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**STAFF APPRAISAL REPORT**

**INDIA**

**NATIONAL SERICULTURE PROJECT**

**APRIL 21, 1989**

Country Department IV  
Asia Region

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## CURRENCY EQUIVALENTS

US\$ 1 = Rupees (Rs) 14.60

## FISCAL YEAR

GOI, States: April 1 to March 31  
NABARD: July 1 to June 30  
Commercial Banks: January 1 to December 31

## WEIGHTS AND MEASURES

The metric system is used throughout the report

## ACRONYMS AND ABBREVIATIONS

AISRCC	-	All India Sericulture Research Coordinating Committee
CRC	-	Chawki Rearing Center
CSB	-	Central Silk Board
CSRTI	-	Central Sericultural Research and Training Institute
CSTRI	-	Central Silk Technological Research Institute
Dfls	-	Disease free layings
DOS	-	Department/Directorate of Sericulture
GOI	-	Government of India
IDBI	-	Industrial Development Bank of India
J & K	-	Jammu & Kashmir
KSSDI	-	Karnataka State Sericulture Development Institute
KSP-I	-	Karnataka Sericulture Project (Credit 1034-IN)
LDB	-	Land Development Bank
MOT	-	Ministry of Textiles
NABARD	-	National Bank for Agriculture and Rural Development
NSSP	-	National Silkworm Seed Project
NGO	-	Non-Government Organization
REC	-	Research Extension Center
RSRS	-	Regional Sericulture Research Station
SDC	-	Swiss Development Cooperation
SKSJTI	-	Shri Krishnarajendra Silver Jubilee Technology Institute
SOE	-	Statement of Expenditures
TSC	-	Technical Service Center

## GLOSSARY

- Acid treatment:** Treatment with hydrochloric acid of bivoltine silkworm eggs in order to break the (natural) hibernation period of the eggs.
- Basin:** Part of the silk reeling machine (in front ) in which cocoons float in warm water as the floss from the cocoons is reeled.
- Bivoltine:** Race of silkworm from temperate regions which breed twice a year and whose eggs go through hibernation (dormancy) period.
- Charka:** Simple, hand driven silk reeling machine with one basin and four to six ends.
- Chawki:** Young silkworm up to the age of about 12 days after hatching. The word comes from the Kanada (Karnataka) language.
- Chulla:** Stoves used in reeling establishments for boiling water.
- Cocoon:** Capsule formed by silkworm larva by extruding thin floss (yarn) to protect itself during hibernation. The worm also metamorphoses as pupa inside the cocoon.
- Cold storage:** Facilities with separate chambers in which temperatures can be controlled and varied in order to replicate natural conditions in order to either preserve bivoltine eggs or to reduce the hibernation period.
- Cottage basin:** Power driven silk reeling machine with six to ten basins each with six ends.
- Denier:** Grams per 9,000 meters of silk yarn - used as a measure of yarn thickness.
- Dfl:** Disease Free Laying of silkworm eggs.
- F1, F2, F3 Farms:** Basic Breeder Seed Multiplication Farms
- Ends:** Part of silk reeling machine where several filaments (from cocoons) are combined into silk yarn during the reeling process.
- Eri:** A variety of silkworm (and silk).
- Filature:** Large scale, modern reeling factory.
- Germ plasm:** Hereditary material of the germ cells (genes).
- Grainage:** Establishment where silkworm eggs are produced through mating of worms and multiplication process.

**Laying:** Eggs laid by a mother moth.

**Muga:** A variety of silk produced in the state of Assam, India.

**Multivoltine:** Tropical silkworm races which breed throughout the year and whose eggs have no dormancy.

**Mulberry:** A variety of plant belonging to Morus alba species. Mulberry leaves are fed to silkworms until they form themselves into cocoons.

**Multi-bivoltine:** A cross between bivoltine and multivoltine races.

**P4/P3/P2 Farms:** Farms in which the first stages of multiplication of eggs is done from 'parent seed'.

**Parent seed:** Parent eggs of pure silkworm races from breeders stock.

**Renditta:** Number of kilos of cocoons required to produce one kilo of silk yarn.

**Tasar:** A variety of silk produced from wild silkworm races.



## INDIA

### NATIONAL SERICULTURE PROJECT

#### STAFF APPRAISAL REPORT

##### I. LOAN/CREDIT AND PROJECT SUMMARY

**Borrower:** India, Acting by its President

**Executing Agencies:** The Central Silk Board (CSB), and the Governments of Andhra Pradesh (GOAP), Jammu & Kashmir (GOJK), Karnataka (GOK), Tamil Nadu (GOTN) and West Bengal (GOWB).

**Amount:** IBRD loan: US\$ 30 million equivalent  
IDA Credit: SDR 133.8 million (US\$ 147 million equivalent).

**Co-financing:** Grant from the Government of Switzerland, acting through the Swiss Development Cooperation (SDC), SwF 40 million (US\$ 25 million equivalent).

**Terms:** IBRD Loan : 20 years including 5-year grace period, at the Bank's standard variable interest rate  
IDA Credit: Standard, with 35 years maturity.

**On-lending Terms:** For the portion allocated to the five beneficiary States: from the Government of India (GOI) to GOAP, GOJK, GOK, GOTN, and GOWB as part of central assistance to the states for development projects on terms and conditions applicable at the time.  
For the portion allocated to CSB: from GOI to CSB as a grant. GOI will bear the foreign exchange risk.

**Beneficiaries:** The project would generate the equivalent of 0.5 million full-time jobs in silk production and related activities. Farm incomes would increase by three to five times over the project period. Beneficiaries would be predominantly female, and most would be poor, including scheduled castes and landless.

**Project Description:** The project would build on the experience gained under the Karnataka Sericulture Project (Credit 1034-IN) which was completed in 1988, extending coverage to India's four other major sericulture states, and supporting pilot developments in twelve other states where sericulture is a relatively new activity. Given its rural base and the labor-intensive characteristics of sericulture, the project will contribute to reduction of poverty in rural areas through creation of employment, including women and scheduled castes/tribes which account for about 60% and 30%,

respectively, of labor engaged in sericulture. The project would finance strengthening and expansion of facilities and support services of CSB and participating states, including: research and development, training, extension services, production of mulberry saplings, basic seed production, seed multiplication grainages, cocoon markets, cocoon drying and testing facilities, silk exchanges, silk testing houses and incremental operating costs of these facilities. The project would provide for increasing private sector participation in silkworm egg production, young silkworm rearing, and silk reeling. Funds have also been allocated for assistance to private chawki rearers in rural areas, support for universities' sericulture research programs, NGOs' operations in sericulture, promotion of more fuel efficient stoves in reeling establishments, technical assistance, overseas training and for a 'beneficiary assessment' of intended project beneficiaries in the rural areas.

**Risks:**

Fair competition between existing government facilities and private grainages will require continued commitment by CSB and participating states, as will expanded private sector chawki rearing. In the light of experience in Karnataka and Jammu & Kashmir so far, CSB and the project states are now convinced that private sector needs to be more heavily involved in grainages, chawki rearing and reeling.

As regards the projected impact on production and quality, the technical packages are largely proven, and the project provides for research to improve still further. The development of improved and expanded reeling facilities would depend on commercial perceptions of the potential benefits. Increasing shortages of higher quality raw silk in the international markets, suggest that the risk is limited.

Estimated Project Costs and Financing

Component	Rupees Million			US \$ Million**			% Foreign Exchange	% of Base Cost
	Local	Foreign	Total	Local	Foreign	Total		
Research and Development	340	24	363	22.7	1.6	24.3	7	13
Basic Seed Production	404	19	423	27.0	1.3	28.2	5	15
Seed Grainages	470	33	502	31.4	2.2	33.6	7	18
Assistance to private CRCs	142	6	148	9.5	0.4	9.9	4	5
Mulberry Plantations	32	*	32	2.2	*	2.2	*	1
Cocoon Drying & Markets	170	8	178	11.4	0.5	11.9	4	6
Spik Exchange & Testing	104	7	111	7.0	0.5	7.4	6	4
Extension Services	433	8	441	28.9	0.5	29.5	2	15
Training Centers	186	7	193	12.4	0.5	12.9	4	7
Tech. Assist./Training	17	104	122	1.2	7.0	8.1	86	4
CSB/DOS Administration	200	5	206	13.4	0.4	13.7	3	7
Advances to Reelers	40	-	40	2.7	-	2.7	-	1
Joint Venture Participation	21	-	21	1.4	-	1.4	-	1
Support to NGOs	40	-	40	2.7	-	2.7	-	1
Smokeless Stoves (Chullas)	7	*	7	0.5	*	0.5	1	-
Beneficiary Assessment & Socio-Economic Surveys	18	*	18	1.2	*	1.2	*	1
<b>Total Baseline Costs</b>	<b>2625</b>	<b>221</b>	<b>2846</b>	<b>175.3</b>	<b>14.8</b>	<b>190.1</b>	<b>8</b>	<b>100</b>
Physical Contingencies	267	12	279	17.8	0.8	18.6	4	10
Price Contingencies	721	54	775	32.0	2.3	34.4	7	18
	<b>3612</b>	<b>287</b>	<b>3899</b>	<b>225.2</b>	<b>17.9</b>	<b>243.1</b>	<b>7</b>	
<b>Institutional Credit:</b>								
• On -farm	1019	-	1019	64.0	-	64.0	-	
• Reeling	637	-	637	40.0	-	40.0	-	
<b>Total Project Cost</b>	<b>5268</b>	<b>287</b>	<b>5555</b>	<b>329.2</b>	<b>17.9</b>	<b>347.1</b>	<b>6</b>	

\* less than Rs. 1 million or US\$ 0.1 million.

Financing Plan:

	Local	Foreign	Total
	----- (US\$ million) -----		
GOI and Participating State	41.1	-	41.1
Banks and Financial Institutions	104.0	-	104.0
Swiss Development Corporation	22.8	2.2	25.0
IBRD/IDA	161.7	15.3	177.0
<b>Total</b>	<b>329.6</b>	<b>17.5</b>	<b>347.1</b>

Estimated Disbursements:

(US\$ million)

	FY90	FY91	FY92	FY93	FY94	FY95	FY96
Annual	4	16	25	25	30	30	47
Cumulative	4	20	45	70	100	130	177

Economic rate of return:

32%

Map: IBRD 21330

## II. THE AGRICULTURAL SECTOR

### Agriculture in the National Economy

2.1 India is the world's second most populous country with a population of 800 million growing at an annual rate of 2.2%. GDP growth has averaged 4.5% per annum over the past decade stimulated by rapid growth of the industrial and services sectors. Agricultural growth has been lower at about 2.5% per annum. Per capita incomes have also increased by some 2.2% per annum to reach US\$260 in 1985. This improvement has resulted in only a marginal reduction in the high incidence of poverty and under-employment, especially in rural areas. Accelerated agricultural growth will be an important element in attaining India's long run objectives of 6% per annum overall GDP growth, and improved incomes in the rural sector.

2.2 Agriculture is the largest sector of the Indian economy and contributes about 37% of the gross national product. It engages about two-thirds of the labor force, and agricultural production accounts for 24% of the country's merchandise exports. The average farm holding is only about 2 ha. Farmers with less than 1 ha of land account for 57% of all holdings, and about 30% of the rural population are landless agricultural laborers.

2.3 Significant advances in agricultural productivity, especially in food grains, were made with the initial impetus of improved varieties, fertilization, irrigation development, and improved crop husbandry during the "green revolution" of the past 20 years. Current strategy continues to emphasize food production, where increases in productivity will be necessary to feed and improve nutrition levels for India's growing population. Development of strong agricultural support services (extension, research, input supply, marketing and credit) as well as basic rural infrastructure such as irrigation and roads are fundamental features of India's agricultural development program.

2.4 Land and water conservation, forestry, and enhanced development of rainfed agriculture are also receiving increased attention. Domestic demand for commodities such as pulses, oilseeds, milk and animal products, horticultural products and fibers is expected to grow rapidly. Similarly, development of commodities with export potential is an important development priority to ease India's balance of payments constraints, critical to India's future growth prospects, and as a means of enhancing rural incomes and employment through agricultural diversification to more remunerative activities.

2.5 Indian development priorities aim both for a high overall GDP growth rate and for increased equity in its distribution. This objective is particularly targeted on rural areas where poverty and under-employment are concentrated. Development activities such as sericulture which favor both GDP growth and equity objectives are therefore particularly attractive.

### The Sericulture Subsector

2.6 Sericulture is an ancient activity in India, dating back to at least the second century B.C. The traditional production centers in India have been

Bengal, Mysore and Kashmir. The wearing of silk in its various forms has become an integral part of Indian culture and tradition.

2.7 Silk Production and Trade. In India, production growth has been particularly rapid in the past decade, increasing from 3,070 tons of raw silk in 1975/76 to 7,900 tons in 1985/86 - some 10% per annum. In 1987 India overtook Japan, where production has been declining, to become the world's second largest mulberry silk producer with 13% of the world's production (see Annex 1, Table 1). About 90% of Indian silk is mulberry silk, the commonest and most easily traded form of commercial silk. The three other commercial varieties of silk, Tasar, Eri and Muga, are also produced. In the high value but limited Muga silk output, India enjoys a world monopoly.

2.8 The gross annual value of Indian silk fabric production is estimated at US\$800 million, of which about 15% is exported. In 1985/86, exports of silk generated Rs 1,600 million (US\$ 125 million) or 1.5% of India's total export earnings. While Indian exports of silk fabric have expanded by a factor of ten in the last decade, this has been largely achieved through increased imports of raw silk for weaving (1,365 tons raw silk were imported in 1983-84, mainly from China), because domestic demand for silk fabric has kept pace with growth in production. The success of India's sericulture expansion and its attractive employment, income generation and poverty alleviation features and export potential, have attracted increased attention and financial support to the sector by GOI.

2.9 Comparative Advantage and Growth Potential. India's comparative advantage in sericulture lies in the favorable climate, permitting low cost and near year-round mulberry leaf and cocoon production (in contrast to Japan, Korea and much of China), and in India's low labor costs compared to traditional producers such as Japan and Korea. Relative to most other rural sector activities in India, sericulture already offers good returns to producers even at the present very low yields.

2.10 The prospects for sustained growth of the Indian sericulture sector are good: domestic consumption continues to absorb production growth; India's silk weaving and garment manufacturing sector has grown even more rapidly, and for production in excess of domestic requirements, export market potential appears good: India still accounts for only 4% of international silk trade. Thus substantial potential exists for the sericulture sector to contribute more significantly to India's employment, income generation and foreign exchange earnings.

