内蚕糸業を圧迫しつつあることことから、自給体制が急がれている（表１参照）。このような状況下、インド政府は、「国家養蚕開発計画」（1989/90～94/95）のなかで、二化性養蚕技術開発について我が国に協力を要請し、JICA はプロジェクト方式技術協力「二化性養蚕技術開発計画」（1991～1997）（以下「フェーズ１」）により、現地に適した蚕品種育成等の技術開発を行った。

その後、インド政府は、フェーズ１で開発された技術をさらに農家レベルに定着させるための協力を我が国に要請した。そこで、フェーズ１で開発された技術成果を農家レベルで実用化する技術協力プロジェクト「二化性養蚕技術実用化促進計画」（以下「フェーズ２」）を 1997 年４月１日から５年間実施した。

フェーズ２では、インドにおいて二化性養蚕が導入可能であることが実証され、かつ農家の所得向上等の成果が見られた。そこで、インド政府は、生糸生産の９割を占める南部３州（カルナタカ州、アンドラ・プラデシュ州、タミルナド州。表２参照。）において、これまで実証された養蚕技術を普及し、二化性生糸を 2007 年までに 6,700 トンに増産する計画を策定し、2001 年１月、我が国に対しフェーズ３となるプロジェクト協力を要請した。

表１　インドにおける生糸生産及び輸入量

年次	生糸生産量(トン)	輸入量（トン）
1980/81	5,041	319
1985/86	7,897	1,767
1990/91	12,560	1,598
1994/95	14,579	5,403
1997/98	15,236	2,760

出所）Central Silk Board(1999)"COMPEDNDIUM OF STATISTICS OF SILK INDUSTRY"

表２　３州の養蚕の現状（2000/01 年）

		養蚕農家戸数 (戸)	生糸生産量(トン)
カルナタカ州	BV	30,000	394
	CB	225,941	7,806
	計	255,941	8,200
アンドラ・プラデシュ州	BV	5,220	25
	CB	125,505	4,185
	計	130,725	4,210
タミル・ナド州	BV	952	7
	CB	40,434	560
	計	41,386	567
総計	BV	36,172	426
	CB	391,880	12,551
	計	428,052	12,977

注）BV＝二化性、CB＝二化性と多化性の交雑種
出所）３州提供資料

※注１，２)多化性蚕とは１年に３回以上卵からふ化する蚕であり、二化性蚕とはふ化する回数がより少ない蚕のこと（自然状態で２回)。一般的に二化性の方が繭が固く大きく、生糸は長く高品質であり、高級絹織物のタテ糸に使われる。

2.相手国実施機関

繊維省中央蚕糸局（Central Silk Board: CSB）、カルナタカ州／アンドラプラデシュ州／タミルナド各州蚕糸（Department of Sericulture: DOS）

3.プロジェクトの概要および達成目標

3-1 達成目標

(1) ﾌﾟﾛｼﾞｪｸﾄ終了時の達成目標

「二化性養蚕の普及システムが軌道にのる」

大規模に二化性養蚕振興を計画する各州蚕糸局に対して、プロジェクトは、普及システムの改善・強化を働きかけ、各州が独自に普及・増産を行う体制を整備することを目的とする。

(2) 協力終了後に達成が期待される目標

「二化性生糸の生産量及び品質が向上し、二化性養蚕農家及び製糸業者の収入が向上する」

プロジェクト終了後には、養蚕技術が普及し、生糸生産量が増加するとともに、養蚕農家及び製糸業者の収入向上が期待される。既にフェーズ2において、選定地区の農家収入が2～4倍に増加しており、適切な普及体制の整備により、収入向上が期待できる。

3-2 成果・活動

(1)「二化性養蚕普及のためのアクションプランが策定される」

CSB 及び各州 DOS の二化性養蚕振興室を中心に、各州の営農振興施策、普及施策等を調査した上で、CSB と各州 DOS との連携に基づいた養蚕振興のためのアクションプランを策定する（アクションプランには、推奨する技術体系、施設整備計画、農家への指導方法、小農支援策等が含まれる）。また、各分野のモニタリングを通じて、適宜、普及施策にフィードバックする。

(2)「CSB と DOS 間の連携・調整メカニズムが確立される」

普及活動を所管する各州 DOS が、CSB と協力して、関係者間の調整、活動モニタリング、各種の定例会議を行い、両者の連携メカニズムを確立する（CSB 及び各州の DOS の二化性養蚕振興室が事務局となる）。

(3)「優良蚕種の大量製造システムが確立される」

高品質蚕種の製造計画を策定し、フェーズ2で導入された蚕品種維持・増殖のシステムを定着させるとともに、品質管理を徹底させる。

(4)「DOS スタッフが二化性養蚕に必要な技術・知識を身につけるとともに、研修施設が二化性に適したものに改善される」

CSB と DOS との連携に基づき研修計画を策定の上、研修施設の改善、研修校の指導者及び DOS スタッフに対する研修カリキュラムの改善を行い、より的確な研修を実施する。

(5)「二化性養蚕の普及モデルが確立される」

DOS が CSB 各機関のサポートを得て、モデル普及所を選定しモデル普及活動を実施する。併せて、普及活動モニタリングを行い、その結果は計画に随時フィードバックし、普及手法を確立する。

3-3 投入（ｲﾝﾌﾟｯﾄ）

(1)日本側投入

日本人専門家は、計画策定、研修指導者の育成等の体制整備を中心に、CSB カウンターパートを通じて DOS に助言・指導を行う（総費用　約6億円）。

①長期専門家：5名（チーフアドバイザー、業務調整、蚕種製造、普及、研修）
②短期専門家：2～3名／年（蚕病防除、蚕種製造技術、桑栽培等）
③研修員受け入れ：3名／年（加えて、国別特設研修「養蚕普及」を実施）
④機材供与：研修用機材、普及所用機材、蚕種製造所用機材等　0.8 億円
⑤ローカルコスト：活動費、ベースライン調査、普及活動費等　0.5 億円

(2)インド側投入

①カウンターパート配置：CSB 本部，CSB 関連4機関（中央蚕糸技術研究訓練所、中央製糸技術研究所、国家蚕種製造計画部、蚕種製造ラボ）及び3州蚕糸局
②施設：プロジェクト事務所、研修施設、普及所等
③ローカルコスト：管理費、カウンターパート活動費等

3-4 実施体制

繊維省中央蚕糸局長を実施責任者とし、CSB 二化性養蚕振興室長を実施副責任者とする。3州の蚕糸局長は、プロジェクト共同実施責任者として、各州における活動を所管する。また、CSB 傘下の4つの機関長は、各所管活動に責任を負う（表3参照）。

表3　各活動と関係機関（◎：主要実施機関、○協力機関）

活動	二化性養蚕振興室(CSB)	中央蚕糸技術研究訓練所	国家蚕種製造計画部	蚕種製造技術ラボ	中央製糸技術研究所	3州DOS
アクションプラン策定	◎	○	○	○	○	◎
連携体制強化	◎					◎
蚕種製造		○	◎	○		◎
研修		◎	○	◎	○	◎
モデル普及体制の確立	○	◎				◎

出所）国際協力事業団（2002）『インド養蚕普及強化計画・短期調査、実施協議調査団報告書』

4. 評価結果（実施決定理由）

以下のとおり、協力を行うことは必要かつ妥当と判断される。

4-1 インパクト

CSB 及び DOS の施策能力を高め、関連機関間の調整機能が強化される。また、農家収入が向上するとともに、養蚕が収益性が高く安定した産業として農村雇用の増大に寄与する。また、高品質生糸の増産は、輸入依存度を減らすことが期待される。

4-2　有効性（目標達成の見込み）

養蚕振興に係る計画・施策づくりに対する助言・指導及び関係機関間の連携体制の確立を活動に含めているので、普及システムを持続的に軌道に乗せることが可能になる。

4-3　効率性

インド側は養蚕振興計画を既に有することもあり、インド側予算で対応できる施設整備等はインド側が行う。また、対象普及所が指導する農家は約 3,600 戸であるが、周辺農家への展示効果が期待でき、また、製糸業者等への波及効果も期待できることから、費用対効果は高い。

4-4　妥当性

インド政府は、二化性生糸の国内生産拡大と輸入依存の軽減を重要課題としていることから、本プロジェクトは右方針と合致し、妥当性が高い。また、本プロジェクトは、二化性生糸の輸入依存を軽減するものであり公益性が高く、農村所得向上に結びつくので、ODA として適格である。養蚕振興は、農村における雇用機会創出と所得向上に寄与するので、農村の生活向上と貧困軽減を重要課題と位置づける、JICA 国別事業実施計画との整合性も高い。

4-5　自立発展性

フェーズ1及びフェーズ2を通じて育成された、CSB カウンターパートは優秀であり、彼らが DOS に指導することが可能であり、自立発展性が高い。

5. 外部要因リスク（外部条件）

現在インドの二化性生糸の価格は国際価格より高い。しかし、中国製生糸の安値攻勢の中で、インド政府は、繭生産者と織物業者の利害を調整しつつ、高品質の二化性生糸価格の大幅な低下がおきないよう適切な政策を採る必要がある。

6．今後の評価計画

6-1 今後の評価に使う指標

(1) プロジェクト目標

・二化性養蚕を開始する農家の数が増加する。
・対象地域の二化性繭の生産量が増加する。
・対象地域の繭市場における二化性繭の取引量が増加する。
・二化性蚕種の生産と供給量が増加する。

(2) 成果

・CSB と DOS の連携に基づいたアクションプランが策定される。
・各州の Bivoltine Cell に情報が整備される。
・P3 レベル以下において蚕種品質管理のガイドラインが導入される。
・蚕種製造所において選除繭歩合が下がる。
・種繭農家の蚕種製造量が増加する。
・研修を受けた DOS スタッフの数が増加する。
・地方語によるマニュアルが配布される。

6-2　評価スケジュール

インド側と合同で行う中間評価（2004 年 5 月頃）、終了時評価（2007 年 1 月頃）。

インド養蚕普及強化計画
プロジェクトドキュメント

平成１４年７月

国際協力事業団

目　次

１．序説・要請の経緯

１—１背景と経緯

インド国内で生産される生糸の大部分は収量・品質の劣る多化性であり、高級絹織物用の経（タテ）糸となる品質の高い二化性生糸の国内需要は、ほぼ全量を中国からの輸入に頼ってきた。一方、インド国内における生糸消費量は増加傾向にあるが、その輸入が困難になり、自給体制が急がれている。このような状況下、インド政府は、「国家養蚕開発計画」（1989/90-94/95）のなかで、二化性養蚕技術開発に係る部分について我が国に協力を要請し、JICAはプロジェクト方式技術協力「二化性養蚕技術開発計画」（1991-1997）（以下、「フェーズ１プロジェクト」）により、実験室レベルでの二化性養蚕の技術開発を行った。

プロジェクト終了後、インド政府は、上記プロジェクトで開発された技術をさらに農家レベルに普及・定着させるための協力を我が国に要請した。これに対し、JICAは、上記プロジェクトで開発された技術が、将来インド国政府が率先して実施する農家と製糸業者への普及を念頭に実用化されることを目的として、二化性養蚕技術の現場実証に係る技術協力プロジェクト「二化性養蚕技術実用化促進計画」（以下、「フェーズ２プロジェクト」）を1997年4月1日から５年間の計画で実施した。

フェーズ２プロジェクトでは、二化性養蚕技術のインドにおける導入が可能であることが実証され、かつ農家レベルでの所得向上等目に見える成果が出ている。このため、インド政府は、プロジェクトにより実証された二化性養蚕技術をさらに普及展開し、二化性生糸を2007年までに6700トンに増産する計画を策定し、2001年１月、我が国に対し、フェーズ３となるプロジェクト「養蚕普及強化計画（仮称）」への協力を要請した。

2001年７月に実施されたフェーズ２プロジェクトの終了時評価調査においては、プロジェクトは当初目標をほぼ達成しつつあり、農家レベルで大きなインパクトを与えていることが日印合同評価調査委員会により評価されるとともに、今後二化性養蚕技術の普及展開を行うにあたっての留意点が提言された。この提言を受け、インド側より、「養蚕普及強化計画（仮称）」の改訂プロポーザルが2001年９月に提出された。

１－２　調査団の派遣

終了時評価における提言及び改訂プロポーザルを踏まえ、2001年11月～12月、短期調査員が派遣され、繊維省中央蚕糸局（Central Silk Board：CSB）及び対象州（カルナタカ州、アンドラプラデシュ州、タミルナド州）蚕糸局（Department of Sericulture：DOS）の二化性養蚕普及政策、普及組織、プロジェクト実施体制等を調査するととも

に、PCM ワークショップを開催し、先方と協議の上でプロジェクト計画（案）が策定された。

2．プロジェクト実施の背景

2－1　社会経済開発の概況

インドは独立以来、混合経済体制下で重工業を重視した輸入代替工業化政策を進めてきた。しかし、貿易赤字体質の継続、巨額の財政赤字等により 80 年代末には経済は行き詰まりを見せ、91 年発足したラオ政権（当時）は経済改革に着手し、規制緩和・撤廃、為替レートの引き下げ、貿易自由化、外貨導入等を内容とする経済自由化を積極的に推進した。この結果、対印外国投資が急増、経済成長率の回復、輸出増大による貿易赤字の縮小、外貨準備高の増加等かなりの成果を納めた。その後の政権も同政策を維持・推進しており、第８次５カ年計画(92～96 年度)の年平均経済成長率は 6.8 %と概ね順調に推移している。

産業部門別GDP構成比の推移を見ると、農業部門のシェアは1980/81年度の41.8%から、99/2000 年度には 27.5%へ低下している。農業は近年ウェイトを低下させているとはいえ、依然インド経済の中心であり、GDP の 3 割弱、就業人口の 6 割程度を占めている。経済の安定した成長を維持するためには、安定的な農業生産が不可欠な要素となっている。

マクロ経済は近年概ね順調であるが、一人あたり GDP は、440 ドル（1999 年）にすぎず、国内の階層間格差、貧困問題が依然大きな課題である。1950 年代には全人口の65%を占めていた貧困層（インドでは、農村では 2400 カロリー、都市では 2100 カロリー以下の食料しか摂取できない階層が貧困層とされている）の割合は、計画委員会統計では 93/94 年には 36%に減少しているものの、人口規模の大きさから、３億 2000 万人から 3 億 5000 万人がその階層に属する。農業開発の推進は、農村の生活向上と貧困軽減のための重要な課題の一つと認識されており、養蚕業の振興は、農村における雇用機会創出と所得向上のための重要な部門として、重視されている。

表１　基礎開発指標

人口（うち都市人口の割合）(98)	人口増加率 (75-98)	一人あたり GDP (1998)	貧困ライン以下の人口	成人識字率(98)	安全な水を利用できない人口 (90-98)	保健医療サービスを利用できない人口 (81-93)	平均余命(98)	５歳未満児死亡率（出生 1000 人当たり）(98)
9.8 億 (27.7%)	2.0%	440 ドル	35.0%	44.3%	19%	25%	62.9	105

出所）UNDP Human Development Report 2000

表2　州別指標（対象3州）

	人口 (1991 Census) (万人)	州内総生産 (State Domestic Product) (Rs. Core) (1996/97)	識字率 (7歳以上) (%) (1991)	幼児死亡率 (出生1000人当たり) (1997)	平均余命 (1991-95)
カルナタカ州	4,498	50,262	56.04	53	62.5
アンドラプラデシュ州	6,651	72,195	44.09	63	61.8
タミルナド州	5,586	69,042	62.66	53	63.3
インド平均	-	-	52.2	71	60.3

出所）Government of India, Economic Survey 1998-99

2－2　養蚕業の概況

インドにおける生糸の生産量は約16,000トンで、中国に次いで世界第2位を占める。世界的に生産量が減少する中で唯一増加の傾向にあり、過去10年間で約50%の伸びを示している。インドには、大規模かつ成長しつつある国内生糸市場、養蚕に適した気候と安い労働力、及び養蚕の長い歴史等、養蚕業の基盤がある。南部のカルナタカ州、アンドラプラデシュ州、タミルナド州でインド全体の生産量の90%以上を占めている他、西ベンガル、カシミール等も伝統的な養蚕地域である。インド製生糸の約9割は家蚕生糸で、最も一般的に取り引きされている。この他、野蚕（タサール、エリ、ムガ生糸）も生産されており、ムガ生糸においては世界市場を独占している。

インドの養蚕業は、現在の生産性は全体としてまだ低いものの、他の大部分の農業分野と比較すると、良好な収益、特に現金収入の機会を生産者にもたらしている。養蚕は労働集約的産業であり、インドにおいては、1ヘクタールの養蚕農家は、桑栽培、蚕飼育、製糸、撚糸、織物、衣類製造部門等を併せて、毎年約13人の雇用を生むと言われている。0.25ヘクタールの土地があれば、小規模な養蚕経営が可能であり、インドにおける農業活動の中で最も労働力・土地当たりの収益性が高いと言われている。また、生糸は腐敗せず、不加価値の高い商品であるため、遠隔地でも流通上の不利は少なく、他の農産物と比べて、養蚕は安定した現金収入源となりうる。加えて、養蚕及び製糸部門の労働力の推定60%を女性が占め、また製糸業はムスリムが中心である等、社会的弱者の雇用と所得の創出の観点から有意義である。

しかし、現在インドで生産される生糸の96%（2000-2001）は収量や品質の劣る多化性または多化性×二化性であり、世界市場における競争力は高くない。また、インド国内においても、サリーなど絹織物用の経（タテ）糸となる品質の高い二化性生糸への需要に対しては、国内で生産されている生糸では品質が劣るため、中国からを含め約4,713トン（2000-2001）（一説には8,000トンとも言われている）を海外からの輸入

でまかなっている。このため、インド政府は「経糸用」生糸の国内自給を目指して、高品質の生糸生産が期待される二化性養蚕の導入とその普及・拡大を強く望んでいる。

また、インド政府は、二化性養蚕の導入が養蚕農家の所得向上に役立つばかりでなく、農村部における婦女子の雇用機会の拡大にも寄与するものとして期待している。実際、近年インド繊維省中央蚕糸局（CSB）が行った経済分析によると、フェーズ1及びフェーズ2プロジェクトにより開発・実証された二化性品種の繭は、在来品種に比較して収量と価格の両面で勝っており、養蚕農家のみならず、従来は他作物を栽培していた農家も養蚕への転換を希望し、農家にとって二化性養蚕は収益性の高い作目であるとの認識が急速に浸透している。農家にとっては、年数回現金を得ることができること、条桑育の導入による作業負担の軽減により家族労働による対応が可能であること等も大きなメリットとなっている。

2－3　政府の養蚕振興策

（1）養蚕振興政策一般

養蚕開発はインド経済開発計画の中でも高い優先順位を与えられ、高品質の二化性生糸生産の試みは 1981 年に世銀の融資を受けたカルナカ州養蚕開発プロジェクトにより開始された。ただし、本プロジェクトの内容は多化性×二化性養蚕が中心で、二化性養蚕の位置付けは低いものであった。また、二化性生糸の生産目標は当時のインドにおける全生産量 150 トンに対して 1,000 トンとするなど極めて意欲的なものであったが、実際の生産量は 100 トンにも満たず、当初の目標とは大きなギャップを抱えていた。このため、インド政府は世銀融資およびスイスからの無償資金提供等により国家養蚕開発計画（National Sericulture Project :NSP）を 1990 年から5ヶ年計画として開始した。この計画は研究施設の建設、研究開発、普及システムなどを含み、その対象も多化性×二化性養蚕と二化性養蚕が混在するなど極めて膨大なものであった。NSP はインド養蚕行政上の目玉プロジェクトではあったが、CSB、各研究所、カルナタカ州政府の間でプロジェクトの目的や手法について十分に合意が得られたものではなかった。このような背景の下、二化性養蚕に関する技術移転の部分を担うものとして、インド政府の要請により、フェーズ1プロジェクト（1991-1997）が実施され、またこの成果を受けて、フェーズ2プロジェクトが実施された。

上記のように、過去のインドの養蚕振興政策は多化性×二化性養蚕と二化性養蚕とが渾然一体となって遂行される傾向があるため、二化性養蚕技術の普及に当たっては、二化性養蚕に係わる補助金制度、普及組織、施設等を明確に区分し、二化性養蚕の一貫体系として遂行することが望まれる。

（2）二化性養蚕振興政策

インド政府は、フェーズ2プロジェクトにおいてインドにおける二化性養蚕の導入が実証されたことを踏まえ、2007 年までに二化性生糸の生産量を 6,700 トンにまで増加させるという意欲的な長期増産計画「Strategies for Quantum Jump in Silk Production-2001/2007」を策定し、第 10 次 5 ヶ年計画では二化性養蚕のみの振興計画を打ち出している。本計画では二化性生糸の生産目標 6,700 トンのうち、カルナタカ州で 4,500 トン、アンドラプラデシュ州で 1,500 トン、タミルナド州では 400 トンを生産する計画となっている。

一方、最大の養蚕州であるカルナタカ州政府は 2001 年に養蚕振興計画（Integrated Sericulture Development Project：ISDP）を策定し、5年間で実施する主要目標を①カルナタカ州の生糸生産を 10 年間で2倍にする、②単位面積当たりの繭生産量を灌漑地区で 42 kgから 65 kgに増大させる、③多条操糸機を導入して国際規格で2A以上の優良生糸を生産する、ことなどを挙げている。ただし、本プロジェクトは二化性養蚕に特化したものではなく、養蚕全体の振興を図ることを目的としている。

また、CSB 本部に加え、カルナタカ州、アンドラ・プラデシュ州、タミル・ナドゥ州の州蚕糸局（Department of Sericulture、以下 DOS）においては、二化性養蚕振興対策室（Bivoltine Cell）が設置され、行政面からもその振興に力を入れ始めている。カルナタカ州は、二化性養蚕農家数を 2000/01 年の約 30,000 戸から 5 年後には 50,000 戸に、アンドラ・プラデシュ州は 5220 戸から 9220 戸に、タミル・ナドゥ州は 952 戸から 7500 戸にする計画を策定している。

表3　3州の養蚕振興計画

			養蚕農家戸数	繭生産量 (MTs)	平均収繭量 (100dfls 当たり kg)	生糸生産量 (MTs)
カルナタカ州	2000/01 年	BV	30,000	2,761	50	394
		CB	225,941	63,756	40	7,806
		Total	255,941	66,517		8,200
	5 年後の目標値	BV	50,000	25,550	60	3,650
アンドラ・プラデシュ州	2000/01 年	BV	5,220	179	40	25
		CB	125,505	37,651		4,185
		Total	130,725	37,830		4,208

	5年後の目標値	BV	9,220	1,440	60	206
タミル・ナド州	2000/01年	BV	952	52	27	7
		CB	40,434	5,057		560
		Total	41,386	5,109		567
	5年後の目標値	BV	7,500	3,202,100	50	300

注）BV＝二化性、CB＝二化性×多化性
出所）3州DOS提供資料

3）養蚕農家支援策

CSBでは養蚕振興を図るための重点施策に対して2001年度、Catalytic Development Plan（CDP）の下で、飼育施設及び桑園改植への補助金、飼育用具及びCharaka操糸機の供与、条桑育及び飼育者への援助等を行っている。また、この外にも、桑園の改植、飼育施設、灌漑施設等に総額約15億Rsの信用供与を実施している。しかし、これらの補助金や信用供与は従来の多化性や二化性×多化性と二化性品種との区別がないため、CDPにおいて二化性振興に特化した支援策を明確化することが必要である。

各州もまた、二化性養蚕の振興を図るため桑園の灌漑、消毒機材、桑の改植、稚蚕飼育所、壮蚕飼育棟、条桑育用飼育施設などに補助金に支出している。一方で、政府の補助金を当てにせず、独自資金で蚕室等を建設するなど、極めて意欲的な農家もあり、養蚕に対する期待の大きさがうかがえる。

かかる支援策は、特に初期投資が必要な二化性養蚕を広く農民に普及するためには不可欠であり、小規模な養蚕農家が二化性を開始できるような支援が今後とも必要である。

2-4 関連事業

(1）他ドナーの主要な養蚕関係プロジェクト

スイス開発公社（SDC）

SDCは、カルナタカ、アンドラプラデシュ、タミルナド、西ベンガルにてSERI 2000（1997/98～2001/02）を実施中（総額約Rs.32.5 Crore)。社会開発を目的し、養蚕をコンポーネントの一つとして、小農、貧農、女性をターゲットに研修やQuality Clubの形成支援、共同稚蚕飼育所への補助等を行っている。

(2) 我が国の協力

1) 現地国内研修

1999 年より5年間の予定で実施中。CSB カウンターパートが講師となり、蚕品種維持増殖、蚕飼育、蚕病防除、桑栽培、養蚕普及方法の5分野にわたり、州（対象3州に加え、マディアプラデシュ州、西ベンガル州、ジャムカシミール州）養蚕普及員及び CSB テクニカルスタッフに対して、二化性養蚕の基礎的な部分に関する研修を実施している。

2) JBIC

・「チャティスガール州養蚕事業」

インドの最貧困地域の一つであるチャティスガール州において、タサール蚕の生産拡大とマルベリー蚕の組織的導入を行うことにより雇用を創出し、貧困層の生活水準の向上を図ることを目的に実施。詳細設計、養蚕用農園整備、養蚕インフラ整備、養蚕農家支援、製糸業者支援等。

・「マニプール州養蚕事業」

インドの貧困州の一つである北東部のマニプール州において、養蚕（エリ蚕、マルベリー蚕）の生産の拡充によって雇用を創出し、貧困層の生活水準の向上を図ることを目的に実施。詳細設計、養蚕用農園整備、養蚕インフラ整備、養蚕農家支援、製糸業者支援等。

（3）他の協力との連携の可能性

SDC の対象地区はフェーズ3プロジェクトと重なっており、SDC が支援する共同稚蚕飼育所や Quality Club 等を本プロジェクトで活用することが検討できる。

また、現地国内研修を引き続きフェーズ3プロジェクトと連携させ、DOS スタッフに対する研修を行うことによる効果が期待できる。

将来的には、フェーズ3プロジェクト後半または終了後において、プロジェクトの成果を下に、CSR&TI を拠点とした第三国研修を実施することが想定される。

3．二化性養蚕の現状と課題

3－1　養蚕関連組織と普及制度

（1）繊維省中央蚕糸局（Central Silk Board：CSB）

CSB は 1949 年に設立され、全国に約 5,000 名のスタッフを擁し、養蚕業発展のための諸政策について中央政府と州政府間の調整を行い、養蚕業の振興・奨励、技術的並びに財政的支援を行っている。CSB の傘下には中央蚕糸技術研究訓練所（Central