2.11 Social Impact of Sericulture Development. The sector contributes directly to India's employment and social objectives. Firstly, it is labor intensive: one hectare of mulberry plantations generates employment of about 13 persons annually in mulberry cultivation, silkworm rearing, reeling, twisting, weaving and garment manufacture; the sector currently provides full- or part-time employment to 5.3 million workers. Sericulture's highly land and labor intensive nature makes it an ideal activity for the smallholder. One hectare of land under mulberry can support a family with a comparatively good income and even one quarter of a hectare can support a small sericulture rearing enterprise - perhaps the highest labor to land ratio of any agricultural activity.

2.12 Secondly, employment and income generation is primarily among disadvantaged groups. Women, scheduled castes and tribes and religious minorities are substantially involved. For women, who make up an estimated 60% of the sericulture and reeling sector work force, cocoon rearing offers light but regular work. Some 30% of sericulture and reeling jobs are held by scheduled castes and tribes, and cases of landless families engaged in cocoon rearing, using mulberry contracted from local farmers are also increasingly common.

2.13 Thirdly, sectoral value added accrues primarily to rural households. Some 57% of the gross value of Indian silk fabrics production is received by cocoon producers, 16% by reelers and twisters, 11% by weavers and 16% by traders. Inclusive of the predominantly rural-based reeling and twisting and some village level weaving, about 75% of silk fabric industry revenues accrue to rural areas. Sericulture is particularly well suited to remote areas as raw silk is a non-perishable, high value-to-weight product. Finally, sericulture offers a more regular and frequent source of cash income than most agricultural activities, an important feature for general nutrition and household welfare.

2.14 Main Production Areas Mulberry sericulture is concentrated in five states - Karnataka, Andhra Pradesh, Tamil Nadu, West Bengal, and Jammu and Kashmir (J&K) - which together make up about 97% of India's mulberry hectarage and 99% of cocoon and raw silk production (see Table 2.1, and Map IBRD 21330).

Table 2.1: MULBERRY SERICULTURE AREA AND PRODUCTION (1985-86)  
(% of Total Area/Production in Parentheses)

STATE	Area (ha)		Cocoons (tons)		Raw Silk (tons)	
Karnataka	132,420	(60.8)	43,000	(56.0)	4,300	(61.2)
Andhra Pradesh	35,268	(16.2)	12,340	(16.1)	1,028	(14.6)
Tamil Nadu	29,418	(13.5)	10,000	(13.0)	833	(11.9)
West Bengal	12,893	(5.9)	9,800	(12.7)	750	(10.7)
Jammu & Kashmir	632	(0.3)	642	(0.8)	34	(0.5)
Other States	7,208	(3.3)	935	(1.2)	84	(1.2)
TOTAL	217,839	(100.0)	76,717	(100.0)	7,029	(100.0)

2.15 Amongst these five states, production in the three southern states, especially Karnataka, has expanded rapidly. Production in West Bengal also shows an upward trend. By contrast, despite its historical significance in Indian sericulture, Jammu and Kashmir's silk production has declined due to inappropriate government interventions and policies. Localized production of mulberry and reeling cocoons is also found in about 12 other states.

2.16 For non-mulberry silk, centers of concentration are Assam and adjacent territories for Muga and Eri silk, and along the Eastern Deccan (parts of Bihar, Orissa, Madhya Pradesh and Maharashtra) for Tasar and Oak Tasar silk production largely practiced by tribal peoples. These silks comprise 10% of national silk production but are of local significance for the incomes of the people concerned. Nevertheless, productivity and rapid growth potential (except, perhaps, for Muga silk) for these silks is lower than for mulberry silk. Production techniques involve gathering of wild cocoons in the case of Eri silks. For all such varieties, demand potential is largely local and dependent on hand processing. Also, a basic research and institutional

support program under the CSB and state governments, including some bilateral aid and NGO assistance is already underway. The project and discussion in the analysis in this report is therefore focussed on mulberry silk production.

**2.17 Silkworm Varieties** Good yields and high quality depend fundamentally on the availability of suitable "seed" (silkworm eggs) to rearers. These must be disease free and appropriate to local conditions and farmer's husbandry standards. The dominant strains of silkworm now used in India are hybrid multi/bivoltine. The strains are well suited to India's tropical climate and often unhygienic rearing conditions. The silk produced, however, is of a lower quality than that of the pure bivoltine strains, which produce longer, stronger, more even quality silk which, after reeling, is suitable for use in power looms. Under natural conditions, bivoltine strains produce only two layings per year; modern seed production techniques (either by temperature cycling, or by chemicals) produce more frequent layings. In this way, higher yielding, higher value production which is a suitable substitute for the imported silk now used in the power loom weaving sector can be produced.

**2.18 Seed Selection and Multiplication** Silkworm seed strains are produced by research work in Government laboratories. Those recommended for mass production are first subjected to extensive field trials, followed by a review by a technical committee. Once approved, silkworm races are released for multiplication, which is carried out on central or state-run Parent 3 (P3) and Parent 2 (P2) farms. The final Parent multiplication stage is contracted out to privately owned P1 farms. During these stages, criteria such as number of eggs per layings, hatching percentage, silk ratio, and pupation rate are applied for elimination of eggs. The process, particularly for production of bivoltine seed, requires top quality breeders' seed and meticulous attention to timing, hygiene and quality control through all stages.

**2.19 Commercial Seed (F1) Grainages** The final stage of multiplication (from P1 seed cocoons) takes place in both public and private sector F1 "grainages". This activity is well suited to the private sector, but most production facilities are currently state-owned and operated. Disease free layings ("dfls") are sold to farmers in units of 100 Dfls, each comprising about 300-350 eggs.

**2.20 Chawki Rearing and Cocoon Production** The first 12 days of silkworm growth from hatching of the egg to young third age silk worm or "chawkis" requires particularly constant attention - very frequent feeding of chopped young mulberry leaves<sup>1</sup> and meticulous hygiene standards to ensure healthy growth in the later stages of growth. Although state-owned chawki rearing centers have been set up, most Indian producers continue to rear directly from purchased seed. The silkworms are traditionally kept in large woven open baskets on wooden racks in the rearer's house or, ideally, in a separate small "rearing house". Rearers usually grow their own mulberry although sub-contracting arrangements with mulberry farmers are sometimes made.

**2.21** About 27 days after hatching, the silkworm extrudes a continuous filament to form the cocoon. Without interference, the natural life cycle would continue with emergence of a moth after 10 days, mating and egg laying.

<sup>1</sup> Mulberry is a hardy and drought-tolerant perennial crop which also responds well to irrigation and fertilization. Under tropical conditions mulberry leaf growth is almost continuous throughout the year.

Commercial rearers instead sell cocoons within a day or two after they have been formed. Rearings throughout the year is possible in most of India.

**2.22 Cocoon and Yarn Marketing** Marketing of cocoons and of raw silk is handled through government-constructed and operated auction markets. Price is determined through open bidding with a one percent market fee levied on both buyers and sellers which more than covers costs. In the larger markets such as Ramnagaram cocoon market in Karnataka and the Central Silk Exchange in Bangalore, competition is fierce and these markets are open 363 days a year. Such markets are popular with sellers and buyers as they are recognized as offering a fair market clearance price. Some attempt has been made to reduce seasonal variations in yarn prices in Karnataka through a buffer stock system operated by the GOK. This has had limited impact due to insufficient working capital and the difficulties of operating a stabilization system. It is not recommended to be followed elsewhere.

**2.23 Reeling** The cocoons are purchased by "reelers" and must be "stifled" (heated by immersion in boiling water or with hot air) to prevent moth emergence and resultant destruction of the filament. Reeling is carried out in about 15,000 houses or establishments using charkas (small, traditional hand reeling units) and about 3,000 larger, power driven 'cottage basins' (see below, para 2.24). In most of these units boiling water needed for stifling cocoons is obtained by burning fuel in traditional 'open' stoves (chullas). The resulting smoke is not only a health hazard for the workers, but also detrimental to the yarn quality. Although simple, closed (or 'smokeless') chullas have been developed, its adoption has been almost negligible so far; reelers are unwilling to make the initial investment (Rs 500 for the charkas and Rs 2,000 for the cottage basin chullas) even though this cost is recovered, through fuel savings in two or three years.

**2.24** While some public sector capacity has been established, reeling is almost entirely handled by private reelers. In reeling, filaments from 8-10 cocoons are combined to obtain a continuous thread of raw silk. The most common technology (60% of raw silk output) is the traditional "charka", a very simple two person manually operated apparatus. "Cottage Basins" which are mechanically driven with usually about 10 reeling work stations or basins, handle most of the remainder, operating as small family industries employing some 15 to 30 persons each. These entail higher labor productivity and produce somewhat higher quality raw silk due to the greater constancy of reeling tension, and, in particular, the additional process of "re-reeling" the raw silk. Working conditions are also much better.

**2.25** Models of "improved charkas" have recently been piloted but have yet to be widely used. The improved charka increases labor productivity and working conditions. While still manually operated, it has nearly the same basic technology and hence output quality of the cottage basin system. A small number of larger reeling enterprises or filatures, mostly owned by State Governments, process about 5% of output. Such government plants have invariably proven to be loss-making enterprises producing poor quality output. A strategically important future need for bivoltine silk production is to promote private sector modern filatures or mini-filatures with semi-automatic equipment for controlling silk yarn thickness and minimizing winding breaks. However, for the mass of Indian cocoon processing, the short and medium term priority is promotion of reeling by cottage basins and improved charkas.

2.26 Further downstream, weaving, dyeing, printing, and garment manufacturing is also almost entirely in the hands of private entrepreneurs. This sector has grown rapidly using locally produced silk as a basis for the traditional weaving techniques (hand looms and small power looms). Larger power looms require warp materials of higher quality imported silk.

#### National and State Level Support Services and Institutions

2.27 While sericulture is predominantly a private sector industry, an important supporting role is played by state and central agencies. The central government's Ministry of Textiles (MOT) has overall responsibility for general policy, planning and guidance of the sector and decisions. It operates largely through its Central Silk Board (CSB) based in Bangalore, Karnataka.

2.28 The CSB was established by an Act of Parliament in 1948. It is entrusted with wide-ranging activities including scientific and technological research; developing and distributing new varieties of silkworm seeds; improving mulberry cultivation and rearing practices; quality controls and testing, rationalization of cocoon and raw silk marketing, and; inspection of silk products for exports.

2.29 The most important operations of the Board relate to research, training, development and propagation of quality seeds. Research activities center around the two Central Sericulture Research and Training Institutes (CSRTI) at Mysore (Karnataka) and Berhampore (West Bengal), the Central Tasar Research and Training Institute (CTRТИ) at Ranchi (Bihar) and the Central Silk Technological Research Institute (CSTRI) at Bangalore for post cocoon technology. Development, production and distribution of silkworm eggs is handled by the National Silkworm Seed Project (NSSP) headquartered at Bangalore under the overall supervision of the Board. NSSP facilities exist in all sericulture states, including 10 basic seed farms, 21 basic seed multiplication and training centers, and 24 seed grainages.

2.30 A network of 18 Regional Research Stations and 61 Research extension centers under the main institutes provide supporting services for field trials, experiments and collection of data on local conditions, and sericulture promotion. Through these activities, the CSB supports and supplements State activities in sericulture.

2.31 The principal sericulture states have Directorates of Sericulture (DOS) under their respective state departments of textiles or industry which consult and coordinate with CSB. Most sericulture services are directly implemented by the DOSs and funded by the state governments concerned with some budgetary support through central government. CSB is also very actively involved through direct implementation of its own specific research, seed production and distribution and extension services in the states.

2.32 The public sector's role is in provision of sericulture support services, input supply and marketing infrastructure. Other public sector sericulture support functions include the following:

**Extension.** Specialized sericulture extension services have been established in the main sericulture states under DOS management. The basic extension unit in the field is the Technical Service Center (TSC)

which comprises a graduate or post-graduate level sericulture officer supervising about 8 graduate or high school matriculate level extension officers. Each TSC is responsible for servicing 80-100 sericulture households. At present, the TSCs also operate the chawki rearing centers. Basic sericulture training is provided through a combination of CSB and DOS research and training institutes.

**Training** Training activities of CSB and state DOSs fall into the following main categories: (i) training of DOS staff for field extension service, basic seed production farms and grainages and other operations (ii) training in sericulture techniques to farmers taking up sericulture for the first time and (iii) to a limited extent, training of reelers.

**Credit.** Credit funds for investments in sericulture and silk processing is available through existing financial institutions and procedures for agriculture credit. For on-farm development (mulberry plantation, rearing house and equipment) term credit is generally available from commercial banks, Land Development Banks (LDBs), and to a lesser extent, the cooperative banks within their allocation of funds for lending to agriculture<sup>1</sup>. Similarly, for reeling investments, credit is available from several sources (commercial banks, state financial institutions and cooperative banks). IDBI provides refinance facilities (similar to NABARD) under its schemes for small and medium size industrial enterprises. The Bank is financing a major ongoing study of Agriculture Credit in India under the NABARD - I project ( Loan 2653-In approved 2/25/86).

#### Performance and experience under the Karnataka Sericulture Project

2.33 The Karnataka Sericulture Project (KSP-I, Credit 1034-IN) was approved for a Credit of US\$54 million in June 1980. The project was completed in 1988, about three years after the appraisal target. Despite this delay, project performance was satisfactory with establishment of project infrastructure and services at about 95% of appraisal targets, and full achievement of production objectives. Expansion of production infrastructure accelerated growth in Karnataka's raw silk production from 2,900 tons in 1980/81 to 4,700 tons in 1986/87, and also encouraged development of sericulture in adjacent areas of Andhra Pradesh and Tamil Nadu, where combined raw silk production is estimated to have grown from 1,270 tons in 1980/81 to 1,861 tons in 1985/86. A Project Completion Report is under preparation.

2.34 While the project had a very positive impact on sericulture development, some shortcomings are evident; specific lessons include the following:

- (a) The introduction of bivoltine cocoon production, which reached 150 tons per annum at completion, was only about 16% of the target. Rapid development of bivoltine silk in India depends on the availability of hardy varieties to withstand Indian conditions, technology for production of quality seeds, establishment of a market premium for the bivoltine

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<sup>1</sup> Currently, commercial banks are required to allocate 18% of their total lending to agriculture. Approximately a third of commercial banks' lending in agriculture is refinanced by NABARD.

silk, and choice of areas climatically suitable for bivoltine rearing.