Sericultural Research and Training Institute：CSR&TI)、中央製糸技術研究所（Central Silk Technological Research Institute：CSTRI)、国家蚕種製造計画部（National Silkworm Seed Project：NSSP)、蚕種製造技術ラボ（Silkworm Seed Technology Laboratory：SSTL)、各種普及組織などがあり、研究開発の企画・支援、優良蚕品種の育成、蚕種の製造・配布、操糸技術の向上等を行っている。また、CSB 本部には、二化性養蚕の振興のために、二化性養蚕室（Bivoltine Cell）が 2001 年に設置され、二化性養蚕に係る事業の計画、モニタリング、情報収集及び州 DOS との調整を行っている。

CSB に所属する主要機関の概要は以下のとおりである。

1）CSR&TI

CSR&TI はインド最大の養蚕研究所として 1961 年に設立され、カルナタカ州マイソールに桑育種・栽培部、養蚕部、普及・経営部、研修部があるほか、カルナタカ州に2ヶ所、タミルナド州に2ヶ所、アンドラプラデシュ州に1ヶ所の支場（Regional Sericultural Research Station：RSRS）を持っている。CSR&TI は、約 200 名の職員を擁し、上記の各専門分野について基礎から応用まで幅広い研究を実施するとともに、第Ⅰ期・Ⅱ期を通じて JICA プロジェクトの中核研究機関として重要な役割を果たしてきた。また、フェーズ2プロジェクトでは 29 名がカウンターパートとして技術移転を受けており、研修会の講師や州政府職員の指導に十分対応できる能力を備えている。また、CSR&TI の構内には JICA 基盤整備費によるモデル稚蚕飼育棟、壮蚕飼育棟及び研修センターが建設され、第Ⅲ期における中核的研修センターとしての役割が期待されている。CSR&TI ではこれらの人材と研修施設等を活用しつつ、①稚蚕飼育研修、②壮蚕飼育・上蔟研修、③二化性蚕飼育技術研修、④蚕品種維持・増殖研修、⑤再教育研修、⑥農家研修、⑦研修指導者研修などを幅広く実施するとともに、啓蒙・普及活動、現地討論会、現地指導なども行っている。

2）NSSP

NSSP は蚕種の需要と供給のギャップを補うため 1975 年に設立された。NSSP はインド全土に 134 の事業所を持ち、1,164 名のスタッフ（研究者 134。技術スタッフ 552、アドミ職員 195、作業員 280）を擁し、原蚕種（P3、P2、P1）の維持・増殖を行っている。NSSP が取り扱う蚕品種は、インドで実用化されている全ての蚕品種に及ぶ。NSSP における蚕種製造はバンガロール、マルダ、デハラドンを中心に全国を3つのブロックに分け、それぞれに蚕種製造センター、原蚕種製造所、研修所などを設置している。CSR&TI で育成された CSR 品種はカルナタカ州のハッサンで P4 が、マイソールで P3 が、ダルマプラで P2 が、K.R.ペット及び C.R.パトナで種繭農家に分譲された後、バンガロールやマイソールなど8ヶ所で交雑種が製造されている。また、NSSP は SSTL や

他の研究機関と協力して、州蚕糸局（DOS）職員に対して蚕種製造技術や蚕種の維持・管理に関する研修を実施するとともに、種繭農家に対しても桑園の管理や蚕の飼育についての研修を行っている。フェーズ２プロジェクトでは、９名がカウンターパートとして配置された。

また、NSSP の傘下にある蚕種製造の専門部署として、Silkworm Seed Production Center（SSPC）が 1979 年に設立され、二化性蚕種の製造のみならず、DOS 職員等への技術研修を実施している。SSPC では 1994 年から二化性蚕種の生産を開始し、現在では全生産量の 95%以上が CSR 交雑種となっている。生産された蚕種は近隣のカルナタカ州、アンドラプラデシュ州、タミルナド州以外に北部各州にも配布されている。職員のうち３名は日本での研修を受け、二化性蚕種の生産技術をほぼ習得し、技術の指導及び蚕種製造の実務に携わっている。二化性蚕種の製造には交配系統の混合防止、微粒子病に汚染されていない健全な蚕種の製造、掃き立て時期に合わせた催青技術の確立などが不可欠であり、今後の普及にあたっては、DOS の蚕種製造所に対して雌雄鑑別や微粒子病検査、蚕種の保護・催青などの技術指導を徹底する必要がある。この意味で SSPC が実施する研修コースは技術の習得を目的とする内容に重点化する必要がある。

３）SSTL

SSTL には種繭生産・蚕病防除・蚕種製造・桑栽培などに関する研究部門と、蚕種の製造管理・普及・研修などに関する普及・研修部門とがあり、宿泊施設を伴った研修施設も整備されている。SSTL では蚕卵の発生・催青・塩酸処理などに関する研究、原蚕種の飼育法及び桑栽培法に関する技術開発、蚕種製造における微粒子病防除技術の開発、バラ種製造法や催青法など蚕種の大量生産技術の開発などを実施している。また、SSTL では蚕種製造所職員や種繭農家などに対して、①原産の稚蚕飼育研修、②二化性蚕種の保護研修、③雌雄鑑別研修、④種繭農家に対する CSR 品種の飼育研修などを実施している。SSTL には５名がカウンターパートとして配置されおり、本邦研修も受けている。今後は、SSTL は蚕種製造技術に重点化した研修コースを設け、研修期間も十分に確保するなど更なる改善が必要である。

４）CSTRI

CSTRI は 1983 年に設立された製糸・絹織物に関するインド唯一の研究機関で、製糸部、機織部、加工部、研修部などがあり、フェーズ２では４名がカウンターパートとして配置され、本邦研修を受けている。CSTRI はインドにおける二化性繭の操糸条件や生糸の品質評価基準を策定するとともに、繭の品質が価格に反映されるよう繭取引の実態に合わせた簡易評価法を開発し、タミルナド州では繭層歩合などを繭価格の決定に反映させている。また、CSRTI は自らが開発した多条操糸機、煮繭機、揚げ返し

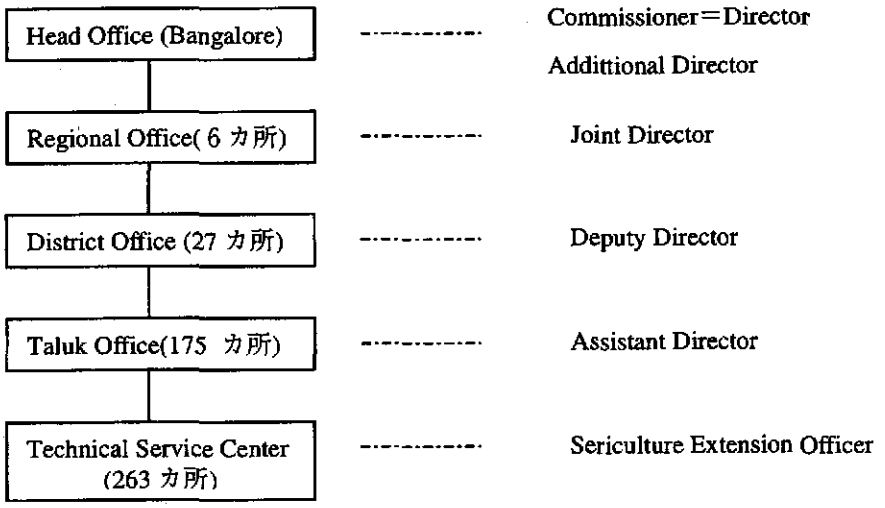
機、選繭機、繭乾燥機等について、民間の協力を得て市販品の製造にも力を入れている。CSB は多条操糸機を 300 ユニットまで増やす計画を持っており、既に一部の普及所（Technical Service Center：TSC)に導入され、研修用として利用されている。CSTRI では幹部職員操糸研修、技術者操糸研修、製糸業者研修などを実施するとともに、養蚕農家、製糸業者、織物業者等を交えた協議会を設置し、生産者と消費者とを結ぶ活動にも熱心である。

（2）3州の養蚕普及制度の概要

1）概況

連邦制をとるインドにおいては、普及活動は州政府の所管事項である。各州の蚕糸局（DOS）組織は概ね同様の形態で、以下のようになっている。なお、農業省下の農業普及制度とは全く別の組織であり、両者の連携は特に見られない。

図1　カルナタカ州蚕糸局組織



Technical Service Center（TSC）と呼ばれる蚕業普及組織は、各州 DOS の出先機関で普及の最前線として位置付けられ、養蚕普及専用の機関である。また、普及関連機関としては、養蚕トレーニングスクール、養蚕に関する研究機関、蚕種の製造を行う製造所（Grainage）等が DOS の管轄下にある。

普及関連施設の数や整備状況、名称や施設ごとの職員数などで異なるが、各州の養蚕農家と TSC の数は概ね以下のとおりとなっている。

表4　3州の養蚕農家数とTSC数

	養蚕農家数	TSC数
カルナタカ州	256,000	263
アンドラプラデシュ州	126,000	176
タミルナド州	41,000	110

TSCはその業務の分担に応じて種繭生産を担当しているTSC(Seed)、製糸技術を担当しているTSC(Reeling)、糸繭生産を担当しているTSC(Commercial)の3つに大別することができ、TSC(Seed)等の各分野の設置箇所は、それぞれの州の生産規模や分野ごとの業者数などが反映されたものになっている。

TSCはSEO（Sericulture Extension Officer。カルナタカ州とアンドラプラデシュ州）又はIP(Inspector、タミルナド州)をトップとして、AI(Assistant Inspector)や、Demonstrator、FF（Farm Foreman）などの普及スタッフで構成されている。普及スタッフになるための資格は特になく、普及スタッフの任用に当たって養蚕に関する問いが含まれた口頭試問が行われている。普及員は、養蚕農家訪問による養蚕技術の普及、研修の実施の他、農民が融資を受けるためのサポート、Quality Clubへの助言などを行っている。TSCスタッフは、DOSが発行する月刊誌や、トレーニングスクール及びCSB機関が実施する研修等を通じて技術情報を入手する。また、3州ともに、移動手段は必ずしもDOSからTSCに供与されておらず、TSCスタッフが個人で所有するバイクや自転車を普及活動に用いて対応し、DOSはTSCスタッフがこれらを購入する際にローンを提供している。

2）二化性養蚕の普及

二化性養蚕の振興と普及のためCSB及び各州は、州蚕糸局(Department of Sericulture：DOS）内にBivoltine Cellを設置している。各州のBivoltie Cellは、州内の二化性養蚕に関するプログラムの計画、モニタリング、及びCSBとの調整等を行っており、カルナタカ州は、Deputy Directorをトップに6人体制、アンドラプラデシュ州は、Joint Directorをトップに6人体制、タミルナド州はJoint Directorをトップに4人体制となっている。カルナタカ州以外は新設されたばかりで、具体的な活動計画等はこれからという状態にあるが、第3フェーズでは重要な役目を果たすべき行政組織であり、その機能が十分発揮できるような体制づくりが急務である。

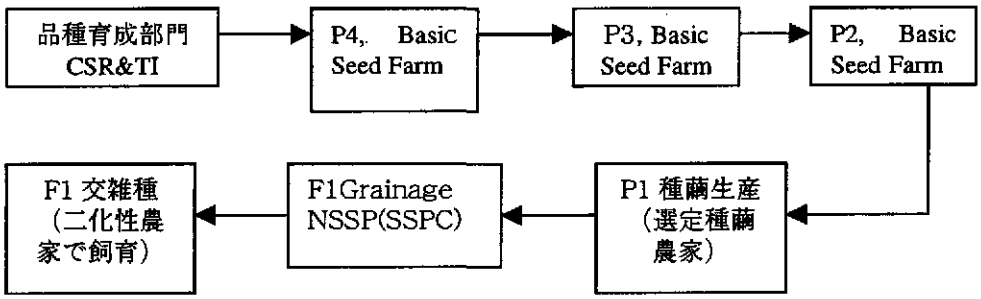
州の普及制度自体は、Bivoltine Cellが設置されている他は、二化性に特化した特別なものはなく、上述の養蚕普及機関のうち、二化性養蚕に適した地域を担当するTSCのいくつかを二化性養蚕を行うTSCとし、必要な施設整備・スタッフ研修等を行い強

化していく方針がとられている。技術的な面では、第2フェーズにおけるプロジェクトの選定農家（通称 JICA farmer）を有する TSC は、フェーズ2の活動を通じて JICA 専門家やカウンターパートが数多く来訪し、知識と技術、経験を得ているが、第3フェーズの対象候補やその他の TSC スタッフは研修機会も少なく、受けた研修も講義やデモンストレーションが中心である。現在、DOS のイニシアティブで、JICA farmer やその他の二化性飼育農家を訪問する形の研修が各州の TSC によって行われているが、参加者は、自発的に BV を飼育している農家、二化性養蚕導入に関心がある農家の他、TSC スタッフ自身も参加し、技術習得を行っている現状にある。

（3）蚕種製造所

フェーズ2プロジェクトにおいては、正しい方法で継代を行うために one-way system と呼ばれる蚕品種の維持・増殖のためのシステムを確立している。

図2　One Way System



本プロジェクトで対象としている CSR 蚕種の供給については、アンドラプラデシュ州とタミルナド州では NSSP からの直接の供給に依存している。

カルナタカ州では、P3 Farm 以降は P2 Grainage, P2 Farm, P1 Grainage, P1 選定種繭農家, 種繭市場, F1 Grainage という蚕種製造のラインを独自に持っている。2001年度は720万 dfls が必要と見積もられており、そのうち 400 万が NSSP から Rs350/100dfls で DOS が購入し、320 万が州の生産ラインで生産され、いずれも農家には無料で配布されている。しかし、2001 年にカルナタカ州で生産された CSR 種については、スタッフに対する十分な研修等がなされないままに行われたため、製造蚕種の品質に問題が生じた。したがって、フェーズ3プロジェクトでは、当面は蚕種の製造はすべて NSSP で行い、その間に州の施設整備・人材育成を行うことが必要である。