- (b) Size of grainages for seed production were too large; lower cost designs and smaller, more manageable and more widely distributed seed production and distribution units would have been preferable;
- (c) Proliferation of government chawki rearing centers proved inefficient and costly and often produced low quality chawkis and incurred heavy losses;
- (d) Efforts to rehabilitate a loss-making parastatal reeling and weaving corporation (the Karnataka Silk Industries Corporation) were not successful. The venture remains a loss making activity with under-utilized capacity, poor yields and high labor costs; and
- (e) Incomplete coordination of research activities between the DOS and CSB resulted in duplication of some research activities.

### III. THE PROJECT

#### Project Rationale and Origin of Bank Involvement

3.1 The Bank's assistance strategy to India is to support policies and investments that will encourage economic growth and social development in a context of macro-economic stability. The emphasis is on efficient resource allocation, increased efficiency in the public sector, and the appropriate targeting and delivery of support systems to the poor.

3.2 With the generally satisfactory progress on implementation of the Karnataka Sericulture Project (paras 2.33-2.34), the Central Silk Board, in consultation with the major producing states, began preparation of a multi-state follow-up project in 1986. Consultants were commissioned to prepare state plans, which were reviewed by IDA in late 1987. Preappraisal took place in March, 1988, followed by appraisal in November.

3.3 Sericulture has the unusual advantage of addressing simultaneously and rapidly several of GOI's priorities. Sericulture provides: (i) employment and income generation in rural areas, (ii) high participation of low income and target social groups; (iii) good comparative advantage and growth prospects; (iv) potential for contribution to export earnings; (v) supporting a greater role for women in development; and (vi) good downstream employment generation impact of raw silk production on the industrial sector. These combined features make sericulture a particularly attractive sector for further development.

#### The Project Area

3.4 The project would be implemented in five states (Karnataka, West Bengal, Jammu & Kashmir, Andhra Pradesh, and Tamil Nadu - the "participating states") which account for almost all of Indian mulberry silk production (para 2.14). Given the success and general popularity of sericulture, and in response to

demand by farmers, many states (other than the five main states) have initiated services and programs to support further development of the industry. To complement and provide proper direction to these states, CSB has formulated 'pilot' development plans for implementation in 12 states (Assam, Bihar, Gujarat, Haryana, Himachal Pradesh, Kerala, Maharashtra, Madhya Pradesh, Orissa, Punjab, Rajasthan and Uttar Pradesh). CSB's involvement in these states will be exclusively for development of bivoltine silk production. CSB's actions will be concentrated in one or two districts in each state suitable for bivoltine rearing. Production in these states is small relative to India's overall production, but expansion has been very rapid and government policy, correctly encourages growth in non-traditional sericulture areas.

### Brief Description

3.5 The project would help finance India's sericulture development through an important expansion phase requiring improvements in productivity, product quality and support services, and increased private sector involvement in specific aspects of the industry. The success of this endeavor will provide the basis for India to exploit its natural comparative advantage in silk production and long-term potential for further growth, without incurring unsustainable demands on state and central budgets. This will require a combination of supporting investments on the one hand, and policy changes on the other.

3.6 Current annual production of mulberry silk of about 9,000 tons is expected to rise to 17,100 tons over the project period. About 4,200 tons of incremental production would be attributable to the project, together with additional employment for about 0.5 million full time workers, 60% of whom would be women. To achieve this, the project would provide:

- (a) Support to the Central Silk Board, (CSB) for development and expansion of its research and training activities, propagation of improved technologies including bivoltine strains, production of quality seeds, extension services and silk yarn testing.
- (b) Support to state-level development in the five major sericulture states - Karnataka, Andhra Pradesh, and Tamil Nadu in southern India, Jammu and Kashmir in the north, and West Bengal in eastern India, and assistance to pilot programs in twelve 'new' states which are in the very early stages of sericulture development.
- (c) Emphasis on a greater role for the private sector in silkworm seed production, chawki rearing in the rural areas, and reeling. Besides reducing the burden on public sector resources, an increased participation of private sector in these operations, will make the industry more efficient and self-sustaining in the long run.
- (d) In Jammu & Kashmir, support for the State's actions towards de-monopolization and liberalization of the

industry, greater incentives for private sector to revive sericulture through market forces.

- (e) Increased production of high quality silk yarn through specific programs to promote bivoltine silk production, and through the introduction of grading facilities to increase awareness of, and reward for, quality.
- (f) Enhanced support for the role of women in sericulture,
- (g) Expansion of the activities of Non-Government Organizations (NGOs) in sericulture, and
- (h) A pioneering program to evaluate the impact of the project on intended beneficiaries using 'beneficiary assessment' techniques which have proved valuable in other countries. This will be supplemented by bench-mark surveys to compare the situation of beneficiaries at the beginning, mid-project and at the end of the project.

#### Detailed Features

3.7 Sericulture Research and Development (13% of Base Cost) At the national level, the build-up over the past several decades of sericulture research in India has been a leading factor in development of the sector and continued vitality and growth of sericulture research will remain central to India's sericulture development prospects. The project would support ongoing work related to development of improved and locally adapted silkworm and mulberry varieties, research on moriculture, sericulture and silk processing technology. The main responsibility for sericulture research has been with the CSB, which has built a large infrastructure of three National Research Institutes and 13 supporting Regional Sericulture Research Stations (RSRS) which undertake field trials and adaptive research work (para 2.29). Of the three institutes, the Central Sericultural Research and Training Institute (CSRTI) is also responsible for dissemination of research and training in sericulture at various levels of operations. The project will fund expansion and strengthening of these Institutes and RSRSs including, additional staff, incremental operating costs and the establishment of a new seed technology laboratory and workshops at each of the three Research Institutes.

3.8 The maintenance of several varieties of mulberry and pure and hybrid races of silkworms acquired or developed over many years of research work is currently dispersed among several institutes as part of their on-going research work. In order to collect, protect and preserve mulberry varieties and silkworm races in a systematic manner, the project will finance construction and operation of a central germ-plasm bank to be maintained by CSB.

3.9 The research component of the project would also enable CSB to commence a program of bio-technology and genetic engineering for development of new silkworm races. While there have been significant advances in genetic engineering, very little has been done to apply the available technology in this field to the development of silkworm races. Project funds will be utilized for laboratory equipment, training of CSB's research staff, consul-

tants and where appropriate, sub-contracting some of the research work to overseas institutions experienced in this field. The entire program (and commencement of expenditures under this allocation) will be subject to prior approval of CSB's proposals by the All India Sericulture Research Coordinating Committee (AISRCC, para 3.12).

3.10 At the state level, the project will finance improvements and strengthening of the Karnataka State Sericulture Development Institute (KSSDI) established under the KSP-I project and establishment of a similar new institute for Andhra Pradesh.

3.11 Frequent transfers of staff engaged in research work has resulted in lack of required continuity and thus affected overall efficiency of research programs in both central and state institutions. An encouraging development in this regard is the recent decision by the CSB to make a clear distinction between research staff and other technical/administrative staff and to keep staff identified as engaged in research in their positions for at least three years. This needs to be further strengthened and more widely adopted. CSB and participating states have provided assurances that (a) all research staff positions will be clearly identified by December 31, 1989; (b) that all staff appointed to such posts shall be for a minimum of three years and (c) that research staff engaged on breeding work will as general rule, remain in their posts for at least five years.

3.12 Research work undertaken by the CSB and participating states is presently coordinated by the (AISRCC) which meets every six months for this purpose. With the increased level of research operations foreseen under the project, there is a need to further strengthen and to formalize the coordination and review functions of AISRCC. Assurances have therefore been obtained from CSB and participating states that: (a) all universities and research institutes funded under this project will prepare annually, a two-part report summarizing (i) the main research work undertaken during the 12-month period ended and (ii) the objectives, and budget for research programs planned for the ensuing three years. (b) AISRCC will review and make its recommendations on the annual reports of all participating research institutes and specifically on the merits of research work proposed, and (c) CSB shall maintain copies of the annual reports of the participating institutes and AISRCC's recommendations, and submit these to the periodic Bank/SDC supervision missions.

3.13 Traditionally, Universities in sericulture states complement research programs undertaken by the existing research institutes of the CSB and Karnataka, focussing specially on adaptive research for local conditions. The project will include a specific allocation (of US\$3.8 million<sup>1</sup>) to support research programs of agriculture universities in sericulture, to be administered centrally by the CSB. Utilization of funds for specific research projects will be subject to review and approval of each research proposal by a sub-committee of the AISRCC. Assurances have been obtained that CSB would cause AISRCC to constitute a sub-committee, headed by its chairman, and including representation from CSB, participating states and other senior qualified experts familiar with research needs of sericulture to review and approve all proposals for use of these funds. CSB will maintain a record of projects approved, and funds utilized, and make available to Bank/SDC super-

<sup>1</sup> Including CSB/State contributions

vision mission all proposals, records and sub-committee proceedings and other records pertaining to this allocation of the project.

3.14 In addition to research work, many agriculture universities offer graduate degree and diploma training courses in sericulture. (The KSP-I project financed specific components for expansion of sericulture teaching in Karnataka universities). There are indications however, that there is now a proliferation (and duplication) of sericulture courses and that the quality and numbers of graduates trained by the universities in sericulture are not entirely in line with the employment opportunities nor with requirements of the industry as a whole. Rather than providing direct financing to universities to expand their sericulture training, the CSB and participating states would first recruit the required staff from the available pool of agriculture graduates and post-graduates, identify their overall training needs and send identified staff for appropriate training to CSB institutes, state training facilities and universities if appropriate. The project includes financing for strengthening of existing and establishment of new training facilities of CSB and participating states (para 3.34). With such expansion, CSB and state training facilities would be able to meet most of the training requirements under the project.

3.15 As an exception to the strategy mentioned above, the project will support teaching programs of Sri Krishnarajendra Silver Jubilee Technology Institute (SKSJTI), Bangalore, for sericulture. Funds for SKSJTI have been included in the allocation for universities described above be subject to approval by AISRCC. In order that CSB and participating states may also benefit of this funding, the State of Karnataka has provided an assurance that candidates from outside Karnataka will have equal access to sericulture teaching programs of SKSJTI.

3.16 Basic Seed (Silkworm egg) Production (15%) To meet the expected increase in demand for seeds, the project will finance establishment and operation of 25 new farms of CSB (5 in Karnataka, 3 in Andhra Pradesh, 2 in Tamil Nadu, 5 in West Bengal, 2 in J & K and 8 in pilot states), and strengthening of 100 existing farms (16 of Karnataka, 50 of Andhra Pradesh, 11 of Tamil Nadu, 15 of W. Bengal and 8 of J & K).

3.17 The selection criteria currently in use in India during the seed multiplication process (para 2.18) need a careful review. CSB has agreed to undertake such a review, including experiments and trials to see the effect of changing the selection criteria and to submit the results of the study to the Bank by December 31, 1989. It will also seek further technical assistance on the subject.

3.18 Seed (F1) Grainages (18%) With the ten large grainages built under the KSP-I project, together with those already planned for execution by CSB, capacity in the public sector grainages in Karnataka is considered to be adequate. In other participating states, grainage capacity is less than required, and a substantial portion of the current production of F1 seeds must continue to come from the CSB and state owned grainages as private-sector capacity is developed. Accordingly, the project will finance a total of 53<sup>1</sup> new grainages: 12 in Andhra Pradesh, 17 in West Bengal, 8 in Karnataka, 5 in Tamil Nadu, 2 in Jammu and Kashmir, and 9 in pilot states. These grainages

<sup>1</sup> Of which 35 would be under CSB control.

will have annual production capacities of 1.5-3 million dfls. In addition, 8 existing grainages in Tamil Nadu and 5 in Jammu & Kashmir will be strengthened under the project.

3.19 For long-term, sustainable development of grainage capacity, it is essential that the private sector be encouraged to establish commercial grainages. In determining the additional capacities in the state grainages, allowance has been made to leave a share of the total market for seeds for private graineurs in all the participating states (except Jammu and Kashmir, where private sector grainage development is not expected during the period of the proposed project). To create an equitable environment for private sector grainage operations, it is necessary to ensure that public sector grainages are subject to financial and commercial discipline, and in particular, recover full costs of their production through market prices. CSB and participating states have agreed that: (i) all public sector grainages will set their seed prices so as to recover, in accordance with timing agreed with the Bank, full cost of production including operating costs, depreciation of plant, equipment and other infrastructure. For CSB, HQ administrative costs attributable to its seed production operations will be included in costs to be recovered, (ii) CSB and participating states shall prepare annually, in accordance with commercial accounting principles, Income and Expenditure statements showing total costs and revenues of their grainage operations; have these statements audited by independent qualified accountants acceptable to the Bank; and, submit the audit reports to the Bank not later than nine months after the end of each fiscal year (para 5.1(a)).

3.20 In addition, CSB and the participating states (except J & K) shall submit to the Bank, by December 31, 1989, an "Action Plan" indicating specific actions it has taken or intends to take in order to promote private sector grainages. Such plans will be reviewed periodically and in agreement with the Bank, revised as necessary in light of experience (para 5.1(a)). CSB has also agreed to take appropriate measures to have at least 3 of its eight grainages planned for Karnataka under the project to be promoted by (or transferred to) private sector, or undertaken as a 'joint venture' with minority participation of CSB.

3.21 A source of inefficiency in the current system of operating public sector grainages is that revenues from sales are passed to the state. To allow the new grainages under the project (and the ten grainages in Karnataka financed under KSP-I) to operate on a more commercial basis, the project will provide financing of 'permanent working capital' to each grainage, in the form of a one-time reimbursement of about six months' expenditures on cocoon purchases and operating costs other than staff costs. CSB and participating states have provided assurances that such working capital will be retained by the grainages and will be replenished from sales revenue.