なお、フェーズ3プロジェクトが開始されれば、アンドラプラデシュ州とタミルナド州では、P2Farm 以降は自前のラインを作る予定である。アンドラプラデシュ州では将来的に必要量の半分を自前で生産することを目標にしている。タミルナド州では自前の生産目標を最大で 150 万～200 万 dfls 程度としている。

（4）繭市場

繭市場は、州政府により管理されている。カルナタカ州においては、Karnataka Silkworm Seed and Silk Yarn Act (1959)に基づき、1961 年に4ヶ所（Chamarajanagar, T.Narasipura, Ramanagaram, Chickballapura）に繭市場が設立された。養蚕農家と製糸業者は、繭の取引のために州蚕糸局が発効する免許を持ち、繭価格は公開オークションで、最高価格を付けた買い手に、その価格に農家が同意した場合に売られる。取引された総額の１％が養蚕農家と製糸業者の双方から市場手数料として徴収される。農家への支払いは現金で、秤量や現金支払いは州スタッフの立ち会いの下に同日に行われる。繭市場における問題の解決・公正な取引実施のための市場委員会が地域の製糸業者と養蚕農家から構成されており、毎月１回開催されている。カルナタカ州最大の繭市場である Ramanagaram 市場の付近には製糸業者が集中しているが、他２州の繭市場は周辺に製糸業者の集積がなく、これら２州の農家の中にも有利な取引価格を求めて Ramanagarama 市場まで運ぶ農家も多い。なお、生糸交換所は、カルナタカ州に 11、アンドラプラデシュ州に１、タミルナド州に１があり、政府の製糸工場は、カルナタカ州に６、アンドラプラデシュ州に１５、タミルナド州に２２存在する。

３－２　二化性養蚕振興のための課題

（1）二化性養蚕の現状

インドにおける二化性養蚕は、フェーズ１プロジェクトの導入により、初めて本格的な技術開発が開始されたと言っても過言ではない。それ以前の二化性養蚕は、多化性×二化性の蚕種を製造するために、種繭用として飼育された NB4D2 などが大部分で、糸繭用としての飼育は極めて限られたものであった。また、これらの二化性養蚕は、本格的な品種改良や飼育技術の開発が行われなかったこともあって、その生産性は必ずしも高いものではなかった。インドにおける養蚕は、カルナタカ州、アンドラプラデシュ州、タミルナド州の南部３州でインド全体の生産量の 90%以上を占めているが、これらの地域でも二化性養蚕による生糸の生産量は極めて少なく、インド全体でも約 300 トンで、そのうちの 200 トンがカルナタカ州で生産されているに過ぎない。最近の統計によれば、インドにおける繭生産量は 124,600 トンで、そのうち二化性繭は全体の僅か 4%を占めるに過ぎない。近年の調査によると、３州の二化性繭生産量は 2,992 トンで約 92%をカルナタカ州で生産している。

一方、100Dfls 当たりの生産量はフェーズ２プロジェクトの選定農家の平均値 70 kg に比較して著しく劣り、多化性×二化性繭に近い値となっている。この収繭量の違いは蚕品種によるばかりでなく、桑品種、栽培方法、灌漑の可否、消毒の徹底、上蔟器

など多くの要因が関与しているところから、今後の普及に当たっては、開発された二化性養蚕技術を一連のパッケージとして導入することが不可欠であることを示唆している。

フェーズ２プロジェクトにおける実証・展示活動の結果では、繭収量の増加及び二化性優良繭による単価増（選定養蚕農家の二化性繭：180～240Rs/Kg、多化性×二化性繭：100～150Rs/Kg）（1Rs.＝約 2.6 円）から、養蚕農家の収入は従来に比較して２～４倍に増加したと報告されている。さらに、カルナタカ州最大のラマナンガラム繭市場では、多化性×二化性繭の取引量が減少している中で、二化性繭の取引量は 10%程度にまで増加し、年間を通じて市場に出回っているところから、二化性繭の需要と供給が着実に増加していることが伺われる。

現在のところ多化性×二化性生糸と二化性生糸との価格差はあまり大きくないが（多化性×二化性が 1,300Rs/Kg、二化性が 1,400Rs/Kg）、二化性繭から操糸される生糸は繭糸長や解じょ率が優れているところから生産性が高く、このことが製糸業者の収入増につながっている。また、二化性繭に対応できる製糸業者を強化・育成する必要性から、CSB は多条操糸機の導入を進め、インドに適した煮繭条件や操糸条件等を設定することで、生糸生産システムが実用技術レベルで構築され、既に国際規格で 2A～4A 格の生糸が生産されるようになっている。

二化性蚕品種についてはフェーズ１及びフェーズ２を通じて、中央蚕糸技術研究訓練所（CSR&TI）により CSR2×CSR4 及び CSR2×CSR5 が育成されている。両蚕品種は生産性が極めて高く 100dfls 当たりの収繭量は 50～70 kg、繭層歩合は 24～26%、繭糸長は 1,270～1,285m、繭格は 2A～4A で国際的にも遜色ない品種となっている。また、夏蚕用として育成された CSR18×CSR19 の諸形質は上記２品種に比較して若干劣るものの、本品種の育成によって初めて年間５回程度の通年飼育が可能となっている。

（２）二化性養蚕振興における課題

フェーズ２プロジェクトでは、気象条件に適合した高収量品種 V1 と S36 の育成、施肥法の標準化、仕立て法の改善、条桑育の導入、回転まぶしの導入、消毒の徹底、多条繰糸機の導入等を行い、二化性養蚕技術を一連の技術パッケージとして確立し、選定農家における実証を行った。

フェーズ２プロジェクトを通じて、カウンターパートへの技術移転はほぼ達成しているといえるが、フェーズ３では、実証された技術パッケージをさらに普及展開するために基盤を強化することとなる。従って、技術面の問題に加えて、技術パッケージを如何に普及していくかというしくみに関わる問題、すなわち州政府の政策・制度に

関する部分が関係することとなる。

1）二化性養蚕振興のためのアクションプラン

養蚕の実用化技術が農家・製糸業者に広く普及していくためには、普及に関連する組織・制度・農家への支援策等を含めた養蚕行政自体を見直すことが必要である。現在は、二化性養蚕の導入に対する農家からの強い要望にこたえる形で、各州 DOS が野心的な二化性増産計画を策定し、これを早急に実施に移そうとしている状況であるが、二化性養蚕技術に関する正しい認識、二化性技術パッケージを普及するための体制等が未整備なままに普及を急ぐことは、優良生糸の増産というそもそもの目的にとってマイナスの結果をもたらす可能性があり、まずは現実的な振興計画（アクションプラン）を策定することが必要である。この際、養蚕農家のインセンティブを高めるための施策（二化性養蚕による繭や生糸の品質を価格に反映させる仕組みづくり等）や農家への必要な支援策の検討等をあわせて行うことも必要である。また、CSR 種を中心とする二化性養蚕技術は CSB にあり、一方普及そのものは州政府の管轄事項であることから、CSB と DOS とが十分に連携した上で、二化性養蚕技術パッケージを普及していくためのアクションプランを策定することが重要である。

2）優良蚕種の大量製造のための基盤強化

フェーズ２プロジェクトにおいて、蚕品種維持と増殖のためのワンウェイシステムが構築され、原系統の維持が行われるようになった。また、４カ所の原蚕種製造所を選定し、原系統に適した飼育技術（催青処理、消毒、衛生環境等病気管理）、蚕種製造技術（蛾区選抜、原系統に合致した選繭）、卵の維持（４，６ヶ月の越年保護方法）の技術指導が行われ、CSB カウンターパートに関しては、技術の習得が行われた。しかし、個々の技術要素（蛹の雌雄鑑別技術、消毒などの衛生・蚕病管理技術、卵の保存技術、蚕品種の混合防止等）に関する現場技術者の技術習得が不十分であり、依然として雌雄や系統の混合といった基礎的な問題が発生していることから、特に P3 以下のレベルにおける品質管理を徹底することが必要であり、チェックシステム、モニタリングシステムを構築することが必要である。なお、二化性養蚕は未だ導入段階であり、現在の生産規模から考えて当面は民間の参入は考えられないため、CSB 及び DOS の蚕種担当組織の強化を行う妥当性は高い。

3）二化性養蚕に特化した研修施設・研修内容の整備

フェーズ２プロジェクトでは、CSB や DOS のテクニカルスタッフ及び養蚕農家や製糸業者に対して、CSR&TI を中心に二化性養蚕技術に係る研修を行った。この際、回転まぶしの使用法、条払い条続報、条桑収穫法、桑仕立て法等の内容を盛り込み、農

家や製糸業者のニーズに即したカリキュラムに改善した。

一方、DOS における研修については課題が多く、フェーズ２プロジェクトの提言にも関わらず、カルナタカ州においては二化性養蚕に特化した研修学校の整備が遅れている（タミル、アンドラはフェーズ２プロジェクトの提言を受けて整備）。また、実用的な研修についての理解が浸透しておらず、実地研修が少ない。また、現在のスタッフが有する技術が二化性養蚕の技術とマッチしておらず、二化性養蚕の研修を受けていない教員が教えているケースや、研修を受けた校長が異動するケース等が散見される。二化性養蚕技術を普及するためには、州において TSC スタッフや農民を研修することができるよう研修実施機関の能力を強化する必要があり、実用的な研修カリキュラムの作成と研修学校の整備、技術指導者の育成が必要である。

４）二化性養蚕振興のための普及システムの構築

従来の養蚕は多化性×二化性をベースとしたものであり、飼育技術や飼育環境に高度なものを要求されないため、二化性養蚕技術を普及するにあたっては、技術パッケージを農家に浸透させることが必要となる。現状は、普及の最前線である TSC については、農家現地指導に必要な移動手段はバス、バイク、自転車、徒歩のいずれかが主体であり、手当てによって燃料費や交通費がまかなわれているものの十分ではなく、機動力に乏しい。当面の課題としては、二化性養蚕の早期普及のため、普及員の技術力向上のための研修の実施、実習を含む実践的技術指導ができる施設の充実、電話による技術相談やパンフレット等普及現場とのコミュニケーション手段の確保等が必要であり、同時に、二化性養蚕に関する普及員の指導能力を高め、地域に適合した普及計画の策定、地域実態調査、営農調査等の分析、評価、情報の収集、分析による迅速な普及情報の提供等を行うことが必要である。

４．プロジェクト戦略

４－１　プロジェクト戦略

（１）計画策定への助言

対象３州がプロジェクト終了後も自立発展的に普及事業を展開していけるような体制を構築するためには、フィールドベースの技術の定着や施設の改善のみならず、普及に関連する組織・制度・農家への支援策等を含めた養蚕行政自体を見直すことが必要となる。このため、フェーズ３プロジェクトにおいては、政策提言に係る部分をプロジェクト活動の一つとして位置づけることとした。フィールドレベルでの活動がプロジェクト目標の達成に結びつくためにも、組織・制度・農家支援策等を含んだ長期計画の策定を含む一貫した活動が必要である。実際の普及活動は州政府の所管事項で

あることから、現実的なアクションプランの策定にあたっては、CSB と DOS との連携・調整が不可欠であり、専門家は、CSB と DOS の連携・協力体制構築のための支援を併せて行うこととなる。

（2）CSB カウンターパートの活用

CSB には、フェーズ1及びフェーズ2を通じた我が国の協力により育成された多くのカウンターパートがおり、各分野の専門家として DOS への指導を行うことが可能である。DOS に対する研修や DOS が行う現場での普及活動への助言・指導においては、これら CSB カウンターパートが中心に行い、専門家は　計画策定、モニタリング、評価方法等につき CSB 及び DOS のカウンターパートを指導することが期待される。プロジェクト終了後には CSB カウンターパートが専門家としてインドの二化性養蚕振興を指導し、3州 DOS が独自に振興計画を実施していけるよう、インド側の人材が前面に出て活動を行う。

（3）プロジェクト終了後においても持続可能なモデルシステムの確立

TSC やトレーニングセンター等の整備においては、日本側投入を必要最小限に保つとともに、養蚕器具の現地調達を促進する等、プロジェクト終了後にインド側が主体となって他の地域に拡大できるようなモデル普及システムを構築するよう留意する。

（4）クラスターアプローチ

対象施設（地区）の選定においては、Commercial TSC の周辺に蚕種製造所や製糸業者、繭市場が存在するような集積した単位を出来る限り対象とすることにより、より大きな効果をもたらすよう配慮する。

5．プロジェクト基本計画

5—1　ターゲットグループ

対象3州（カルナタカ州、アンドラプラデシュ州、タミルナド州）の二化性養蚕農家

3州養蚕局の統計によれば、二化性、多化性をあわせた全養蚕農家戸数は、カルナタカ州で約 25.5 万戸、 アンドラプラデシュ州 12.5 万戸、タミルナド州 4.1 万戸である。このうち、二化性養蚕農家戸数は、カルナタカ州で 30,000 戸、アンドラプラデシュ州で 5220 戸、タミルナド州で 952 戸であり、各州はこれを5年後にはそれぞれ50,000戸、9,220戸、7500戸に増加させる計画をもっている。

養蚕農家は、土地所有面積（桑園面積を含めた土地所有面積全体）によって、Marginal Farmers (0.40ha以下), Small Farmers (0.40 から 1 ha), Medium Farmers (1 から 2 ha), Big farmers (2ha 以上)に分類されている。カルナタカ州では、このうち、Marginal Farmers が 12 万 4056 戸で全体の 48%を占め、以下多い順に Small Farmers 10 万 530 戸(39%)、Medium Farmers 2 万 1047 戸(8%)、Big Farmers1 万 308 戸(4%)となっている。土地なしの養蚕農家は全体の 5%程度と言われている。養蚕農家は、地域により異なるものの、桑園以外には野菜、ココヤシ、豆類、ターメリック等の農地を若干有する。

このうち、本プロジェクトで主な対象として想定されるのは、灌漑施設のある桑園を 1 エーカー (0.4ha) から 2 エーカー確保できる Small Farmers である。Medium Farmers も数的には少ないが含まれることになると思われる。所有農地を桑畑に転換できれば比較的容易に桑園の拡大がはかれるので成長の可能性が高いこと、また、二化性養蚕に必要な設備を整える資金や土地が初期投資として必要となることから、普及の初期の段階では、1～2 エーカー規模の農家が妥当と想定される。ただし、かかる対象農家の取り上げ方が農村内の格差拡大につながらないか否かについてはプロジェクト開始時に行うベースライン調査等を通じて再検討することが必要である。

養蚕農家の帰属集団でみると、カルナタカ州では、ヒンドゥー教徒が 84%、指定カースト（Scheduled Caste）が 11%、指定部族（Scheduled Tribe）が 3.5%、その他マイノリティ（ムスリム、仏教徒等）が 1.5%である。一方、製糸業者については、作業の過程で繭の中の蛹を殺すことに対する宗教的タブーのため、伝統的にヒンドゥー教徒が少なく、圧倒的にムスリムが多い。

現状では、二化性養蚕農家を行っている農家でも、夏の高温で乾燥し水が不足しがちな時期（3 月～8 月）は、その条件への耐性が強い多化二化品種を飼育するのが一般的である。また二化性を飼育するか二化性×多化性を飼育するかは、農家の選択にまかされており、同じ農家でも年によって何作二化性をやるか異なる場合があり、一般的に、現状では農家を二化性養蚕農家と多化二化養蚕農家に明確に区分することは困難である。ただし、フェーズ 2 プロジェクトにおいて、夏の高温につよい蚕種（CSR18×CSR19）が開発され、選定農家における実証の結果通年飼育が可能であることが実証されたことから、本プロジェクトにおいては、夏期は CSR18×CSR19 の飼育を行い、CSR の通年飼育を推奨する。

5－2　上位目標

二化性生糸の生産量及び品質が向上し、二化性養蚕農家及び製糸業者の収入が向上する。

二化性養蚕振興のための現実的なアクションプランに基づき、優良蚕種の製造システムが確立され、二化性養蚕普及のための人材の育成、施設の整備が行われ、モデルとなる普及システムが確立されることで、プロジェクト終了後には、品質のよい二化性養蚕が普及し、生糸生産量が増加する。また、これにより、二化性養蚕農家及び製糸業者の収入が向上することが期待される。すでにフェーズ2プロジェクトにおいて、CSR 種を取り入れた選定地区の農家の収入が選定農家・非選定農家を問わず2～4倍に増加しているとの調査結果がでており、適切な普及体制のもとで技術パッケージが普及された場合には、二化性養蚕農家の収入の向上が期待できる。

5－3　プロジェクト目標

二化性養蚕の普及システムが軌道にのる。

現在は、多化性×二化性の養蚕をベースにした養蚕普及体制であるが、各州 DOS はこの体制を改善・強化しつつ、独自に二化性養蚕普及・振興を大規模に開始しようとしている。しかしながら、二化性養蚕の普及のためには、普及システムの強化が必要であることから、プロジェクトでは、二化性養蚕普及のための CSB と DOS の連携に基づくアクションプランの作成、蚕種大量製造の体制の強化、州 DOS スタッフの強化、モデル普及所における活動を行い、これらを通じて各州の二化性養蚕の普及システムが軌道にのり、各州が CSB の支援を得つつ独自に普及・増産計画を実施できる体制が整備されることを目的とする。

5－4　プロジェクト成果及び活動

（1）二化性養蚕普及のためのアクションプランが策定される。

二化性養蚕振興のための各分野の具体的計画及び技術パッケージを普及するための仕組みに係るアクションプランを策定する。活動としては、CSB 及び各州の Bivoltine Cell を中心に、各州の二化性養蚕普及、二化性養蚕普及政策、農家支援策、養蚕農家の営農の現状等を調査した上で、CSB と各州 DOS との連携・調整に基づいた二化性養蚕の振興のための現実的なアクションプラン（推奨する二化性技術パッケージの整理、施設整備計画の策定、農家への指導方法、普及方法、小農支援策の検討等）を策定する。各分野の活動開始後は、そのモニタリングを通じて、二化性養蚕普及のために必要な措置を見直し、適宜計画にフィードバックする。繭の品質を価格に反映させる制度の導入等の各州が取るべき政策的な措置については、CSB のガイダンスを得つつ、

州政府が計画に反映させていく。

（2）CSB と DOS 間の連携・調整メカニズムが確立される。

すでに、CSB 及び各州に二化性養蚕振興のための組織（Bivoltine Cell）が設置されており、ここが、事務局として二化性養蚕に係る関係者間の連携・調整、プロジェクト活動のモニタリング、関連情報の収集等を行う。また、意志決定レベルから活動実施者レベルまでの各レベルにおける関係者間の定例会議（合同調整委員会、四半期会議、Bivoltine Cell 会議、分野別担当者会議等）を通じて、連携・調整のメカニズムをプロジェクト期間を通じて確立する。

連携メカニズムの確立は、他の活動成果とはやや性格を異にするが、連邦制をとるインドにおいて、二化性養蚕という新しい技術パッケージを効果的に普及するためには、両者の連携・協力体制が不可欠であることから、プロジェクトの成果・活動として位置づける。なお、プロジェクト開始前に、CSB と DOS の間で十分な意見交換を行い、それぞれの役割・責任につき明記した覚書（MOU）を締結する。

（3）優良蚕種の大量製造システムが確立される。

CSB（NSSP 中心）と DOS との連携・調整に基づき、高品質蚕種の製造計画を策定する。フェーズ2プロジェクトで導入されたワンウェイシステムを確立するとともに、特に P3 以下のレベルにおける品質管理を徹底させる。なお、対象蚕種は CSR 種（CSR2,4,5,18,19）とし、州政府の開発した蚕種はプロジェクトの対象としない。DOS の製造所が整備されるプロジェクト後半では、P2 レベル以下について州の Grainage でも生産することを検討するが、プロジェクト初期においては、品質管理の観点からプロジェクト対象地区（TSC）に対する蚕種の提供は NSSP が一元的に行う。

BSF や DOS スタッフ及び種繭農家への研修及び訪問による助言・指導については、必要に応じて NSSP や CSR&TI からのリソースパーソンの提供を得ながら、SSTL が中心となって行う。また、NSSP と DOS は、並行して Basic Seed Farm 及び Grainage の整備を行う。

（4）DOS スタッフが二化性養蚕に必要な技術・知識を身につけるとともに、研修施設が二化性に適したものに改善される。

CSB（CSR&TI 中心）と DOS の連携の下で策定された研修マスタープランに基づいて、研修校の指導者及び DOS スタッフ（TSC スタッフ）に対する研修カリキュラムを改善し、研修を実施する。研修を受けた研修指導者及び DOS スタッフは、二化性養

蚕農家に対する研修・指導を行う。研修カリキュラムや教材は、CSR&TI が中心となり、各分野を担当する CSB の機関及び DOS と相談しつつ、実習を重視したものに改善する。同時に、DOS は、桑園の整備等を行い、研修校を二化性養蚕の研修ができる状態に整備する。

（5）二化性養蚕の普及モデルが確立される。

二化性養蚕普及手法の確立のため、モデル TSC を設置し、モデル普及活動を実施する。モデル普及活動は、DOS が主体となっておこない、CSR&TI を中心とする CSB 各機関がこれをサポートする。日本人専門家は、計画策定、モニタリング、評価に対し助言・指導を行う。あくまで DOS が自らの事業として継続的に実施していけるようなレベル・内容のものを提案した上で、モデル TSC においてこれを実施、モニタリングし、その結果をフィードバックし、普及手法を確立する。

初年度に、ベースライン調査を実施し、自然環境、TSC の整備状況、対象農家の状況等を検討の上、対象とするモデル TSC を決定する。DOS が中心となりモデル TSC の施設・機材の整備を行う一方、CSB は、CSR&TI を中心に、各分野専門のカウンターパート３～４名から成るチームを形成し、現プロジェクトで実証された二化性養蚕技術パッケージを TSC スタッフが農家に普及するための助言・指導を TSC スタッフに対して行う（農家の場を借りて DOS スタッフに指導方法を教える)。農家への指導そのものは、CSB の指導・研修を受けた TSC スタッフが行うため、プロジェクトは直接対象としない。対象 TSC は二化性養蚕を初めて開始する地区であるため、プロジェクト初期段階においては、TSC が農民を指導するのを CSB チームが巡回指導するが、次第にその頻度を減少させることとなる。実際、フェーズ２プロジェクトで選定農家を指導した普及員からの聴き取りでは、２～５蚕作経験した後であれば、二化性養蚕技術を専門家や CSB スタッフの同行なしに一人で自信をもって農家に指導できるとの回答が多く、１年目（５蚕作）以降は専門家及び CSB スタッフの指導の頻度を減らすことは可能である。

５－５　対象施設

二化性養蚕普及手法を確立するため、プロジェクトでカバーするモデル普及所及び蚕種製造所、トレーニングセンターの数については、以下のとおりとする。DOS が普及を行うための現実的なモデルという位置付けで活動を行うため、選定農家への濃密な指導は行わないこと、インド側（特に DOS）が主体となって行う活動であることから妥当な数と考えられる。実際の対象施設の特定は、プロジェクト開始後にクライテ

リアを専門家とCSBがともに検討、候補施設の調査を行った上で決定する。

表5　対象施設数

	TSC		Grainage	Basic Seed Farm	Training School
	Commercial	Reeling			
ｶﾙﾅﾀｶ州	8	2	5	4	4
ｱﾝﾄﾞﾗﾌﾟﾗﾃﾞｼｭ州	6	-	2	1	1
ﾀﾐﾙﾅﾄﾞ州	4	-	1	1	1
CSB	-	-	3 (NSSP)	3 (NSSP)	-

この中で、Commercial TSCについては、1TSC当たり1年間で50戸の農家を対象として二化性養蚕の指導を行い、4年間で1TSC当たり200人を対象とすることが計画されている。よって、プロジェクトが直接農家を対象とはしないが、対象とするCommercial TSCが5年間でカバーする対象農家は36,000戸と想定される。このためには、1TSC当たり2～3の稚蚕飼育施設（Chawki Rearing Center）が必要と想定され（1CRCで4000dflが可能）、これらの整備はDOSが行うこととなる。

TSCは、既に有する農家データに基づき、新たに二化性を開始するための条件がある農家を特定し、10農家を1グループとして、5グループを対象にTSCが指導することが検討されている。フェーズ2プロジェクトにおける選定地区でも見られたように、二化性が収入増に結びつくため農家間の学び合いが期待できる。なお、上記TSCは、二化性養蚕専用のTSCとして位置づけられ、整備される予定であり、このためにカルナタカ州及びアンドラプラデシュ州で10名、タミルナド州で7名の専任スタッフが配置される予定である。また、対象施設においては、年間5回の飼育（条件のよい季節はCSR 2,4,5、夏期はCSR 18, 19）を指導する計画である。

対象となるReeling TSCは、カルナタカ州にのみ存在するが、製糸業者が集積する地域に位置して製糸業者への指導を行う。

Grainage及びBSFについては、プロジェクト開始時期は蚕種製造をNSSPのみで行うが、各州の対象施設を整備し、次第に州においてCSR種の蚕種製造を行える体制を整備する。

Training Schoolについては、アンドラプラデシュ州およびタミルナド州ではすでに二化性養蚕の指導ができる施設の整備が開始されており、これを対象とする他、カルナタカ州では、今後二化性養蚕指導が可能となるための整備を行う。

5－6　投入計画

（1）　日本側投入

実証を目的とした前プロジェクトと異なり、州政府が行う普及事業をサポートする体制を強化するものであるため、日本人専門家は、CSB カウンターパートを通じて DOS に助言・指導を行う。フィールドにおける普及活動そのものは州政府の責任で行うべき事業であるため、普及活動への日本側の直接的な投入（農家への養蚕器具の供与、専門家の農家直接指導等）は最小限とし、むしろ普及計画の策定、研修指導者の育成、蚕種大量製造のための体制整備を行う。また、普及の持続性を考慮し、養蚕器具等の現地調達を促進する。

1）長期専門家派遣

専門家は、CSB に配属され、CSB と DOS の連携のもとで研修、蚕種製造、普及体制強化のための助言・指導を行う。関係機関が多岐に渡るため、CSB 内の関連機関及び CSB と州との連携・協力体制の構築等、組織運営面での専門家の貢献が求められる。専門家の構成は以下のとおり。

表6　長期専門家構成

指導科目	配属先	業務内容
チーフアドバイザー	CSB 本部（Bivoltine Cell）及び CSR&TI	プロジェクト全体の運営管理、関係機関間の調整、連携・協力体制の構築、二化性養蚕振興に係る州の養蚕行政への助言・指導等
業務調整	CSB 本部（Bivoltine Cell）及び CSR&TI	チーフアドバイザーを補佐し、プロジェクトの円滑な運営を図る
蚕種製造	CSR&TI 及び NSSP	ワンウェイシステムの徹底、優良蚕種の大量製造のための品質管理システムの導入、蚕種製造所スタッフへの指導等
研修	CSR&TI	DOS スタッフへの研修計画の策定支援、研修施設整備計画の策定支援、研修カリキュラム・教材作成支援等
普及強化	CSR&TI	CSB と DOS の連携に基づいた二化性普及アクションプランの策定支援、モデル普及活動の計画・実施支援、普及手法に係る技術移転等