3.22 Assistance to Private Chawki Rearing Centers (5%) Rearing of healthy young silkworms (chawkis) through special care applied at the early stage of the worms is of crucial importance for cocoon yields and quality of silk yarn (para 2.20). To promote chawki rearing, the Directorate of Sericulture, Karnataka has set up some 1,400 CRCs, which are operated and run mostly by its extension staff, a model followed by other states on a smaller scale. The operations of these state-owned CRCs has not been entirely satisfactory: costs are not recovered, and they have become an increasing burden on the DOS budgets. States cannot maintain a consistent level of efficiency in a large

number of CRCs spread over rural areas and thus are unable to provide the quality output needed by the farmers. At the same time, this is an activity which could be undertaken by private farmer-entrepreneurs, (or a group of farmers on a cooperative basis) which would have the additional benefit of freeing state extension service staff from responsibility for operating CRCs. The project thus includes measures to transfer existing CRCs to the private sector. New CRCs under the project will be started only by private owners and in areas where there is adequate potential demand to make private CRCs viable. However, in the present environment in which advantages of chawki-rearing have not been fully demonstrated and the farmers are used to obtaining chawkis at significantly less than full-cost, the project will provide financial assistance for initial investment required for establishment of CRCs and a reducing contribution towards operating costs during a the transition phase. Such assistance will be phased out as CRCs owners are able to demonstrate the quality of their chawkis, establish their clientele and progressively recover costs through higher selling prices.

3.23 Assurances have been obtained that CSB and the States of Tamil Nadu, Andhra Pradesh and W Bengal shall, by December 31, 1989, and the State of Karnataka by December 1991, transfer the existing CRCs (excluding CRCs for seed production) to private farmers identified in accordance with the following criteria: (i) the farmer should have his own productive mulberry garden; (ii) the farmer should already own or be willing to invest in a proper chawki rearing house; (iii) the farmer should have a satisfactory record of sericulture practices, and considered able to run the CRC as a small business enterprise. CSB and the States have also agreed not restrict the price that CRCs can charge for the chawkis (para 5.1(b)).

3.24 CRCs may be also transferred to or established by a group of farmers on a formal or informal cooperative basis, provided such cooperatives have adequate management, motivation and capability to run the CRC.

3.25 Actual cash costs incurred by CSB and participating states to provide the initial equipment<sup>1</sup> for setting up of the CRCs will be reimbursable under the project. Similarly, the project will reimburse contributions to CRCs' operating costs<sup>2</sup>, on a reducing scale. CSB and participating states shall, by December 31, 1989, provide the Bank financial 'models' and proposed schemes for CRCs, indicating five year projection of production, sales, revenues and expenses and the basis on which initial and operating costs of CRCs are to be supported. The plan will be reviewed and amended periodically as appropriate in agreement with the Bank. Participating states and CSB shall also (i) take necessary steps to ensure that CRCs assisted under the project shall be capable of being financially viable at least by the fifth year of its operation; and (ii) enter into an agreement with CRC owners receiving assistance under the project setting out terms and conditions governing provision of such assistance.

3.26 Mulberry Nurseries (1%) Planting material for mulberry cultivation is supplied by CSB and DOSs from their farms and nurseries. This is supplemented by cuttings obtained from farmers as and when required and available. In Karnataka, Andhra Pradesh and West Bengal these procedures are well es-

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<sup>1</sup> limited to: trays, stands, and insecticide sprayers.

<sup>2</sup> for rent, hired labor, mulberry leaves, paraffin paper, and chemicals.

established and there is sufficient capacity to supply planting material to the farmers during the project period.

3.27 In Tamil Nadu, Jammu and Kashmir and the 12 pilot states however, in order to meet the required quantities of saplings of the improved variety of mulberry, the project will finance a program for increasing the production and distribution of saplings. Production of saplings in Tamil Nadu and pilot states will be contracted to private farmers who will be reimbursed for cost of production plus a small margin. In Jammu and Kashmir, saplings will be produced at nurseries and green houses to be established under the project. States (except Jammu & Kashmir) implementing this component of the project and CSB (for pilot states) have agreed to collect a sale price for saplings which will initially be adequate to cover at least 50% of the operating costs for the production of such saplings and which shall be increased so as to recover the full cost of production by April 30, 1994. Similarly, Jammu & Kashmir has provided assurance that it will collect a sale price so as to recover at least 50% of the cost of production by the end of fiscal year 1994/95. The participating states and CSB will also provide the Bank a 'plan of operation' for their sapling production and distribution indicating estimated costs of production, prices to be charged for the saplings, and portion of total costs to be recovered through prices. The plan will be revised as appropriate during project implementation.

3.28 Cocoon Markets and Drying Chambers (6%) Establishment of a large cocoon market at Ramnagaram in Karnataka operating daily auctions has been a significant factor in development of sericulture in the state. Following this example, several smaller markets have been established in each sericulture state. To cater for the expanded production foreseen during the project period, funds have been allocated for a total of 48 commercial cocoon, and 8 seed cocoon auction markets<sup>1</sup>. The new markets in Andhra Pradesh, West Bengal and pilot states will also have cocoon testing units attached to the markets. The project would also finance 100 small drying chambers in Jammu and Kashmir, 59 in West Bengal and 280 in the 12 pilot states, to decrease reliance on sun drying, and hence improve the quality of bivoltine cocoon production.

3.29 CSB and participating states have provided assurances that all new cocoon markets (except for seed cocoons) shall charge a fee which shall, not later than in the fourth year of operation of such market, amount to at least 1% of the transaction value of the cocoons marketed. States (other than Jammu & Kashmir) and CSB will also ensure that charges for use of drying chambers set up under the project would initially cover 50% and by the fourth year of operation of such drying chambers, 100% of their operating costs.

3.30 Silk Exchanges and Testing Houses (4%) The silk exchange at Bangalore brings together a large number of sellers (reelers) and buyers (mainly weavers but also traders) of silk yarn at daily auctions. This is the only exchange of its type in India today, and attracts buyers and sellers from all over India. Approximately 65% of total silk yarn production is marketed through the Bangalore exchange. Other sericulture states have attempted to establish less elaborate infrastructure and procedures for marketing of silk yarn. Production levels envisaged under the project would require provision of extra facilities, though on smaller scale than those in Bangalore. The project will

<sup>1</sup> 8 in Karnataka, 7 in Andhra Pradesh, 15 in Tamil Nadu, 11 in West Bengal, 3 in Jammu & Kashmir and one each in the 12 pilot states.

thus include financing for establishment and operation of three silk exchanges, one each in Andhra Pradesh, West Bengal and Jammu & Kashmir. The three states have provided assurances that each will introduce a fee on the value of yarn sold and progressively increase the fee to reach 0.5% by the fourth year of operation of the exchanges.

3.31 Silk yarn brought for sale at the silk exchanges is not subjected to scientific testing for determination of quality on identifiable and measurable criteria<sup>1</sup>. Lack of such testing makes it virtually impossible to distinguish different qualities of yarn produced, establish premiums for superior qualities of silk, and thereby develop price incentives for quality improvements. There is thus a need to introduce silk testing in relation to basic criteria (yarn thickness, deviation and winding breaks). The project will include financing for CSB to construct and operate four silk conditioning and testing houses each attached to the states' silk exchanges. Such testing facilities will be part of the building complexes for silk exchanges. CSB will therefore undertake the construction of the entire complexes and hand over the silk exchange part to the respective states for operation. States have provided assurances that they will require silk testing and classification of all yarn to be sold in the silk exchanges.

3.32 Extension Services (15%) Specialized extension services are provided by the Directorates of Sericulture (DOS) of participating states (para 2.32). The project will finance a total of 441 TSCs of CSB and participating states<sup>2</sup>, including incremental extension staff, operating costs and mopeds for TSC staff. With this expansion, the proportion of sericulture farmers which the DOSs should be able to service will be between 25% in Karnataka and 40% in Jammu & Kashmir. This is considered reasonable and adequate: costs of achieving a 100% coverage would be prohibitively high; with a judicious selection of areas/districts, DOSs should be able to transfer TSCs from 'old' areas to areas where farmers are taking up sericulture for the first time and require greater assistance. CSB and the states will ensure that mopeds financed under the project will be exclusively for field extension staff and that these will be provided to the staff as interest free loans.

3.33 Sericulture extension staff deal mainly with specialized matters related to silkworm rearing in farmers' houses and including technical advice on plantation and maintenance of mulberry. While these areas are inextricably linked in sericulture, this creates an overlap between the general agricultural extension service and the specialized sericulture service. CSB and participating states have agreed to make appropriate arrangements to organize closer links between general agriculture extension and DOSs' specialized extension staff at the field level, through arranging participation of agriculture extension staff in extension work related to mulberry cultivation, participation of DOS staff in periodic meetings and training sessions of general agriculture extension service (as subject matter specialists). To the extent possible, in states where the general agricultural extension service has the capacity, mulberry extension would be dealt with by that service.

<sup>1</sup> Silk traded in international market is tested and graded for six main criteria - yarn thickness and deviation, winding breaks, neatness, cleanliness, tensile strength, and yarn length.

<sup>2</sup> 106 in Karnataka, 70 in Andhra Pradesh, 92 in Tamil Nadu, 79 in West Bengal, 38 in Jammu & Kashmir, and 56 in pilot states

**3.34 Training (7%)** Existing training facilities and programs will be expanded and strengthened under the project. Training in CSRTI (paras 2.29, 3.7) will include relevant management methods to allow an improvement in productivity in rainfed areas. CSB has also recently initiated training of private graineurs and these will be further strengthened under the project. Project funds will be utilized for establishment and operations of the following units:

	Karnataka	Tamil Nadu	West Bengal	Andhra Pradesh	Jammu & Kashmir	Total
<b>Training Schools:</b>						
New	2	1				3
Improved	4		2		1	7
<b>Reeling Schools &amp; Extension Centers</b>	18	6		4		28
<b>Farmer Training Centers</b>		5				5
<b>Mobile Demonstration Units</b>	2	2	2			6

**3.35 Technical Assistance (4%)** Particularly valuable technical assistance was provided by Japan under the KSP-I project in Karnataka. The project will allow continuation and broadening of such assistance; funds have been provided for about 38 foreign consultants to assist various sericulture establishments in participating states spread over five years, and for approximately 318 Indian staff and sericulturists to be trained abroad. This component will be centrally administered by the CSB. Most of the funds allocated for visits abroad have been earmarked for CSB and the participating states. About 20% of the resources will be utilized on the basis of need among the participating states and the pilot states. Technical and training assistance will be available for consultancies or training in all countries where sericulture experience and technology are relevant to Indian conditions. For administration of this component of the project, CSB has agreed that:

- (a) A sub-committee consisting of Directors of the five participating states and the Member-Secretary of CSB will approve candidates for overseas training.
- (b) Significant changes in the states' allocation indicated above will be made with the concurrence of the participating states,
- (c) Prior approval from IBRD/IDA will be obtained for any contracts proposed for technical assistance or overseas training in excess of US\$ 200,000.

**3.36 Project Administration Facilities (7%)** Incremental administrative staff and operating costs necessary to implement and supervise expanded programs of CSB and the participating states will be financed under the project. This will include the establishment of new engineering cells in the DOSs of Andhra

Pradesh, Tamil Nadu, West Bengal, and Jammu & Kashmir to handle all work relating to design, procurement and supervision of civil works financed under the project.<sup>1</sup> DOS headquarters of Andhra Pradesh, Tamil Nadu Jammu & Kashmir and West Bengal are presently located in inadequate, rented buildings. The project provides for construction of new office space and facilities for these states.

3.37 Advances to Reelers (1%) Ramnagaram market (and similar smaller markets in Karnataka), have provided the basis for a growing private sector reeling industry in Karnataka. However, elsewhere (particularly Andhra Pradesh and Tamil Nadu) state DOSs find it extremely difficult to attract reeling establishments to sericulture areas in and around cocoon markets. Lack of ready markets for cocoons creates severe difficulties for the smaller farmers in these states; farmers often decide to travel long distances to sell their cocoons in larger markets where they are assured of a competitive price. The difficulties of attracting reelers in new areas is further exacerbated by the nature of reeling industry: profit margins are relatively low, subject to risks due to fluctuations in cocoon and yarn prices.

3.38 Attempts to solve this problem by DOSs so far have been restricted to setting up public sector reeling units. Most such public sector reeling units run at losses, and the project will not support further investments in public sector reeling capacities. The project would however, support setting up a 'fund' (of Rs. 40 million) to be centrally administered by CSB, which will be utilized to provide short term advances to private reelers around the cocoon markets in states other than Karnataka. Such advances will be repayable to the fund within a maximum period of 120 days and bear a minimum interest of 10% per annum. CSB will channel the funds through the participating states who will guarantee the repayments of advances to CSB. The fund will be exclusively for private reelers and will serve a particularly critical role in the pilot states where there is presently very little reeling and such activity will be essential for production of bivoltine silk. To further encourage private sector reeling, the project would support training. CSB will submit a 'plan of operation', acceptable to the Bank/IDA, specifying procedures, criteria, interest rates, repayment terms etc, applicable to the operation of the fund (para 5.1(c)).

3.39 Equity Participation in Joint Ventures in Andhra Pradesh (0.7%) To attract larger investors in modern reeling establishments, the state of Andhra Pradesh has taken equity participation in two enterprises promoted in the private sector. Under the project, it intends to broaden its involvement in similar joint ventures in reeling with the private sector. Assurances have been obtained that funds provided under the project will be utilized to finance equity participation of Andhra Pradesh (and possibly other states) in corporations established as joint ventures in reeling, provided the following procedures and criteria are followed (para 5.1(d)):

- (a) The State's participation in the share capital of the corporation does not exceed 25% of the total share capital of the corporation specifically set up for silk reeling.

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<sup>1</sup> similar to the one in established in DOS Karnataka under the KSP-I Project.

- (b) The total investment proposal of the corporation has been reviewed by independent lending institutions (such as IDBI, a Bank) and certified to be viable and acceptable investment proposal in its judgement.