研究開発及び実証展示を目的としたフェーズ1及び2プロジェクトとは異なり、3州との連携に基づいて普及システムを強化することが必要となることから、州政府との調整及 CSB の実施責任者である Member Secretary 及び Bivoltine Cell との意志疎通が

重要であり、この点から CSB 本部（バンガロール）の重要性が前２期のプロジェクトと比較して大きい。他方、これまでの協力により養成されたカウンターパートの多くは CSR&TI にいることから、カウンターパートとの日常の接触が重要である。したがって、本プロジェクトのメインオフィスはバンガロールに置く一方、マイソール（CSR&TI）にも事務所を設置し、専門家は、それぞれの分野の必要性に応じて CSB 関係機関および DOS に対する助言・指導を行うこととする。

2）短期専門家派遣

必要に応じ、桑栽培、蚕病防除、蚕種製造技術等の分野において年２～３名の短期専門家を派遣する。

3）研修員受け入れ

カウンターパート研修は、各技術分野において、DOS スタッフを優先して実施する。ただし、蚕種製造については課題が残されているため、CSB スタッフの研修も必要である。また、DOS 幹部や Bivoltince Cell の責任者に対する視察型研修も検討する。DOS スタッフ（Additional Director クラス）を対象とした普及手法・普及行政に関する研修も有効と考えられることから、国別特設研修を検討する。

4）機材供与

日本側は、予算の範囲内でプロジェクトに必要な機材を供与する。TSC、トレーニングスクール、Grainage、BSF の整備に必要な機材のうち、DOS による手当ができないもの、及び CSB カウンターパートが DOS への指導を行う上で CSB に必要な機材について要望を検討する。将来的に他 TSC へのモデルとなる形で普及システムを構築する必要があることから、一般的な TSC とかけ離れた整備は行わない。車輌については、いくつかの TSC でシェアすることを検討する。

5）現地業務費

一般現地業務費に加え、対象 TSC を決定するための調査及び対象 TSC 決定後のベースライン調査、対象 TSC における啓蒙普及活動、フィールドデーの実施、及び DOS 幹部を対象としたワークショップの実施等が想定される。なお、啓蒙普及活動では、実証展示を目的としたフェーズ２プロジェクトとは異なり、DOS 及び農家自身の応分の負担が必要であることを認識させることが重要。

（2）インド側投入

1）実施体制

実施機関は、繊維省中央蚕糸局（CSB）および対象3州の蚕糸局（DOS）とする。CSBのMember Secretaryは、プロジェクトディレクター兼プロジェクトマネージャーとしてプロジェクトの運営に責任を持つ。二化性養蚕に特化した部署として、CSB Member SecretaryのBivoltine Cellが設置されており、Bivoltine Cellの責任者がDeputy Project Managerとしてプロジェクトの日常業務のモニタリングやCSB各機関及び各州DOSとの調整に責任をもつ。CSB Bivoltine Cellは、Member Secretaryの下で事務局として調整及び情報収集業務を行うとともに、計画策定などにおける調査や分析においては、CSR&TI等CSB各機関との連携・調整により実施する。

3州DOSのCommissioner / Directorは、州におけるプロジェクト活動に責任を持ち、プロジェクトの共同実施責任者とする。各州には、Commissioner / Dorectorの下にBivoltine Cellが設置されており。日常業務のモニタリング及びCSBとの調整を行う。

各活動における関係機関の詳細な役割は、別添（Plan of Operations）のとおり。

表7　各活動と関係機関（◎：主要実施機関、○協力機関）

	Bivoltine Cell (CSB)	中央蚕糸技術研究訓練所	国家蚕種製造計画部	蚕種製造技術ラボ	中央製糸技術研究所	3州DOS
アクションプランの策定	◎	○	○	○	○	◎
連携体制強化	◎					◎
蚕種製造		○	◎	○		◎
研修		◎	○	◎	○	◎
モデル普及体制の確立	○	◎				◎

2）カウンターパート

CSB及びDOSの双方にカウンターパートを配置する。CSB各機関のカウンターパートが主に各分野の専門家としてDOSへの指導等を行うが、それぞれの分野においてDOSにも対応するカウンターパートをおき、州におけるプロジェクト活動の体制を明確化する。

3）プロジェクトに必要な土地、建物、機材

日本人専門家の執務室を、CSB 本部及び CSR&TI に設置する。

4）ローカルコスト

TSC に対する指導を行う CSB カウンターパートの活動経費、DOS 普及員の活動経費、TSC および研修施設整備、農家支援措置等に係るインド側経費措置が求められる。

5－7　モニタリング・評価方法

（1）モニタリング

CSB 及び各州 DOS の Bivoltine Cell による定例会議、研修・蚕種製造・普及の各分野毎のグループ会議、毎蚕作前・後のジョイントミーティング、四半期毎のレビュー会議、及び合同委員会の５つの機構により、各レベルの CSB 及び DOS 関係者並びに専門家チームによる協議・意志決定を行うとともに、活動のモニタリングを行う。モニタリングにおいては、PDM の指標、Plan of Operation を含む諸活動計画を用いる。

（2）評価

プロジェクトの評価は、日本政府とインド政府によって任命された合同評価チームにより評価５項目に沿って実施。中間評価はプロジェクトの２年目の終わりに、終了時評価はプロジェクトの終了予定の６ヶ月前に実施する。

5－8　前提条件、外部条件の分析と外部要因リスク

（1）前提条件

1）Bivoltine Cell が CSB 及び DOS において設立される。

2）CSB と DOS の間の調整と協力に関する MOU が結ばれる。

3）PPPBST（第２フェーズプロジェクト）においてトレーニングを受けた CSB と DOS のカウンターパートが、可能な限りフェーズ３においても活用される。

（2）外部条件

1）成果(Output)が達成されるための外部条件

A.プロジェクトで任命されたカウンターパートの配置替えがされない。

B. トレーニングを受けた CSB と DOS のスタッフが十全に活用される。

C. ３州における法と秩序が悪化しない。

A.及び B.は、関係者と対象範囲が多い本ﾌﾟﾛｼﾞｪｸﾄにおいて活動が成果につながるた

めの重要な条件である。C. に関しては、３州ともに小規模な騒乱あるが、プロジェクトの実行上大きな支障となる可能性があるほどの大きな要因は現時点では見い出されていない。

２）プロジェクト目標(Project Purpose)が達成されるための外部条件

A. 新しい病気が大発生しない。

B. 大きな気候の変動がない。

病気の発生と拡大を防止するための衛生管理の徹底と検疫システムの確立はプロジェクトの活動に含まれており、それを脅かす大きな潜在的な危険があるという情報は今のところない。

３）上位目標(Overall Goal)が達成されるための外部条件

A. 高品質の二化性生糸の値段が大幅に下がらない。

B. 高品質の二化性生糸の需要が減少しない。

現在の二化性生糸の価格は、次第に国際価格に近づいてはいるものの、現在は国際価格と比較して高い水準にある。中国製生糸の安値攻勢が今以上に強まれば、ｲﾝﾄﾞの蚕糸業が影響を受けることが想定される（但し一方で、中国の生糸生産量は減少の傾向にある)。

現在は加工して輸出することを条件に生糸の輸入が認められており、その許可証を持つ業者が輸入して輸出せずに国内で消費する場合には 34%の関税が掛けられている。その許可制度が WTO の関係で 2004 年には撤廃される予定であり、関税は継続される見込みであるが、輸入量の規制が掛けられなくなる。中央政府はそれ以降においても Anti-Dumping Duties（ダンピング課税）を課す権限を保持するが、繭生産者と織物業者の利害は必ずしも一致しておらず、高課税が維持される保証がどこまで得られるのかは現時点で不明である。

中央政府はこれらの利害を調整した上で、高品質の二化性生糸の値段の大幅な低下と需要の減少が起きないよう、適切な政策を取る必要がある。

6　プロジェクトの妥当性

6－1　効果

（1）政策的・制度的インパクト

プロジェクトは二化性養蚕を担当する CSB 及び DOS の、現場からの情報収集能力、現場の情報に基づいた的確で戦略的な政策立案の能力、関連機関間の情報共有・相互調整能力などの諸機能を高めることが期待される。

また、二化性養蚕普及システムのモデルの確立は、適切な計画に基づいた農家指導

が課題であるインドにおいて、普及全体のモデルとなり得る。

二化性養蚕普及が軌道に乗り、二化性養蚕農家の収入の向上が図れれば、政府及びその職員に対する農民からの信頼性が増大することが期待される。これは既にフェーズ２プロジェクトの効果として生じており、本プロジェクトによりさらに普及制度への信頼が増大することが期待される。

（２）社会・文化的インパクト

二化性養蚕農家と製糸業者の収入向上によって、生活条件の改善が期待される。

また、養蚕振興において、技術移転の一環としてグループ化の促進が図られており、コミュニティの相互扶助機能が強化される可能性がある。

一方で、先進農家とそれ以外の農家、大規模農家と小規模農家の収入格差の発生は、社会的緊張を増す危険性を孕んでいる。よって、ベースラインサーベイによって農村の階層構造や社会関係について把握するとともに、格差が拡大しないような配慮が必要である。

（３）技術的インパクト

プロジェクトは二化性養蚕技術の普及体制を強化し、標準化された実用技術が中央政府研究機関から州政府の普及所まで一貫したものとなることが期待される。

また、広く二化性養蚕とその優位性を知らしめることを可能にし、技術の改善に対する意識を高めると予測される。

（４）経済的インパクト

高品質の生糸の生産量の増加は、輸入への依存度を減らす効果が期待できる。さらに、農村での収益性の高くかつ安定した産業として、収入向上と雇用機会の増大が期待される。また、製糸、織物等関連する周辺産業の振興が期待できる。

６－２　目標達成の見込み

（１）計画の論理性

現場レベルの技術の定着、人材育成、及び関連施設の整備のみならず、二化性養蚕振興に係る計画策定・養蚕行政に対する助言・指導及び関係機関間の連携・協力体制の確立を活動に含めることにより、活動が現場レベルだけで終わらずに、州政府の行う二化性養蚕振興のための普及システムを軌道にのせることが可能となる。技術移転及び施設整備に留まらず、組織運営・行政面での支援を活動項目とすることにより、先方の組織体制を所与のものとせず、プロジェクト目標達成のための幅広い関与が可能となり、先方に対する組織体制整備の重要性を喚起することが可能。

（2）目標の妥当性

インドは、サリー等絹織物のタテ糸となる二化性生糸の国内需要のほぼ全量を中国からの輸入に頼っている状況にあり、二化性生糸の国内生産拡大を重要な政策課題としていることから、本プロジェクトはインド政府の政策と合致する。

二化性養蚕振興が重要な政策課題であることから、各州政府は、独自に二化性養蚕普及・振興を大規模に開始しようとしているが、実効性の高い現実的な計画策定・人材育成・施設整備・二化性に適した普及システムの改善がなされていない状態にある。プロジェクト活動は、過去の協力をベースにしつつ普及に向けたこれらの体制整備を行うものであり、かつ受け皿としての各州政府の取り組みが既に確保されていることから、目標は妥当である。

（3）日本の優位性

本プロジェクトにて対象とする CSR 種、採用する二化性養蚕技術パッケージは、フェーズ1及びﾌｪｰｽﾞ2プロジェクトの成果に基づくものである。また、過去の協力を通じて構築された信頼関係が存在することから、養蚕行政に係る分野についてもアドバイスを受け入れられる素地があり、日本の優位性は極めて高い。

6－3　効率性

（1）費用対成果

プロジェクトの対象範囲・関係機関が多岐にわたるが、対象施設の整備等については、インド側（CSB 及び3州 DOS）が独自の養蚕振興計画の予算においてできる機材整備はインド側が行う。また、他地域への普及を念頭において現地調達可能なものは現地化を進める。

（2）費用対効果

対象とする TSC が直接の指導の対象とする農家数は、Commercial TSC で合計 3,600 戸であるが、フェーズ2の経験からも、周辺農家へのデモンストレーション効果が期待できる。また、農家にとどまらず、製糸業等関連産業への波及効果が期待でき、費用対効果は高いと考えられる。

6－4　妥当性

（1）案件内容の公益性・ODA としての適格性

輸入依存を減らし、農家の収入向上に結びつくものであり、公益性が高い。農村における所得向上に結びつくものであり、貧困対策の観点からも、ODA として適格であると認められる。

（2）国別事業実施計画との整合性

貧困対策支援はわが国の対インド協力の重点分野であり、農業開発の推進は、農村の生活向上と貧困軽減のための重要な課題の一つと位置づけられている。養蚕業の振興は、農村における雇用機会創出と所得向上のための重要な部門であり、整合性がある。

（3）インド政府の政策との整合性

インド政府は、二化性生糸の国内生産拡大を重要な政策課題としており、本プロジェクトは先方政策との整合性がある。

（4）参加型の計画策定

短期調査において、PCM ワークショップが開催され、参加者の出席のもとプロジェクト計画が策定された。

6－5　自立発展性

（1）実施機関の適格性

過去2期の協力を通じて、CSB には多数のカウンターパートが育成されており、州 DOS への指導において CSB カウンターパートが専門家としての役割を果たすことが可能である。よって、CSB を実施機関とすることは妥当である。

（2）組織運営能力

1）CSB

3－1にて記載のとおり、CSB は十分な技術力をもった人員を有する。ただし、連邦制をとるインドにおいて、DOS との調整は容易ではなく、プロジェクトを通じて連携・協力体制の確立が必要である。

2）3州 DOS

3－1にて記載のとおり、3州の DOS についても、普及組織・人員は一貫した体制を有する(過去の協力により養成されたカウンターパートは、カルナタカ州 DOS に9 名、アンドラプラデシュ州に 1 名、タミルナド州に 1 名)。DOS に限らずインド政府の問題として、予算の８０％～９０％ほどは人件費と言われていること、また予算は立てられても資金調達ができずに予算額を執行できないことがあることから、TSC のシステムの整備については、優先順位を付けて確実に実行することが必要である。

（3）社会的・環境的・技術的受容性

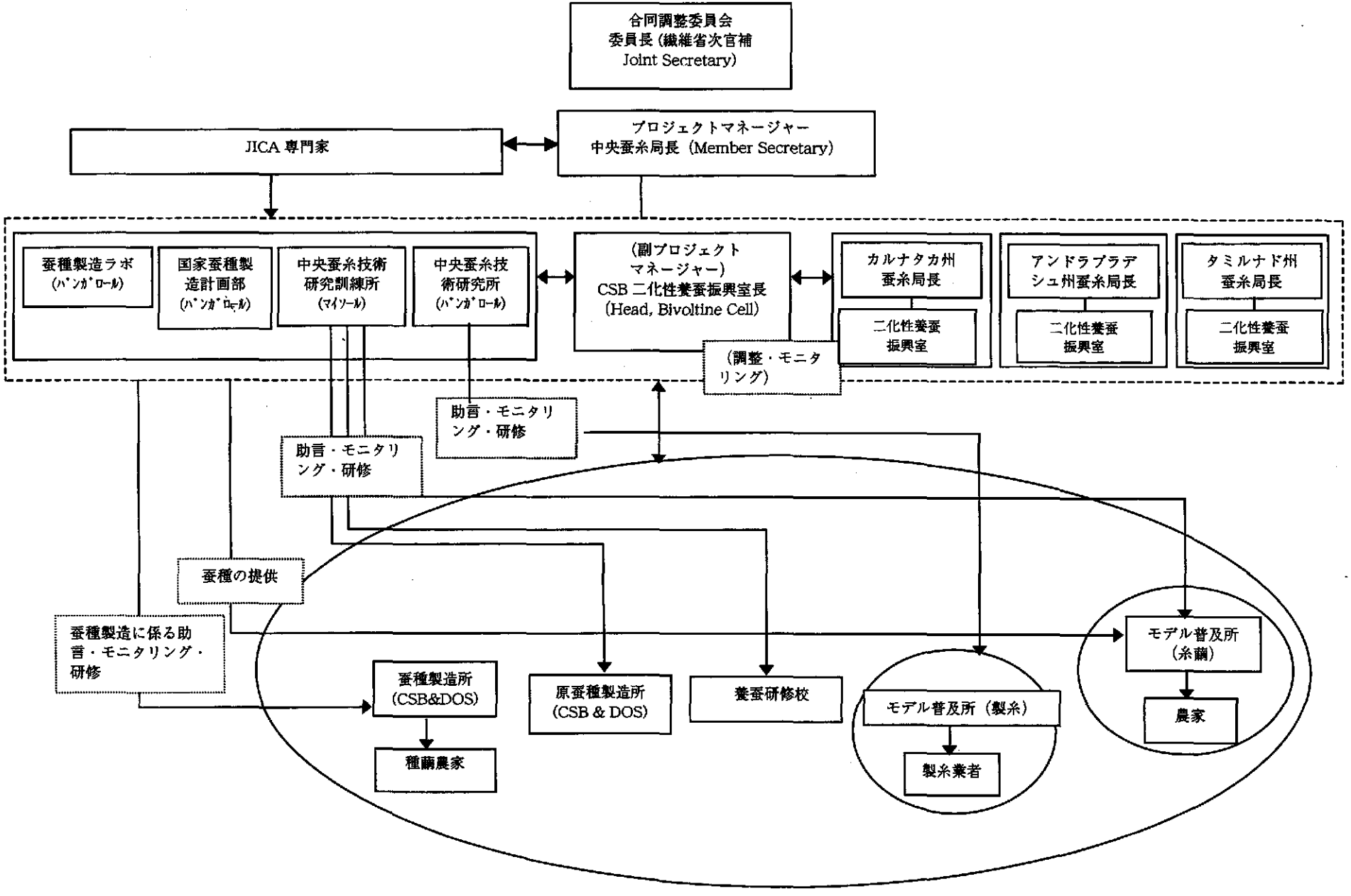
カルナータカ州では養蚕の 300 年の歴史があり、アンドラプラデシュ州やタミルナード州でも 30 年ほどの歴史がある。しかし、二化性は多化性×二化性とは異なる衛生管理、飼養・飼育管理を必要とするため、継続的に啓蒙普及活動を行っていくことが必要となる。

別添資料

1　実施体制図

2　PDM （仮和訳）

3　Plan of Operation


合同調整委員会
委員長（繊維省次官補
Joint Secretary）
JICA 専門家
プロジェクトマネージャー
中央蚕糸局長（Member Secretary）
蚕種製造ラボ
(ﾊﾞﾝｶﾞﾛｰﾙ)
国家蚕種製造計画部
(ﾊﾞﾝｶﾞﾛｰﾙ)
中央蚕糸技術研究訓練所
(ﾏｲｿｰﾙ)
中央蚕糸技術研究所
(ﾊﾞﾝｶﾞﾛｰﾙ)
（副プロジェクトマネージャー）
CSB 二化性養蚕振興室長
(Head, Bivoltine Cell)
カルナタカ州蚕糸局長
二化性養蚕振興室
アンドラプラデシュ州蚕糸局長
二化性養蚕振興室
タミルナド州蚕糸局長
二化性養蚕振興室
（調整・モニタリング）
助言・モニタリング・研修
助言・モニタリング・研修
蚕種の提供
蚕種製造に係る助言・モニタリング・研修
蚕種製造所
(CSB&DOS)
種繭農家
原蚕種製造所
(CSB & DOS)
養蚕研修校
モデル普及所（製糸）
製糸業者
モデル普及所
（糸繭）
農家

PDM（案）

プロジェクト名：インド養蚕普及強化計画　　ターゲットグループ：対象地域の二化性養蚕農家

対象地域：カルナタカ州・アンドラプラデシュ州、タミルナド州　　協力期間：2002.7 ～ 2007.6

要約	指標	指標データ入手手段	外部条件
【上位目標】 二化性生糸の生産量及び品質が向上し、二化性養蚕農家の所得が向上する。	1対象地域の二化性養蚕農家の養蚕収入が増加する。 2対象3州の高品質生糸（国際規格2A以上）の生産量が増加する。	・CSB及びDOS資料 ・ベースライン調査 ・対象農家及び製糸業者への定期調査 ・繭市場のデータ	・中央及び州政府の二化性養蚕振興政策が変更しない。
【プロジェクト目標】 二化性養蚕の普及システムが軌道にのる。	1二化性養蚕農家数が増加する。 2対象地域の二化性種繭生産量が増加する。 3対象3州の繭市場で取り引きされる二化性繭の量が増加する。 4優良な二化性蚕種の供給量が増加する。 5二化性養蚕に必要な施設が整備される。	・ベースライン調査 ・CSB及びDOS資料	・高品質二化性生糸の取引価格が暴落しない。 ・インドにおける二化性生糸の需要が減少しない。
【成果】 1 二化性養蚕振興のアクションプランが策定される。 2 CSBとDOS間の連携・調整メカニズムが確立される。 3 優良蚕種の大量製造システムが確立される。 4 DOSスタッフが二化性養蚕に必要な技術・知識を身につけるとともに、研修関連施設が二化性養蚕研修に適したものに改善される。 5 二化性養蚕普及モデルが確立される。	1-1 CSBと州との連携による普及アクションプランが策定され、予算措置がなされる。 1-2 二化性養蚕普及のためのTSC等施設整備の計画が策定され、予算措置がなされる。 2-1 Bivoltine Cellにおいて、州の二化性養蚕に係る情報が整備される。 2-2 CSBとDOSで問題点・計画が共有される。 3-1 蚕種製造所において品質管理作業手順が導入される。 3-2 ＢＳＦにおいて選除繭歩合が減少する。 3-3 ＢＳＦにおいて蛹の雌雄混合、原系統混合がなくなる。 3-4 ＢＳＦにおいて化蛹歩合が９０％以上になる。 3-5 ＢＳＦにおいて蚕種製造効率が２５％以上になる。 3-6 種繭農家において種繭収量が増加する。 3-7 蚕種製造所スタッフ及び種繭農家に対する研修が実施される。 4-1 CSTRIによるDOSスタッフ研修数が増加する。 4-2 CSTRI及びDOSによる普及研修カリキュラム・教材が実習を重視したものに改善される。	・ベースライン調査 ・プロジェクト四半期報告 ・CSB及びDOS資料 ・対象農家及び製糸業者への定期調査 ・各種会議議事録、業務報告書	・蚕及び桑の新しい病害が発生しない。

	4-3 改善された研修教材・マニュアルの利用頻度 4-4 研修校における普及スタッフ研修数が増加する。 4-5 研修を受けた普及員に対する農民の満足度が向上する。 4-6 二化性養蚕向けに改修・整備された研修校が増加する。 5-1 農家普及のための現地語マニュアルが活用される。 5-2 対象地域において稚蚕飼育等における共同活動が実践される。 5-3 回転まぶし等養蚕器具が現地生産される。		
【活動】 1．二化性養蚕普及アクションプランの策定 1-1 ベースライン調査（対象地域養蚕農家調査、3州の普及制度、普及計画、小農支援策、農民組織強化策等） 1-2 品質検定制度及び価格決定に品質評価を取り入れる制度の導入 1-3 対象3州の現行普及制度、普及計画、小農支援策、農民組織強化等改善策のとりまとめ 1-4 CSBとDOSの連携による普及強化アクションプランの策定 2．CSBと3州DOS間における連携・調整メカニズムの確立 2-1 二化性養蚕振興室（Bivoltine Cell）の活動計画を策定する。 2-2 CSB・ＤＯＳ合同の定例会議を通じて活動のモニタリングを行う。 3. 優良蚕種大量製造システムの整備 3-1 優良蚕種大量製造のための計画策定 3-2 CSB及びDOSにおけるワンウェイシステムの確立 3-3 P3以下レベルにおける品質管理基準、作業手順（チェックポイント）の確立 3-4 BSF及びDOSスタッフならびに種繭農家への指導計画の策定 4. 研修強化 4-1 二化性養蚕普及のための研修M／Pの策定 4-2 研修施設整備計画の策定 4-3 研修施設の改善・整備（DOS）	【インプット】 1．日本側 長期専門家 チーフアドバイザー、業務調整、蚕種製造、研修、普及 短期専門家 必要に応じて派遣 研修員受け入れ 機材供与 研修機材 車輌・バイク その他 2．インド側 カウンターパートの配置 プロジェクトマネージャー 副プロジェクトマネージャー CSB各機関及びDOSのダイレクター 研究者（必要な分野に応じて） サポートスタッフ 土地及び建物 ローカルコスト		・カウンターパートが異動にならない。 ・研修を受けたCSB及び州DOSのスタッフが適切に活用される。 ・3州の治安が悪化しない。 （前提条件） ・CSB及び対象3州にBivoltine Cellが設置される。 ・CSBと対象3州間で調整・連携に係る覚書（MOU）が結ばれ、連携したプロジェクト実施のための基盤が整備される。 ・PPPBSTで研修を受けたCSB及びDOSのカウンターパートが適切に活用される。

4-4 実技重視の研修カリキュラムの作成 4-5 CSB による DOS 研修指導者養成研修の計画・実施 4-6 DOS による農家研修の計画・実施 4-7 各分野の研修内容・教材の作成 4-7-1 蚕品種維持・蚕種製造 4-7-2 桑栽培 4-7-3 蚕飼育・蚕病防除 4-7-4 製糸 4-8 DOS による普及スタッフ研修の計画・実施 5. 二化性養蚕普及手法の確立 5-1 対象地区におけるモデル普及活動の計画・実施 5-2 PPPBST の成果に基づく二化性養蚕技術パッケージの取り纏め 5-3 普及活動のモニタリング・評価方法の検討 5-4 TSC の整備（DOS）		

Plan of operations (Tentative)