**3.40 Non-Government Organizations (1.4%)** Given its rural base and potential to help the poor, sericulture has already attracted several NGOs; examples include those assisting sericulture adoption in tribal areas, an NGO established to produce quality seed in a small grainage, and organizing groups to teach or adopt improved reeling techniques. There is considerable potential for expansion of NGOs for activities in a wide range of activities such as: promoting participation of women, landless and other underprivileged groups in sericulture, obtaining access to cultivable wasteland for mulberry cultivation, organizing groups to adopt improved equipment for rearing, silk waste-spinning, groups to facilitate transport, marketing and credit utilization, establishing chawki rearing centers etc. In order to develop this potential in the project areas, the project will include an allocation of US\$ 2.5 million to be administered by CSB, and available to all participating states to fund NGOs' activities in sericulture. The senior female officers to be appointed by the states (para 3.82) will be primarily responsible for identification and liaison with suitable NGOs, promotion of appropriate activities and generally for reviewing and monitoring activities of NGOs involved in programs funded under the project. Specific programs and budget proposals for use of funds under this allocation will be subject to review and approval by a state level committee convened by the senior officer in charge. Under the chairmanship of CSB, a central coordinating committee composed of the senior officers of CSB and states will coordinate and guide the activities related to NGOs as well as actions to promote greater participation of women in sericulture. Assistance provided to NGOs will normally be in kind (training, equipment, possibly deputation of staff, etc). Cash contributions, not exceeding Rs 100,000 per annum to support NGO's administrative costs may be approved in selected cases if a review of its overall expenditure/staff pattern and proposed program of activities confirms that this is justified. Appropriate assurances have been obtained from CSB and the states in respect of the arrangements and procedures for NGO assistance mentioned above.

**3.41 Installation of Smokeless Stoves in Reeling Units (0.3%)** In order to accelerate the conversion to smokeless chullas (para 2.23), the project will support a program to be initiated by the CSTRl of the CSB, under which mobile units will be set up to propagate conversion of chullas and provide on-the-job training to DOS staff (and NGOs where appropriate) to undertake such conversion. The program will aim to introduce chullas on 10,500 charkas and 1,050 cottage basins. CSB and the states will ensure that while smokeless chullas may be provided free of cost to reelers under this program, beneficiaries will provide the necessary labor for chulla conversion.

**3.42 Beneficiary Assessment and Socio-economic Surveys (0.6%)** Monitoring and Evaluation under this project will consist of an extensive program of beneficiary assessment. This will be a major departure for project impact assessment in agriculture projects in India. Beneficiary assessment uses participant-observation and related techniques to gauge beneficiary values, preferences and reactions at different points in project cycle. It involves protracted periods of residence in the communities of beneficiaries, group and individual discussions with representative samples of intended beneficiaries around predetermined topics selected by project management. Though much of

the information is qualitative, responses are categorized and tabulated to allow quantitative analysis.

3.43 The project will finance all expenses related to beneficiary assessment. Under the overall direction and guidance of CSB the assessment will be carried out by suitable firms or institutes selected by CSB and acceptable to IBRD/IDA. Manpower required for the assessment may also be supplemented by local and foreign consultants acceptable to the Bank. CSB shall submit to the Bank for its approval, (i) Terms of reference and contract proposed for to be entered with the main agencies to undertake the beneficiary assessment, (ii) an overall program for the beneficiary assessment, indicating, organization and responsibilities of various parties involved, timing and arrangements for receipt of feed-back reports and their discussion with implementing agencies etc.

3.44 The beneficiary assessment will be supplemented by a series of three socio-economic surveys to be undertaken in the participating states, one at the early stage of the project implementation, and repeated twice during the project period. Under the overall direction of CSB, these surveys will be designed to assess, mainly in quantitative terms, the project impact, including effect on beneficiaries' production levels, incomes, etc. CSB will also ensure that the institution(s) selected for these surveys and their terms of references for the surveys will be acceptable to the Bank/IDA.

3.45 Institutional Credit On-farm development for sericulture (mainly mulberry plantation, items of small equipment and rearing sheds) have by and large, been self-financed by the farmers. However, sericulture falls within the overall priorities accorded under the government directives for lending for agriculture generally. Currently, all commercial banks are required to allocate 18% of their lending resources to agriculture. Given the fact that sericulture is fairly profitable and produces a regular cash income, banks are generally willing to promote and lend for sericulture schemes. For many farmers, sericulture generally constitutes a 'side-activity' in that mulberry garden constitutes only a part of their land usage.

3.46 It is estimated that the project will generate additional demand for credit of Rs 1.0 billion (US\$ 64 million) for on farm development, mulberry plantations and rearing houses, which have been included as part of project costs, to be funded through institutional credit over the project period. This will constitute a very small portion of annual flow of credit funds for agriculture through financial institutions and will be accommodated within the existing procedures and institutional arrangements for agriculture credit. In order to ensure availability of funds to eligible borrowers, and refinancing facilities from NABARD, it will be necessary for State DOSs, in consultation with the local banks and NABARD, to take the necessary actions to promote appropriate schemes.

3.47 In addition to on-farm development the project will also generate investments in reeling enterprises in the private sector of about Rs 789 million (US\$ 40 million). Credit funds for small and medium scale industries are also available from commercial banks and the states' industrial financial corporations, who in turn, can avail of the refinancing facility from IDBI for such lending. IDBI has indicated that the total credit requirements can be met through its existing procedures for investments which satisfy its usual criteria for viable investments. As for on-farm development, credit require-

ments for this component will also be financed by banks, and State/GOI financial institutions.

3.48 Assurances have been obtained that CSB and State DOSs shall, in consultation with local commercial banks, state finance corporations, IDBI and NABARD, take appropriate actions, to initiate required schemes and programs to facilitate flow of credit to eligible borrowers (para 5.1(e)).

### Project Costs

3.49 Total project costs including physical and price contingencies are estimated at Rs 5.6 billion (US\$ 347.1 million)<sup>1</sup>. The breakdown of costs by main components and by states is shown at Annex 2, Tables 1-14.

3.50 Costs are based on March 1989 prices, and include physical contingencies averaging 9.9% on total base costs, and price contingencies of 25% based on projected annual inflation rates, for foreign costs, of 5.3% in 1989/90, 5.0% in 1990/1 and 4.1% for 1991/2 and thereafter. Corresponding figures for local costs are: 8% in 1989/90, 7% in 1990/1-1992/3 and 6.5% thereafter. Estimated taxes and duties amount to Rs 96 million (US\$ 6.1 million).

3.51 Project costs include requirements for credit funds (approximately Rs 1.6 billion, US\$ 104.0 million) expected to be met through the banking system and existing institutional arrangements including the refinance facilities from NABARD and IDBI. Of the remaining costs, Rs 1,779 million, (US\$ 113.1 million), about 46% will be for land acquisition, civil works, equipment and vehicles for expansion of facilities. Approximately 44%, Rs 1,745 million (US\$ 106.5 million) is for incremental staff and recurrent costs of services and facilities of CSB and participating States. These costs also include a total of Rs 207 million (US\$ 13.0 million) required for assistance to private CRCs in respect of equipment and operating costs during the transition period (paras 3.22-3.25). The balance of the costs, Rs 375 million (US\$ 23.5 million) would finance working capital for seed grainages, equity participation in joint ventures, advances for reelers, foreign technical assistance and training, assistance to NGOs, and consultants' costs for beneficiary assessment and socio-economic studies.

3.52 Investment and recurrent costs will be incurred by the respective Directorates of Sericulture and CSB as indicated in Annex 2, Table 1. Expenditures shown for pilot states will be administered by CSB. Allocations under CSB also include Rs 868 million (US\$ 54.6 million) for those project components (basic seed farms, grainages, TSCs, and promotion of private CRCs) which CSB will implement in participating states, and components which CSB will administer centrally for the entire project (support to universities, technical assistance and overseas training, advances to reelers, support to NGOs and beneficiary assessment).

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<sup>1</sup> US\$ amounts are converted at (projected) variable exchange rates applicable during the project period. The resulting average rate is US\$ = Rs 15.92

Financing Plan

3.53 Total project costs will be financed as follows: (in US\$ M)

	<u>GOI/ States</u>	<u>Credit Institutions</u>	<u>IBRD/ IDA</u>	<u>SDC</u>	<u>Total</u>
Civil works	5.9	-	48.4	6.8	61.1
Land Acquisition	1.7	-	-	-	1.7
Equipment & Vehicles	4.9	-	39.8	5.6	50.3
Staff and incremental operating costs	26.6	-	70.0	9.9	106.5
Tech. Assistance, NGOs, Working capital, reelers' advances, beneficiary assessment	2.0	-	18.8	2.7	23.5
Credit requirements	-	104.0	-	-	104.0
Total	<u>41.1</u>	<u>104.0</u>	<u>177.0</u>	<u>25.0</u>	<u>347.1</u>
% of total	11.8	30.0	51.0	7.2	100

3.54 The financing plan for the project includes joint cofinancing arrangements agreed with the Swiss Development Cooperation (SDC) under which the SDC will provide SwF 40 million (approx US\$ 25 million equivalent) available for all components supported by IBRD/IDA. SDC participated substantially during project appraisal and has made valuable contribution in project formulation. SDC intends to continue its involvement in the project during implementation and has agreed to supplement the Bank's staff resources for project supervision.

3.55 Institutional credit requirements for the project will be met by commercial and cooperative banks from their available resources and be eligible for refinance from NABARD/IDBI under the existing institutional arrangements (paras 3.45-3.48). State Directorates of Sericulture in consultation with the banks operating in local areas will promote schemes under which eligible borrowers will be able to obtain credit for on-farm mulberry development as well as for establishment of private reeling units. NABARD and IDBI have confirmed that provided such schemes meet their criteria, loans under such schemes will be refinanced by these two apex institutions within their available resources and existing procedures for such refinance facilities.

3.56 External financing for the project (IBRD/IDA and SDC) will thus be for the remaining, non-credit components. On this basis, IBRD/IDA financing will amount to 51% and SDC's contribution to 7.2% of total project costs. IBRD/IDA financing includes 100% of foreign exchange costs and 49% of local costs.

Procurement Arrangements

3.57 Procurement arrangements are summarized in the table below. Amounts to be financed by IBRD/IDA are indicated in parenthesis.

Procurement Arrangements

(in US\$ Million)

	<u>ICB</u>	<u>LCB</u>	<u>Other</u>	<u>Total</u>
Land acquisition			1.7	1.7
Civil works	-	59.3 (47.0)	1.8 (1.4)	61.1 (48.4)
Equipment, goods & vehicles	16.7 (13.3)	30.0 (23.7)	3.6 (2.8)	50.3 (39.8)
Incremental staff & operating cost			106.5 (70.0)	106.5 (70.0)
Working capital, advances to reelers, joint venture partic., tech. assistance, overseas training, sapling distribution	-	-	23.5 (18.8)	23.5 (18.8)
<b>Totals<sup>a</sup></b>	<b>16.7 (13.3)</b>	<b>89.3 (70.7)</b>	<b>137.1 (93.0)</b>	<b>243.1 (177.0)</b>

<sup>a</sup> Exclusive of institutional credit

3.58 IBRD/IDA and SDC financing not exceeding US\$ 7.7 million will be retroactively available for project expenses incurred prior to signing of credit agreements (but after the project appraisal date) provided that procurement procedures acceptable to IBRD/IDA have been followed in incurring such expenses.

3.59 The largest three civil works and buildings planned under the project (each estimated to cost between US\$ 1.0 - 2.0 million) would be for the germ plasm bank, the seed technology laboratory and the silk testing house in Bangalore, all to be procured by CSB. Other civil works contracts would consist of development of seed farms, buildings for grainages, cold stores, laboratories and research centers, testing houses, cocoon markets, silk exchanges, training schools, student hostels and staff quarters. These would be individually small (generally less than US\$300,000), incurred by five DOSs and CSB. Civil works contracts are unlikely to attract foreign bidders and will therefore be let on the basis of local competitive bidding in accordance with procedures satisfactory to IBRD/IDA. However, bid documents and contracts estimated to cost more than US\$ 500,000 will be subject to prior review and approval by the Bank. In addition, irrespective of the cost, CSB and each of the participating states will submit to the Bank for approval specifications and draft contracts for the first grainage and cocoon market to be constructed under the project. Small civil works (for work on seed farm improvements, renovations of grainages markets etc,) not exceeding Rs 20,000 for each job with an aggregate limit of 3% of total civil works allocation for each implementing agency may be executed through force account.

3.60 Plant and equipment will be procured by the six project agencies, spread over five years, and include small, locally available items. Participating states and CSB will require some 300 vehicles and 2,300 mopeds (for extension staff) during the project period. Most of these will be used in rural, often remote areas, where ready availability of spare parts and maintenance service is critical. For operational efficiency, it is essential to have vehicles of types locally available and already in use by DOSs and CSB.

3.61 Plant, equipment and vehicle orders of less than US\$ 200,000, and not exceeding aggregate limit of US\$ 30 million, would thus be procured by each State (and CSB) in accordance with local competitive bidding procedures acceptable to the Bank. Foreign suppliers will be allowed to bid on LCB tenders. Contracts will nevertheless be bulked to the extent possible and procured in lots US\$ 200,000 or more through ICB procedures acceptable to the Bank. Small, off-the-shelf items costing less than US\$ 20,000 required for project execution, may be purchased by prudent shopping through normal commercial channels, subject to an aggregate limit of about 10% of total allocation for equipment for each agency (US\$ 2.5 million for CSB, US\$ 120,000 for Tamil Nadu and US\$ 250,000 for the other states). All ICB tender documents, bid evaluations and contracts will be subject to prior review by the Bank.

#### Disbursements and Special Account

3.62 IBRD/IDA and SDC funds would be available as indicated for the following main disbursement categories:

- (a) 90% of expenditures for all civil works, locally procured plant, equipment, furniture and vehicles.
- (b) 75% of incremental staff salaries and other recurrent costs. grainages and existing cocoon markets.
- (c) 100% of foreign exchange expenditures for plant, equipment, technical assistance and overseas training.
- (d) 100% of advances (sub-loans) to reelers (against purchase of goods), subject to a maximum of Rs. 40.0 million.
- (e) 100% of sub-loans for mopeds
- (f) 100% of staff and incremental operating costs provided as assistance to NGOs.

3.63 Disbursements for all civil works contracts and for plant and equipment exceeding US\$500,000 will be fully documented. In addition, disbursements for vehicles and all ICB contracts will be fully documented. For all other categories, IBRD/IDA would disburse against certified statements of expenditures (SOEs). The Bank will provide the CSB and the participating states the formats and indicate data to be provided in the SOEs. Supporting documentation for SOEs would be available for inspection by the Bank supervision mission and auditors and retained by the States and CSB for at least two years after the Bank has received the audit report for the fiscal year in which the last withdrawal from the loan/credit account was made.

3.64 Disbursements for assistance to private CRCs and equity investment in joint ventures will be made against equipment, goods and incremental operating costs on the basis of para 3.63, above.