Activities	Outputs	Schedule (Japanese FY) 2002	2003	2004	2005	2006	Under Responsibility of	Mainly implemented by	supported by
1. Formulation of Action Plan for Promotion of Bivoltine Sericulture							CSB, DOS	CSB BC, DOS	EX(L) (E)
1-1. Baseline Survey (on target farmers, current extension system, current extension plan, and government policy to support small sericulture farmers and to strengthen farmers' group, etc.)								CSB BC, DOS BC, CSR&TI	EX(L)(E)
1-2. Promotion of full introduction of cocoon marketing system with quality assessment								DOS	EX(L), CSTRI
1-3. To examine the needs for modification on current extension system, current extension plan, government policy to small sericulture farmers and to strengthen								CSB BC, DOS BC, CSR&TI	EX(L)(E)
1-4. Action plan for promotion will be formulated with close coordination of CSB and DOSs								CSB BC, DOS BC, CSR&TI	EX(L)(E)
2. Establishment of Coordination/Collaboration Mechanizm among CSB and DOSs							CSB, DOS	CSB BC, DOS BC	EX(L)(C)
2-1. To formulate plan of activities for Bivoltine Cells								CSB BC, DOS BC	EX(L)(C)
2-2. To monitor project activities through regular joint meetings								CSB BC, DOS BC	EX(L)(C)
3. Strengthening of System of Seed Production							NSSP	NSSP, DOS	EX(S)
3-1. To formulate plan for mass production of quality seed								NSSP, DOS	EX(S)
3-2. To establish one-way system at CSB and DOS								NSSP, DOS	EX(S), SSTL, CSR&TI
3-3. To establish quality control control guidelines and checkpoints at P3 level and below								NSSP, DOS	EX(S), SSTL, CSR&TI
3-4. To formulate guidance plan to BSF staff, DOS staff and seed farmers								NSSP, DOS, SSTL, CSR&TI	EX(S)
3-5. Strengthening of seed production facilities								NSSP, DOS	
4. Strengthening of Training							CSR&TI	CSR&TI	EX(T)
4-1. To formulate Training Master Plan for bivoltine sericulture								CSR&TI, DOS	EX(T)
4-2. To formulate facility development plan								DOS	EX(T)
4-3. Strengthening of training facilities (by DOS)								DOS	
4-4. To revise training curriculum to be *field oriented*								CSR&TI, DOS	EX(T)
4-5 To conduct trainers' training								CSR&TI	EX(T)
4-6. To conducts farmers' training (by DOS)								DOS	
4-7. To devise training curriculum and materials in each field								CSR&TI	EX(T)
4-7-1 *Silkworm Race Maintenance/ Seed Production*								CSR&TI, SSTL, NSSP	EX(S)
4-7-2 Murberry cultivation								CSR&TI	EX(T)

4-7-3 Silkworm rearing/ Desease Control				CSR&TI	EX(T)
4-7-4 Reeling				CSTRI	EX(T)
4-8. To conducts training course for extension staff				CSR&TI	
5. Establishment of Model for Bivoltine Sericulture Extension			CSB, DOS	CSB BC, DOS BC, CSR&TI	EX(L)(E)
5-1 To select target TSCs				CSB BC, DOS BC, CSR&TI	EX(L)(E)
5-2. To plan and implement model extension activities in the targeted areas				CSB BC, DOS BC, CSR&TI	EX(L)(E)
5-3. To tune up technical package developed by PPPBST				CSB BC, DOS BC, CSR&TI	EX(L)(E)
5-4. To prepare method of monitoring and evaluation for extension activities				CSR&TI, DOS	EX(L)(E)
5-5. STrengthening of TSC (DOS)				DOS	

MEMORANDUM OF UNDERSTANDING BETWEEN CENTRAL SILK BOARD(CSB) AND DEPARTMENT OF SERICULTURE,GOVT.OF KARNATAKA FOR SMOOTH IMPLEMENTATION OF THE PROJECT FOR STRENGTHENING EXTENSION SYSTEM FOR BIVOLTINE SERICULTURE IN INDIA

On the basis of the Minutes of Discussions of the preparatory Study for implementation of a Project for "Strengthening Extension System for Bivoltine Sericulture" signed on December 21, 2001, the Central Silk Board (CSB), Ministry of Textiles, Govt. of India and The Commissioner for Sericulture Development and *Director of Sericulture, Karnataka* had held detailed discussions on measures to be taken for successful implementation of the project in the state of Karnataka.

On the basis of the above mentioned discussions, CSB and DOS have agreed to sign a Memorandum of Understanding (MOU) as per the attached document.

Dated 4th May 2002
Bangalore

P.JOY OOMMEN
Member Secretary
Central Silk Board

C.R.CHIKKAMATH
Commissioner for Sericulture Development &
Director of Sericulture
Govt.of Karnataka

Attached Document

Background

Government of India represented by Joint Secretary (Silk), MOT and JICA represented by Mr. N. Niwa, Team Leader, JICA Pre Survey Team have signed Minutes of Discussions for implementing a project for Strengthening Extension System for Bivoltine Sericulture on 21st December 2001 at New Delhi.

The basic objective of the project is to develop an effective extension system for promotion of bivoltine sericulture in three states namely Karnataka, Andhra Pradesh & Tamilnadu. The project will focus on the following aspects related to bivoltine sericulture.

1. Establishing a system of Mass production of quality seed
2. Strengthening Training system for staff of DOS and farmers.
3. Establishing an Extension model for spread of bivoltine sericulture.

As a sequel to the understanding reached between Govt. of India and JICA, it was also agreed that for the smooth implementation of the project a Memorandum of Understanding will be signed between Central Silk Board (CSB) and respective Department of Sericulture (DOS) before the Government of India and JICA enter into an appropriate agreement for implementation of the project.

The following Memorandum of Understanding (MOU) is entered into on 4TH MAY 2002 between Govt. of Karnataka, represented by the Commissioner for Sericulture Development and Director of Sericulture on one side and the Govt. of India represented by the Member Secretary,CSB on the other side for smooth implementation of the proposed project.

1. CSB will have the responsibility for Race maintenance, supply of seed to selected Technical Service Centers (TSC) and training of DOS staff. It shall also extend technical advice to the extension staff, co-ordinate with DOSs in formulating action plans and monitor the project activities.

2. The DOS, Karnataka will be responsible for Extension activities, *Strengthening of identified TSCs, Training* Schools, Basic seed Farms, Grainages, and for technical and financial support to farmers and reelers.

The DOS, Govt. of Karnataka would involve CSB and JICA in identification of TSCs, Farms, Grainages, Training School selected under the JICA Project and in the survey and selection of beneficiaries covered by these identified centers.

UPGRADATION OF FARMERS AND REELERS

The DOS shall conduct a detailed survey of farmers identified for Extension of Bivoltine Sericulture and take inventory with regard to availability of facilities vis-a-vis requirements. The DOS shall provide funds for augmenting the equipments/requirements of farmers/reelers through CSB assisted Catalytic Development Programme (CDP) to make up deficiency. The DOS, therefore, have to make sufficient budgetary allocation for implementation of CSB assisted CDP. Prevention and control of Silkworm Disease is important for crop success. Hence, DOS will arrange for disinfection of rearing houses of the selected farmers and / or make available quality disinfectants to farmers under CDP. CSB would make timely funds releases under CDP and facilitate the skill and facility up gradation of farmers and reelers.

UPGRADATION OF DOS UNITS

Technical Service Centers (TSCs)

The DOS would provide/ deploy 10 staff per TSC under the project. The DOS will also ensure necessary facilities for speedy communication, transportation of staff and materials. TSC would be provided with tools and equipment necessary for controlling and monitoring of diseases and for support to farmers' rearing and farming. The DOS shall organize CRC with improved mulberry garden suitable for young silkworm rearing and equip the CRCs with adequate rearing equipment,

temperature and humidity controller, generator, disinfection equipment and accessories. For overall coordination of TSCs' activities, an Assistant Director of the State Sericulture Department would be designated as nodal officer.

Basic Seed Farms (BSF) and Grainages

The DOS should upgrade the BSFs and Grainages identified under this project with infrastructure, necessary facilities and deployment of trained manpower.

Sericulture Training School (STS)

The DOS should upgrade the Sericulture Training School identified under the project with necessary facilities viz., separate rearing house with mounting hall, improved mulberry garden, adequate rearing equipments, temperature and humidity controllers, disinfection equipment, generator, hostel facilities, audio-visual equipment, vehicles, trained staff etc.

DISTRIBUTION OF SILKWORM SEED

It is agreed that only CSR races will be taken up for rearing under the project. The CSB through National Silkworm Seed Project (NSSP) will supply the new silkworm hybrid seeds to the DOS, after incubation, at the agreed cost. The incubated laying would be carefully transported by the DOS and chawki reared before supply to the identified farmers. The Central Sericultural Research & Training Institute (CSR&TI) will maintain the basic P4 stock which will be further multiplied by NSSP and F1 seed would be made available to DOS as per agreed time schedule at different locations.

DEPLOYMENT OF PERSONNEL

The DOS shall provide necessary staff required for the project. In addition, the DOS shall nominate a nodal officer (head of the Bivoltine Cell) to coordinate the activities of the project and to cooperate with the expert and institutions concerned of CSB. The CSB shall also nominate a nodal officer (head of the Bivoltine Cell) for coordination of the project and allocate necessary experts required to support and guide the counterpart staff of DOS and farmers. The staff deployed to this project shall be retained in the project for the entire project period and shall not be transferred except for compelling and unavoidable reasons.

TRAINING OF STAFF AND FARMERS

The CSB shall organize training programme for all DOS staff participating in the project at CSRTI/CSTRI/SSTL and provide training in, Young Age Silkworm rearing, Late Age Silkworm Rearing, Disease Control, Mounting and harvesting, Basic Seed Multiplication Technology, Loose Egg Production Technology, Hibernation Technology, Reeling Technology etc based on a master plan drawn in consultation with JICA. The training curriculum and material will be prepared by CSB in consultation with JICA experts.

PROJECT MONITORING

The Central Silk Board will have responsibility for coordination and monitoring of all project activities. The Commissioner of Department of Sericulture, Govt of Karnataka will have overall responsibility for the managerial and technical matters related to the activities within the states.

The project will be implemented as per the action plan formulated and drawn by Bivoltine Cell and approved in consultation with JICA. The CSB experts shall periodically visit the TSCs, CRCs and selected farmers and provide necessary guidance and instructions in the field. The progress of the project will be regularly monitored as detailed below.

BIVOLTINE CELL MEETING

The CSB Bivoltine Cell in coordination with Bivoltine Cell of DOS Karnataka will monitor the activities and discuss matters relating to the project implementation including problems and take counter measures wherever necessary. It shall also organize coordination and monitoring meetings as per agreed schedule.

GROUP MEETINGS

Separate Group meetings on egg production, training and extension will be held every two months to discuss progress and problems encountered. Bivoltine Cell of CSB will facilitate these meetings which would be attended by the respective counterparts of state government and Central Silk Board.

JOINT MEETING

A Joint Meeting will be held before/or after each crop to discuss the performance and problems encountered and to suggest remedial measures to overcome the difficulties. Similarly the planning sheet containing all the necessary details, date of visit of experts etc. will be prepared. The action plan and steps required for the next crop will also be discussed and finalized. DOS or a senior officer deputed by him and Directors of CSRTI, Mysore, NSSP, CSTRI and SSTL, the Heads of Bivoltine Cells of CSB and DOS and JICA experts will be attending the joint meeting.

QUARTERLY MEETING

A quarterly monitoring committee meeting chaired by the Member Secretary, CSB and attended by the experts, coordinators and nodal officers of DOS and CSB will be arranged to review the progress and to take important decisions to resolve the problems if any, and to draft action plan for the next quarter.

JOINT COORDINATING COMMITTEE MEETING

A Joint Coordinating Committee meeting will be held every year under the chairpersonship of Joint Secretary(Silk), MOT, Govt. of India to review the overall progress of the technical cooperation programme as well as achievements and to formulate annual work plan under the framework of Record of Discussions. DOS and members of the committee from CSB units would attend the meeting.

EVALUATION

On the basis of performances of selected farmers in the project site, extension system for bivoltine sericulture including mass production of eggs and training for bivoltine sericulture in three states will be developed to help the DOS in taking further necessary action for strengthening extension system and in upgrading the quality and productivity of bivoltine raw silk in the state.

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MEMORANDUM OF UNDERSTANDING BETWEEN CENTRAL SILK BOARD(CSB) AND DEPARTMENT OF SERICULTURE,GOVT.OF TAMIL NADU FOR SMOOTH IMPLEMENTATION OF THE PROJECT FOR STRENGTHENING EXTENSION SYSTEM FOR BIVOLTINE SERICULTURE IN INDIA

On the basis of the Minutes of Discussions of the preparatory Study for implementation of a Project for "Strengthening Extension System for Bivoltine Sericulture" signed on December 21, 2001, the Central Silk Board (CSB), Ministry of Textiles, Govt. of India and The Director of Sericulture, Govt. of Tamil Nadu had held detailed discussions on measures to be taken for successful implementation of the project in the state of Tamil Nadu.

On the basis of the above mentioned discussions, CSB and DOS have agreed to sign a Memorandum of Understanding (MOU) as per the attached document.

Dated 4th May 2002
Bangalore

P.JOY OOMMEN
Member Secretary
Central Silk Board

4.05.2002

L.S.RAMASWAMY
Director of Sericulture (I/C)
Govt. of Tamil Nadu

MEMORANDUM OF UNDERSTANDING BETWEEN CENTRAL SILK BOARD(CSB) AND DEPARTMENT OF SERICULTURE,GOVT.OF ANDHRA PRADESH FOR SMOOTH IMPLEMENTATION OF THE PROJECT FOR STRENGTHENING EXTENSION SYSTEM FOR BIVOLTINE SERICULTURE IN INDIA

On the basis of the Minutes of Discussions of the preparatory Study for implementation of a Project for "Strengthening Extension System for Bivoltine Sericulture" signed on December 21, 2001, the Central Silk Board (CSB), Ministry of Textiles, Govt. of India and The Commissioner of Sericulture, Govt. of Andhra Pradesh had held detailed discussions on measures to be taken for successful implementation of the project in the state of Andhra Pradesh.

On the basis of the above mentioned discussions, CSB and DOS have agreed to sign a Memorandum of Understanding (MOU) as per the attached document.

Dated 4th May 2002
Bangalore

P.JOY OOMMEN
Member Secretary
Central Silk Board

I.VENKATESWARLU
Commissioner of Sericulture
Govt. of Andhra Pradesh