3.65 Project implementation has been planned over a period of five years beginning from April 1989 (which is also the beginning of the fiscal year of CSB and the participating states). However taking into account the country disbursement profile for previous projects and given the likely delays in this multi-component project, IBRD/IDA disbursements have been lagged over seven years. Anticipated disbursements are shown in Annex 3, Table 1.

3.66 In order to facilitate timely payments of project costs a Special Account amounting to US\$ 17 million would be established at the Reserve Bank of India. Replenishment to the Special Account would be made quarterly or when the Account is drawn down by about 50% of its initial deposit, whichever occurs first.

#### Accounting, Reporting Requirements and Audit

3.67 Project expenditures by the five project States will be incurred by their respective Directorates of Sericulture (DOSs). As part of the State Governments, the DOSs maintain accounting records of budgetary allocations, directorate expenditures etc., and these are subject to annual audits by the respective State Accountant General.

3.68 State DOSs and CSB will maintain separate adequate records of all expenditures incurred in respect of the project and prepare annual accounts showing total expenditures, contributions from the State, GOI and use of IBRD/IDA/SDC funds. Such annual accounts shall be audited by the respective State Accountant General and submitted to the Bank not later than nine months after the end of each fiscal year. All withdrawals on the basis of SOEs shall be audited annually and the auditor's report shall include a separate opinion on whether the funds withdrawn under SOEs are properly documented and used for the purposes of the project.

3.69 Monitoring of physical targets and collection of data on key indicators and targets during project implementation will be done by CSB and the participating states who will also be primarily responsible for preparation of periodic progress reports for submission to the Bank. CSB will however, be responsible for collection of required data, and for submission of consolidated progress reports to the Bank every six months. List of key indicators and other main items to be included in periodic progress reports is shown in Annex 4.

3.70 While CSB is set up and operates as an autonomous Board, its present accounting procedures generally follow government procedures with the consequence that its annual accounts do not adequately reflect costs of its various operations, its total assets and its liabilities. Hence in order to make the necessary corrective adjustments, CSB will engage qualified, experienced chartered accountants, to institute changes in its accounting procedures that are necessary to change from government oriented procedures to accounting practices applicable to independent corporations and to prepare its annual financial statements in accordance with generally accepted accounting practices as applicable to independent corporations.

### Project Organization, Management and Implementation

3.71 Under the overall responsibility of the Ministry of Textiles at the national level, the Central Silk Board, and the Directorates of Sericulture (DOSs) of the five participating states, will be responsible for project implementation. Existing state infrastructure, staff and facilities for sericulture development in each of these states would be fully integrated in implementation of pilot efforts.

3.72 Financial institutions particularly commercial banks, but also including Land Development Banks (LDBs), and possibly cooperative banks will be involved to the extent of providing funds to eligible borrowers requiring credit assistance for on farm development for silkworm rearing, setting up of reeling enterprises and weaving. DOSs would work closely with the local banks to ensure that appropriate schemes are promoted and that loans for sericulture development are eligible for refinance facilities from the two national level credit institutions NABARD and IDBI (paras 3.45-3.48).

3.73 Central Silk Board (paras 2.27-2.30) As the central organization to coordinate and advise the Government of India on all matters relating to silk, the Board consists of the Chairman, Vice-Chairman, and 34 members appointed from members of the Parliament, nominees of Central and States and representatives from trade and industry. The chief executive of the Board (Member-Secretary) reports to the Secretary, Ministry of Textiles.

3.74 Administratively, in addition to its headquarters in Bangalore, it has 12 regional offices (mostly in capitals of states having sericulture programs) which provide overall support to the Board's activities in the state. Total current staff of the Board is 4,319. An organization chart of the Board is shown in Annex 5 table 1.

3.75 Under the project, CSB would be the central coordinating agency for all project components, and would have primary responsibility for research-related components (paras 3.7-3.15), establishment of silk testing houses (para 3.30), administration of technical assistance and overseas training (para 3.35), advances to reelers (para 3.37). Activities in pilot states (para 3.4) would also be formulated and implemented by the CSB. The involvement of Non-Government Organizations (para 3.40), promotion of smokeless stoves (para 3.41) and administration of the Beneficiary Assessment program and socio-economic studies (paras 3.42-3.44) would also be the responsibility of the CSB. In total, project activities over the project period are estimated to require additional 2,514 staff.

3.76 Directorates of Sericulture (paras 2.31- 2.32) Headed by Directors, the DOSs in the five participating states have the overall responsibility for all existing operations and future development programs for sericulture development in their respective states. DOS Directors generally report to the State Secretaries for Commerce or Industry. Total staff strength of DOSs and their distribution among various operations varies from state to state depending upon the stage of development and main activities undertaken. Karnataka has a total staff of 4,705, West Bengal 1,633, Tamil Nadu 1,573 and Andhra Pradesh 1,350. Generally, close to two-thirds of the staff in these states is engaged in management of basic seed farms, field extension services, running of CRCs, grainages and cocoon markets. The rest of the staff is spread over ad-

ministration, training and in state reeling establishments. (Organization charts of participating states DOSs are shown in Annex 5, Tables 2-6).

3.77 State DOSs will be responsible for project activities related to seed grainages (para 3.16); training (para 3.34); extension (para 3.32); promotion of private CRCs (para 3.22); and development of local adaptive research facilities (para 3.10).

3.78 Additional staff requirements for each DOS have been identified by each unit to be strengthened or newly established under the project. The project provides for additional staff over the project period of : 2,029 in Karnataka, 1,063 in Tamil Nadu, 919 in West Bengal, 882 in Andhra Pradesh, and 305 in Jammu & Kashmir. Incremental staff requirements for project execution have been carefully reviewed during appraisal: most of the staff will be for field activities including extension, grainages, basic seed farms and training establishments; additional staff for headquarters and administration has been kept to a minimum and includes staff required for engineering cells to handle procurement and supervision of civil works contracts in each state. In J&K as a result of decline of sericulture in recent years, the DOS is over-staffed. With the expansion of operations envisaged under the project, J&K should be able to redeploy most of its staff. Incremental staff (of 305) has been kept to the minimum and would be for qualified, higher level staff needed mostly for field services.

3.79 Participation of Jammu & Kashmir. Development of sericulture in J & K has stagnated in recent years: restrictive policies, inadequate state-fixed prices for cocoons, state monopoly of reeling operations and allocation of silk yarn to weavers on administratively fixed quotas are the main factors inhibiting a free and dynamic development of the industry. However, recent actions by the State should reverse the trend: private ownership of mulberry trees and plantation has now been allowed, the state has taken the first steps to establish a free market for sale of cocoons, established licencing procedures to allow private sector to establish reeling enterprises, abolished the quota system for allocation of silk yarn and is committed to establish a free market for sale of yarn.

3.80 The state of J & K's commitment to continued liberalization and de-monopolization of the industry during the project period have been confirmed through assurances that, by March 31, 1990 (para 5.1 (f)):

- (a) It will have established three auction markets for sale of cocoons, allowing buyers (or sellers) from outside the state to participate freely in the auctions.
- (b) It will have removed of all restrictions (except licencing conditions) on setting up reeling enterprises in the state.
- (c) It will have established a silk exchange for sale of silk yarn produced in J & K through an auction market, allowing buyers (or sellers) from outside the state to participate freely in the auctions.

These actions would be a condition of the state's continuing participation in

the project beyond March 31, 1990.

**3.81 Pilot Programs in Twelve States.** In respect of implementation of pilot programs (para 3.4), CSB has provided assurances that (i) such pilot programs in the twelve states shall be exclusively for production and development of bivoltine silk; (ii) that prior to implementation of the program, CSB shall enter into an agreement with the pilot state concerned for the secondment of staff required for the program; and that (iii) CSB, by a date to be agreed with the Bank, agree with each pilot state on a time bound action plan for establishing a free cocoon market.

**3.82 Role of Women in Sericulture** Specific measures to enhance the role of women would include: (i) appointment of senior level female officers in the five participating states, who will report directly to Directors of DOSs and be responsible for issues related to women, initiating actions to support and enhance women's role in sericulture development generally and to identify and monitor the activities of NGOs engaged in sericulture with the support of the state-level committee (para 3.40); (ii) support and assistance for group formation; (iii) provision of separate space for women in cocoon markets and of facilities in public places (iv) support for better access to credit and improved technology (v) greater emphasis on extension advice for women; (vi) employment of female para-extension agents; (vii) entry of wife's name in sericulture Pass Books; and (viii) recruitment and training targets to be met by CSB and the DOSs. CSB and participating states have provided appropriate assurances that they will make efforts to reach the targets on recruitment and training of women and undertake other measures as set forth in Annex 6 to enhance the role of women in sericulture.

**3.83 Production of Bivoltine Silk** Wider adoption bivoltine silkworm races is of critical importance for upgrading of Indian silk. However, efforts in this direction by Karnataka, Andhra Pradesh, Tamil Nadu and W. Bengal<sup>1</sup> so far, have not been successful. Several factors have inhibited a rapid expansion of bivoltine production: climatic conditions are not universally suited for bivoltine rearing; special care needs to be taken in selecting areas to promote bivoltine; bivoltine silkworm races available in India and those developed through research are not yet as hardy as the more generally accepted multivoltine and multi/bivoltine hybrid varieties; and, until recently there were insufficient buyers to offer an adequate premium for Indian bivoltine yarn.

**3.84** Despite the difficult context noted above, efforts to promote bivoltine production would be supported under the project. Recent restrictions on Chinese exports of silk is already resulting in a greater demand for bivoltine silk yarn in the Indian market, which should soon translate into a substantial price premium. To ensure continuation of efforts for a higher production of bivoltine, assurances have been obtained that the four participating states, in consultation with the CSB, will prepare and submit to the Bank, by December 31, 1989, a detailed Action Program for Bivoltine, indicating yearly targets, areas to be selected for bivoltine promotion, actions to strengthen extension service for bivoltine and any other actions planned to meet the targets. The plan will be subject to periodic review and modification, in agreement with the Bank, during project implementation.

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<sup>1</sup> Production in Jammu & Kashmir is exclusively of bivoltine silk.

#### IV. PROJECT BENEFITS, JUSTIFICATION AND RISKS

##### Project Impact

4.1 **Production** India's national sericulture program aims to increase raw silk production to about 17,140 tons by 1996. Of this, the project would account for annual incremental production of about 4,200 tons after seven years, with an estimated annual value of US\$ 162 million in 1989 prices. The project would also improve the quality of raw silk, as bivoltine production will increase from about 150 tons to 1,000 tons. The project will also lay the foundation for expansion of sericulture in non-traditional states where the prospects for future growth are excellent..

4.2 The increase in raw silk production would result from increases in the area planted under mulberry, in cocoon yields, and silk recovery rates. In 1987 the area under mulberry reached about 241,000 ha, and without the project it is expected to expand to 348,000 ha by 1996. With the project, mulberry cultivation would increase by an additional 52,000 ha, to a total of 400,000 ha. Through better varieties of mulberry and more stable bivoltine and multi-bivoltine egg production, per-hectare yields in existing mulberry plantations would increase by the equivalent of about 3 kg of raw silk per year. Tested and proven new varieties of mulberry, specifically suited to the various agro-climatic areas in the project, are expected to increase yields of irrigated and rainfed mulberry by 40-50%. All new varieties have more nutritious leaves leading to higher silk output.

4.3 With the introduction of new grainages and humidity-controlled cold storages, the project would strengthen the existing crossbreeds and provide bivoltine eggs over and above the requirements for multi/bivoltine seed production. This availability of locally produced bivoltine cocoons will enable progressive reelers to provide hand looms and power looms with warp silk for weaving as well as for high value-added textiles such as crêpe, georgette, and chiffon.

4.4 Success of the project will depend on an upgraded extension service in each state that will assist growers with new techniques for mulberry cultivation and silk worm rearing. Most farmers will produce five or more silkworm rearings. With a competent chawki rearing center in an area, some farmers could rear as many as 15 times a year.

4.5 **Employment** Without the project, employment in silkworm rearing, silk reeling and weaving is expected to increase from 1.7 M work-years equivalent to 2.3 M. The project would create the equivalent of an additional 518,000 full time jobs in these activities, for a total of about 2.9 M jobs. Moreover, as shown below, the incremental employment would largely benefit groups which are target groups on social grounds. Sixty percent of the incremental jobs to be created by the project are expected to benefit women, 30% scheduled castes/tribes, 26% small farmers and 65% rural landless<sup>1</sup>.

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<sup>1</sup> The total exceeds 100% since some people fall into more than one group.

Summary of Project Impact

	<u>1989</u>	<u>1996</u> without project	<u>1996</u> with project	<u>Incremental</u>
<b>Production</b>				
Mulberry Area (ha) <sup>a</sup>	247,000	348,000	400,000	52,000
Raw Silk (tons)	9,220	12,970	17,140	4,170
of which bi-voltine	150	360	1,360	1,000
<b>Employment ('000)<sup>b</sup></b>				
Women	996	1,402	1,711	309
Sched. Castes/Tribes	498	701	855	154
Small Farmers	622	876	1,008	132
Rural Landless	858	1,208	1,543	335
<b>Total Employment</b>	<b>1,661</b>	<b>2,337</b>	<b>2,851</b>	<b>518</b>

a) Break down of area by rain fed and irrigated land is provided in Annex 7.

b) Direct employment expressed in terms of full time job equivalents in silkworm rearing, silk reeling and weaving.

4.6 Environmental Impact As a perennial crop with good foliage and root coverage, mulberry contributes to soil conservation providing a stabilizing influence against wind and water erosion. Mulberry would generally replace crops which utilize more water (sugarcane and rice). Rain fed mulberry provides better use of available water resources. Higher incomes from sericulture would reduce the need of rural families to cultivate ever more marginal land. Waste from silkworm rearing can be returned to the field as fertilizer.

4.7 An environmental concern is the increase in demand for fuel wood needed for reeling. The estimated incremental fuel wood consumption, if existing reeling technology is retained, is 100,000 tons per year. However, this would be more than offset by the mulberry areas with an estimated potential of 150,000 tons per year of fuel wood equivalent in dried twigs and branches for household consumption. Government recognizes the importance of the fuel wood problem and will support research, development and installation of improved, more fuel efficient wood-burning stoves (chullas) in reeling units.

Financial Analysis

4.8 The financial viability of mulberry farming and silkworm rearing, both for new plantations and for improvements on existing plantations has been tested through appropriate models (see Annex 8, Tables 3 to 7). In all models incomes would exceed pre-project levels by three to five times. Reelers have an extremely high turnover with low average margins. The cost of purchasing cocoons is the predominant cost item, and margins are subject to short-term fluctuations in cocoon and raw silk prices. However, raw silk is not perishable, and reelers can withhold some or all of their production when prices are unfavorable.

Economic Analysis

4.9 The economics of silkworm rearing in India are robust. Essentially, India has a large and growing domestic market for silk, agro-climatic and labor cost advantages, and an ancient history of sericulture. However, India's comparative advantage is as yet not in raw silk itself, the quality of which is not directly competitive in a world market geared towards silk processing on high-tension power looms. India's strength lies in its capacity to supply unique silk textile designs produced on low-tension hand looms, for which domestic raw silk quality is ideal. Thus, while Indian raw silk is not currently exported, nor is it of exportable quality, it does substitute directly for imported silk in products which are exported. The project would encourage production of export quality bivoltine silk as a direct substitute for imports, but the bulk of production would be of traditional quality. In the economic analysis, the price of raw silk is based on a conservative estimate of the international price (which has recently risen sharply as Chinese supplies have become scarce), reduced by the ratio of the internal market price of domestic production to imported silk (about 80%).

4.10 The ERR of the overall project is 32%. Details of the assumptions used are given in Annex 8.

4.11 Sensitivity Analysis Sensitivity analyses were carried out to test for the effects of various adverse assumptions on the project's viability. The results are summarized below:

Sensitivity Analysis		ERR
Base Case		32%
Investment Cost & Operating Costs	+ 20%	23%
Econ. Silk Price	-20%	22%
	-40%	10%
Total Costs and Silk Price	+ 20%	
	- 20%	14%

4.12 Switching values for important cost and benefit elements are given below:

	Appraisal Value <sup>a</sup>	Switching Value <sup>a</sup>	Max. Permissible Relative Change
	-----	Rs Million	-----
<b>Costs:</b>			
Investment Costs	2,740	8,148	+197%
Operating Costs	4,941	10,348	+109%
All Costs	7,681	13,089	+70%
<b>Benefits:</b>			
Silk Value	12,530	7,122	-43%
All Benefits	13,089	7,681	-41%

<sup>a</sup> Net present value, at a discount rate of 12%.

The economic viability is robust with respect to unfavorable deviations from assumptions, even with sharply lower prices of raw silk and substantial increases in investment and/or operating costs.

### Project Risks

4.13 Risks The main project elements are: (a) strengthened government services; (b) greater private sector involvement in grainages and chawki rearing; and (c) expansion of private sector production of raw silk and reeling. With respect to improving services, the major risk lies in underfunding by the state governments. However, the funds required are a very small proportion of total state budgetary resources, and the participating states have demonstrated strong commitment to the project during the preparation and appraisal process.

4.14 Increased private sector involvement in grainages depends primarily on fair competition between existing government facilities, and existing and potential commercial producers. Assurances that government production would be commercially priced would provide the basis for attracting increased private participation. Implementation of this underlying concept will require a continued commitment by CSB and participating states and a willingness to promote private sector in activities (grainages and chawki rearing) which have hitherto been predominantly in the public sector. However, these risks are reduced in the light of experience in Karnataka and Jammu & Kashmir so far, CSB and the project states are now convinced that private sector needs to be more heavily involved in grainages, chawki rearing and reeling.

4.15 Increases in production of raw silk will depend on the improved services and facilities provided under the project. The technical packages on which most extension efforts are to be based are proven, and the project provides for research to improve still further. The development of improved and expanded reeling facilities would depend on commercial perceptions of the potential benefits, however the buoyant domestic and export market for silk, and the shortages of higher quality raw silk in the international markets, suggest that the risk is limited. Moreover, experience to date shows that reelers are highly responsive to increased availability of raw silk.

## V. AGREEMENTS REACHED AND RECOMMENDATION

5.1 Appropriate assurances on a number of actions necessary for various project components have been obtained as mentioned in Chapter 3 and incorporated in a detailed Schedule (Implementation Program) of the Project Agreement. Of these, the main agreements reached are summarized below:

- (a) All public sector grainages will adjust their prices of seeds so as to recover, in accordance with timing to be agreed with the Bank, full costs of grainages, be subject to increased financial disciplines; CSB and project states will take actions to encourage greater private sector involvement in grainage business (paras 3.19-3.20).
- (b) Existing Chawki Rearing Centers (CRCs) will be transferred to the

private sector during the project period. Assistance to CRCs will be on the basis of 'models' and schemes specifying criteria, and contractual arrangements acceptable to IBRD/IDA (para 3.23).

- (c) Advances to private reelers shall be in accordance with a 'plan of operation' submitted by CSB, specifying interest rate, repayment terms and other criteria acceptable to IBRD/IDA (para 3.38).
- (d) Equity participation of project states in joint sector reeling enterprises shall not exceed 25% of share capital of the corporations and for investments whose financial viability has been independently verified (para 3.39).
- (e) CSB and participating states will take actions to ensure flow of credit to eligible borrowers from banks and commercial institutions within the existing procedures and criteria (para 3.48).
- (f) Jammu & Kashmir has confirmed its continued commitment towards de-monopolization of sericulture, and for establishment of facilities for open auction of cocoons and silk yarn (para 3.80).
- (g) CSB and Project States' will take various actions to enhance the role of women in sericulture, including allocation of separate space for women in cocoon markets, efforts to attain training and recruitment targets for women in CSB and Directorates of Sericulture in participating states (para 3.82).
- (h) Standard assurances have been obtained on procurement procedures (paras 3.59-3.61), accounting, auditing requirements and those for Special Account (paras 3.67)

#### Recommendation

5.2 On the basis of the agreements obtained, the proposed project would be suitable for a Bank loan of US\$ 30 million equivalent and IDA Credit of SDR 113.8 million (US\$ 147 million equivalent).

SILK PRODUCTION, CONSUMPTION, TRADE AND PRICES

World Market .....	1
Indian Market .....	1
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Production of Bivoltine Silk .....	6

Table 1 : World Production of Raw Silk

World Market

1. World production of fresh cocoons is estimated at about 550,000 tons for 1987, which is a 15% increase over the 1984 production of 480,000 tons. This increase came mainly from China and India, and to a lesser extent from Brazil. On the other hand, the Japanese silk cocoon crop decreased from 75,000 tons in 1984 to 35,000 tons in 1987, an average decline of about 16% per year. World production of raw silk has also increased and is estimated at about 70,000 tons in 1987, with China and India together accounting for 45,000 tons of raw silk, or 64.5% of the total (see Table 1). Four other countries - Japan, Korea, Brazil, and USSR - account for 85% of the remainder. While it is very difficult to forecast how production will evolve in the main producer-countries, recent trends show the following characteristics: (i) an increase in new mulberry planting and silk production in India; (ii) a small increase in mulberry plantings, but an increase in yield per ha in China, resulting in a growth rate of about 7% per year for the next five years; (iii) rapid reduction in area and yields in Japan as labor becomes short; (iv) increasing yields in Brazil, but a marginal gain in production; (v) in Korea, despite government promotion, a slow deterioration in production as rural labor is increasingly attracted to higher paying urban areas; and (vi) a leveling-off of production in the USSR.

2. Major changes in world consumption and trade patterns are also apparent. Global demand for raw silk is expanding. While Japan remains one of the world's biggest consumers and importers of raw silk, thrown silk and silk fabrics, the USA has recently passed Japan's total imports of all silk items; together they import and consume nearly 70% of the total silk items exported.

Indian Market

3. In 1987 India became the world's second largest producer of raw silk yarn, accounting for about 13% of global production. India is also the only country producing all four varieties of commercial silk: mulberry, tasar, eri

and muga. About 90% of India's silk production is from mulberry, producing about 8,455 tons of raw silk out of 9,500 tons of all silk. Since 1980 mulberry silk production has grown rapidly from 4,200 tons at an average rate of 9% per year.

4. India's domestic consumption has expanded at an average 8% during the past decade. In the past six years, the demand for raw silk yarn in India exceeded local production capabilities. A study commissioned by the Industries Ministry and conducted by the Indian Institute of Management indicated that silk demand cannot be satisfied for many years, as total demand estimates range from a conservative 20,000 tons to an optimistic 45,000 tons. Production will not reach 20,000 tons for another ten years, by which time demand will have increased further with growth of population and per capita disposable income.

5. Indian silk is of very low quality by international standards, mostly falling into the lowest grade (Grade H). Silk textiles, garments, furniture coverings, are normally manufactured from Grade A or AA, with slightly lower grades in carpets. However, Indian raw silk yarn is suitable for the handloom and the low torque power loom sector in India. Indian silk cannot be machine-loomed in high-speed European looms as its fiber is short, unstable, and often breaks. Despite its seeming disadvantages, demand is high in India due to price advantages, and the superiority of Indian designs. Nevertheless, the silk industry - particularly importers, hand loom weavers, and the power loom sector - are concerned with the need for imports of higher quality silk yarns for the domestic and export markets. A clear indication of the high demand for silk are the rising prices of both cocoons, raw silk yarn and sarees.

#### Trade

6. About 24% (2,000 tons) of the raw silk yarn consumed in India is imported. It is normally used in the finer quality silk for domestic consumption; some goes for warp in hand looms and power looms; and the remainder goes for crepe de chine, heavy taffeta, chiffon, georgette, Jacquard, and fine "Dacca" muslin for domestic consumption.

7. Exports amounted to about Rs 2,550 M for the year 1987/88, far exceeding the target of Rs 2,000 M, and almost five times the 1980 total. Pure mulberry silk goods accounted for over 75% of the total export earnings during the year. Production of mulberry silk goods for export has grown at an average annual rate of about 26%. An analysis of exports during the past five years reveals that ready-made garments have recorded an average annual growth rate of 40% in value, indicating a higher unit value due to exports of fashion garments. Dress and furnishing material exports grew at about 23% in quantity and 35% in value. Carpet exports have grown at about 45% in quantity, but only 23% in value. A significant improvement is the sizeable average annual growth recorded by mixed and blended silk goods, at 36% in quantity and 48% in value. The share of silk goods in India's aggregate export of all commodities has gone up to 1.14% against 0.79% in 1980-81, a 44% rise. Currently, the bulk of India's exports is of handloom silks. The export potential is excellent for superior items such as crepe de chine, heavy taffeta, georgettes, pongee, silk shirting, fabrics with jacquard and fashion originated designs, etc., with European quality and prices. Already a small

number of Indian exporters are seeking ways of furnishing such items to France, Germany, U.K. and Italy.

8. Exports of blended silk goods also registered a significant growth. Earnings from these items increased from Rs 5.7 M in 1980/81 to Rs 30.4 M in 1987/88. Western Europe buys 38% of India's silk exports, while USA and Canada account for 45%. Silk fabrics account for about 45% of the industry's exports, and it is the hand loom sector which is responsible for the bulk of silk fabric exports, providing large-scale employment. Even with these increased exports, India only has a 4-5% share of the global market for silk and silk goods. Chinese competition is stiff, and since India's power looms are old, goods of these varieties are not only outpriced by about 30% but are poorer in quality and finish. China has sought actively to modernize its silk industry, to improve the quality of its raw silk and its silk exportable items, offering the products at competitive prices; India, as yet, has not. India's share of the world market can be expanded only by improvements in the quality of raw silk and of silk exportable items, and by offering the products at competitive prices.

9. India's strength lies predominantly in its capacity to supply unique designs, unequalled by other countries, and its ability to provide small quantities (50 meter lots) compared to large (1000 meter) lots from China. There is general agreement in Western European overseas markets that this unrivalled capacity should be tapped. However, a strong effort must be made to improve fabric quality. Most overseas buyers claim that goods are often inferior. Often a high percentage of silk goods originating from India is rejected. There is a need for consistent quality control. Chinese competition for quality silk goods and for lower priced silk goods is stiff. To further complicate the situation, India's power looms are old and its raw silk often breaks and slows processing. As a consequence, silk goods from power looms are outpriced by other countries by about 30%, and often are poorer in quality and finish.

### Prices

10. **World Market Prices.** International prices of raw silk were traditionally determined by the Canton Silk Exchange and the Yokohama Silk Exchange. Export prices were not guided by auctioning, but by administered pricing by the respective governments' policies. Traditionally, Chinese authorities have set prices of cocoons and raw silk based on a low exchange rate and the low prices paid by Government-operated reeling facilities. Importers of raw silk from China knew well in advance their cost of raw silk as China rarely changed the price.

11. Starting in 1982, silk prices were slowly raised by the Chinese Government, anticipating liberalization under the new policy of using the market to determine prices in certain non-basic food commodities. By March 1987, when the Chinese farmer was able to sell his cocoon to whomever he wanted, the administered price reached US\$39.00/kg, while "non-official" silk was sold through Hong Kong without the controls of the State Silk Trading Company at even higher rates. Supplies of silk through official channels is increasingly tight, and the International Silk Association (Lyon, France) and most European buyers are predicting that raw silk prices will be close to US\$75.00/kg by June 1989.

12. Almost no raw silk entered India from official Chinese channels in 1987/8, despite the demand for lower quality (Grade G), which is traditionally sold at much lower prices. Most imports came from Hong Kong and Bangkok, at an average (1987) price for Grade G silk of US\$39.50/kg.

13. **Domestic Prices.** Prices for cocoons, raw silk, and silk goods have been increasing steadily during the past five years. Prices for cocoons are determined at state-operated cocoon markets where daily auctions are held between cocoon farmers and reelers or their respective representatives. The cocoon markets allow participation in these auctions only for registered cocoon farmers and licensed reelers.

14. Since the early 1980s, cocoon prices for average grades in the cocoon markets have increased at an annual rate of 8%, while the price of high quality cocoons has increased by 11%. Cocoon prices increased from Rs 25/kg in 1980/81 to Rs 60/kg by September/October 1988. High quality cocoons reached over Rs 80/kg, and bivoltine cocoon prices have reached Rs 180-200/kg. Raw silk prices, while averaging only Rs 240/kg in 1981, are now averaging Rs 750/kg (US\$50.68); high quality silk prices are Rs 1020/kg or about US\$68.92/kg.

#### Main Silk-Producing States in India

15. The project would involve India's five main producing sericulture states; Karnataka, Andhra Pradesh and Tamil Nadu in the south, West Bengal in the east, and Jammu and Kashmir in the northwest, and provide support to pilot sericulture development actions in promising areas of up to 12 other states. Key features and differences between these areas are highlighted below.

16. The CSB and DOS research and extension programs have progressively introduced higher performance multivoltine varieties and multivoltine-bivoltine hybrids. The latter is now the basis of more than 90% of southern states cocoon production. Institutions (research, DOSs, CSB) are well established: in Karnataka and Tamil Nadu, DOSs were in existence prior to 1950. Sericulture in Andhra Pradesh is more recent but is now growing very rapidly.

17. **Southern States.** Sericulture was first introduced to this area some 200 years ago, by Tippoo Sultan, ruler of Mysore which is now part of Karnataka state. Hardy but low yielding multivoltine races, originally from West Bengal, were introduced and these local varieties are still favored in many traditional sericulture villages. The states (Andhra Pradesh, Karnataka, and Tamil Nadu) have fairly similar agroclimates with variations within each state mainly depending upon altitude and availability of irrigation. Two or three rearings per annum are possible under rainfed conditions, increasing to 6 rearings under irrigated conditions. In higher altitude areas, bivoltine rearing is possible with better sericulture hygiene and husbandry standards. Sericulture development is concentrated in Karnataka and districts adjacent to Karnataka in Tamil Nadu and Andhra Pradesh which benefit from the more developed infrastructure in Karnataka, in particular the major cocoon markets and sources of seed supply. In all three states, sericulture development requires expanded seed production; marketing infrastructure; further buildup of research and extension services; and increased reeling capacity.

18. West Bengal. West Bengal sericulture dates back over 2,000 years. The hot, humid climate and availability of irrigation in major sericulture districts such as Malda allow for substantial mulberry leaf growth and near year-round cocoon production. Bivoltine potential is limited to higher altitude areas such as Darjeeling or cooler season production in some other areas. Nevertheless, some bivoltine potential is present and, due to its favorable mulberry yield features, the area has particularly good prospects for profitable expansion of lower grade silk production. A particular constraint in West Bengal is the slow adoption rate of hybrid multi/bivoltine silkworm races. Expanding DOS and CSB infrastructure has resulted in steady growth of sericulture over the last five years.

19. Jammu and Kashmir. Jammu and Kashmir shares West Bengal's ancient sericulture heritage and has the unique feature amongst the five main traditional sericulture states of producing only bivoltine silk for which the cooler climate makes it ideally suited. The cooler conditions limit mulberry leaf growth and rearing potential to two to three crops per year though currently only one rearing is generally practiced.

20. Mainly due to outdated institutional policies and government regulations, the sector has been in serious disarray. After several decades of stagnation, production declined in the past 20 years and now amounts to only about 45 tons (less than 1% of national silk production). Unlike other sericulture states the state government held a monopoly on all cocoon purchasing, reeling and sale of silk yarn through two outdated and highly inefficient government filatures. Cocoon prices were fixed at very unremunerative prices and until recently the legislation also prevented private utilization of mulberry plants which were regarded as public property. The two government filatures are greatly over staffed (1,200 employees), produce very poor quality yarn and, despite cocoon purchasing at prices less than half the free market prices prevailing in other states, have incurred heavy losses. The combined impact of this situation resulted in very poor incentives for rearing and modern mulberry cultivation, suppression of a private reeling sector and decline of the weaving sector. In 1988 the Jammu and Kashmir government enacted a major reform of its past policies in consultation with CSB and the World Bank. Actions undertaken included:

- (a) cocoon price fixing was abolished and replaced with a 'minimum price' for cocoons (twice the level of 1987 price); the state government is in the process of establishing open auction markets away from the government filatures.
- (b) private parties have been allowed to establish reeling units which will be able to buy cocoons in the free markets.
- (c) sale of raw silk to weavers on government prescribed quotas has been abolished and a free auction market for raw silk is to be established. Restrictions on entry of weavers into the market have also been abolished.

### Sericulture Development in Other States

21. Given the success and general popularity of sericulture, and in response to demand by farmers, many states (other than the five main participating states) have initiated services and programs to support further development of the industry. Several of these states have, or are in the process of establishing, small nucleus departments to coordinate and implement services for sericulture farmers.

22. To complement and provide proper direction to these 'new' sericulture states, CSB has formulated 'pilot' development plans for implementation under the project, in 12 states (Assam, Bihar, Gujarat, Haryana, Himachal Pradesh, Kerala, Maharashtra, Madhya Pradesh, Orissa, Punjab, Rajasthan and Uttar Pradesh). CSB's involvement in ten of these states will be exclusively for development of bivoltine silk production. CSB will select one or two districts in each state suitable for bivoltine rearing and concentrate its activities around one or two grainages and TSCs to promote and emphasize production of bivoltine silk. The underlying intention under these programs is to introduce higher quality, higher yielding bivoltine silkworms at an early stage of sericulture development in these states.

### Production of Bivoltine Silk

23. A greater emphasis and a wider adoption of rearing of bivoltine silkworm races is of critical importance for upgrading of Indian silk to quality standards demanded in international trade for silk. However, efforts in this direction by Karnataka, Andhra Pradesh, Tamil Nadu and W. Bengal<sup>1</sup> so far, have not been successful. In Karnataka for example, annual production of bivoltine attained under KSP-I project was barely 100 tons against the project target of 1,000 tons. Several factors have inhibited a rapid expansion of bivoltine production: climatic conditions are not universally suited for bivoltine rearing and special care needs to be taken in selecting areas to promote bivoltine acceptance by farmers. The bivoltine silkworm races available in India and those developed through research are not yet as hardy as the more generally accepted multivoltine and multi/bivoltine hybrid varieties and the farmers are unwilling to undertake greater care and higher risks involved for bivoltine rearing. Until very recently, with the availability of Chinese bivoltine silk yarn, there were insufficient buyers in the modern weaving sector willing to offer an adequate premium for Indian bivoltine yarn.

24. Despite the difficult context noted above, efforts to promote bivoltine production would be supported under the project. Recent restrictions on Chinese exports of silk is already resulting in a greater demand for bivoltine silk yarn in the Indian market, which should soon translate into a substantial price premium. However, it is recognised that particular attention should be paid to selecting those areas which are climatically suited for bivoltine and where multivoltine rearing is non-existent. Farmers' concerns regarding higher risks can be reduced through a more focussed and thorough extension service specifically for bivoltine. At the same time, research efforts will continue to develop hardier bivoltine races adaptable to Indian rural conditions.

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<sup>1</sup> Production in Jammu & Kashmir is exclusively of bivoltine silk.

25. Further development of bivoltine production will be concentrated in the new pilot areas as mentioned above, and in Jammu & Kashmir which produces only bivoltine silk. In addition, with experience gained so far, Karnataka should be able to make more concerted efforts to promote bivoltine in carefully selected areas; as target, it will aim to have about 10% of its annual production in the fifth project year in bivoltine silk. The other states are committed to have specific programs for bivoltine although they may not be able to attain the targets similar to Karnataka.

**INDIA**  
**NATIONAL SERICULTURE PROJECT**

Annex 1  
Table 1

World Raw Silk Production  
(metric tons)

<u>Country</u>	<u>1938</u>	<u>1970</u>	<u>1980</u>	<u>1986</u>
China	4,853	11,124	23,485	35,000 <sup>1</sup>
India	691	2,258	4,593	8,787 <sup>1</sup>
Japan	43,152	20,515	16,515	8,341
USSR	1,900	3,000	4,254	3,999
Republic of Korea	1,854	3,026	3,279	2,196
Brazil	33	259	1,284	1,664
Other countries	4,047	818	1,760	2,748
<b>TOTAL</b>	<b>56,500</b>	<b>41,000</b>	<b>55,500</b>	<b>62,735</b>

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<sup>1</sup> Includes tasar silk production

**INDIA - NATIONAL SERICULTURE PROJECT**

Annex 2  
Table 1

**Project Cost Summary by States**

<b>Component</b>	<b>CSB *</b>	<b>Karna- taka</b>	<b>Andhra Pradesh</b>	<b>Tamil Nadu</b>	<b>West Eengal</b>	<b>J &amp; K</b>	<b>Pilot States</b>	<b>Total Rs M</b>	<b>Total US\$ M ..</b>
Research & Development	274	14	32					320	21.3
Universities Support	44							44	2.9
Basic Seed production	177	91		26	8	3	84	389	26.0
Seed Grainages	256	12	37	32	52	21	93	503	33.6
Seed CRCs (DOS)		34						34	2.2
Assistance to private CRCs	28	39	26	3	18	21	12	147	9.9
Mulberry Saplings		1				17	15	33	2.2
Cocoon Markets		20	24	18	26	10	43	141	9.5
Cocoon Drying						15	21	36	2.4
Silk Exchange			3		2	2		7	0.5
Silk Testing Houses	104							104	6.9
Extension Services	70	136	27	79	53	17	59	441	29.5
Tech. Assistance/training	122							122	8.1
Training centers	6	62	47	24	49	5		193	12.9
Joint venture participation			13		7			20	1.4
CSB/DOs Administration	69	38	26	37	19	16		205	13.7
Assistance to NGOs	37			4				41	2.7
Promotion of New Ovens	7							7	0.5
Assistance to Reelers	40							40	2.7
Beneficiary Assessment	13							13	0.8
Socio-Economic Surveys	5							5	0.4
<b>Total Base Costs</b>	<b>1,252</b>	<b>447</b>	<b>235</b>	<b>223</b>	<b>234</b>	<b>127</b>	<b>327</b>	<b>2,845</b>	<b>190.1</b>
Physical Contingencies	117	48	24	23	24	12	31	279	18.6
Price Contingencies	316	146	61	68	63	36	83	773	34.4
<b>Total Cost Incl. cont.</b>	<b>1,685</b>	<b>641</b>	<b>320</b>	<b>314</b>	<b>321</b>	<b>175</b>	<b>441</b>	<b>3,897</b>	<b>243.1</b>
<b>CREDIT</b>									
- On farm		413	167	148	121	63	107	1,019	64.0
- Processing		129	306	20	56	12	114	637	40.0
<b>Total Project Costs</b>	<b>1,685</b>	<b>1,183</b>	<b>793</b>	<b>482</b>	<b>498</b>	<b>250</b>	<b>662</b>	<b>5,553</b>	<b>347.1</b>

\* Includes Rs 868 Million (including contingencies) for facilities which CSB will establish and operate in the five participating states (basic seed production, CRCs, TSCs, silk testing houses)

India  
NATIONAL SERICULTURE PROJECT  
Summary Accounts by Year

Totals Including Contingencies  
(RS. '000)

Totals Including Contingencies  
(US\$ '000)

	Totals Including Contingencies (RS. '000)								Totals Including Contingencies (US\$ '000)							
	1	2	3	4	5	6	7	Total	1	2	3	4	5	6	7	Total
<b>INVESTMENT COSTS</b>																
A. LAND ACQUISITION	14,390.0	6,938.2	2,720.8	1,500.0	478.2	312.1	85.2	26,425.5	961.3	454.7	173.5	93.1	29.1	18.5	4.9	1,735.0
B. CIVIL WORKS																
1. LAND DEVELOPMENT	16,211.5	16,157.8	12,101.5	2,402.3	1,397.9	1,062.3	275.0	48,608.3	1,082.9	1,058.8	771.8	149.0	84.8	63.0	15.9	3,228.2
2. BUILDINGS	55,407.8	248,674.7	330,779.3	153,171.0	73,214.6	34,719.6	12,591.0	908,558.1	3,701.3	16,295.9	21,095.6	9,501.9	4,439.9	2,058.1	729.5	97,822.2
Sub-Total CIVIL WORKS	71,619.3	264,832.5	342,880.8	155,573.3	74,612.6	35,781.9	12,866.0	958,166.4	4,784.2	17,354.7	21,867.4	9,651.0	4,524.7	2,121.0	745.4	61,048.4
C. MACHINERY AND EQUIPMENT	63,882.9	150,224.5	211,516.9	139,565.4	71,408.3	38,762.4	17,619.8	690,980.0	4,267.4	9,844.3	13,489.6	8,657.9	4,330.4	2,179.2	1,020.8	43,789.6
D. VEHICLES	16,384.4	22,831.6	27,569.4	19,875.4	9,540.0	5,462.8	1,334.8	102,998.4	1,094.5	1,496.2	1,758.3	1,233.0	578.5	323.8	77.3	6,561.6
E. SAPLINGS DISTRIB.	602.2	1,522.2	2,701.4	3,674.4	4,568.7	4,338.7	3,554.9	20,862.5	40.2	99.7	172.3	227.9	277.1	257.2	206.0	1,280.4
F. TECHNICAL ASSISTANCE	1,646.1	4,837.3	8,691.3	9,110.4	11,056.5	7,199.9	2,656.7	45,198.2	110.0	317.0	554.3	565.2	670.5	426.8	153.9	2,797.6
G. TRAINING	10,100.7	12,709.2	18,121.6	19,654.3	22,508.0	19,977.9	14,682.6	117,734.4	674.7	832.8	1,155.7	1,219.3	1,365.0	1,184.2	849.5	7,281.2
H. WOMEN/NGO ASSIST.	5,717.2	5,717.2	5,717.2	5,717.2	5,717.2	5,717.2	5,717.2	40,020.7	381.9	374.7	364.6	354.7	346.7	338.9	331.2	2,492.7
I. WORKING CAPITAL	22,059.7	18,855.1	24,850.2	17,775.7	5,814.8	1,520.6	323.9	91,200.0	1,473.6	1,235.6	1,584.8	1,102.7	352.6	90.1	18.8	5,858.3
J. RAW MATERIAL BANK	1,907.4	8,619.1	8,877.4	1,192.1	8,877.4	8,619.1	1,907.4	40,000.0	127.4	564.8	566.2	74.0	538.4	510.9	110.5	2,492.1
K. JT. VENT. EQ. PART.	2,961.4	2,961.4	2,961.4	2,961.4	2,961.4	2,961.4	2,961.4	20,730.0	197.8	194.1	188.9	183.7	179.6	175.5	171.6	1,291.2
<b>Total INVESTMENT COSTS</b>	<b>211,271.5</b>	<b>500,048.2</b>	<b>656,608.5</b>	<b>376,599.7</b>	<b>217,544.1</b>	<b>128,654.0</b>	<b>63,690.0</b>	<b>2,154,416.1</b>	<b>14,113.0</b>	<b>32,769.6</b>	<b>41,875.5</b>	<b>23,362.3</b>	<b>13,192.5</b>	<b>7,626.2</b>	<b>3,690.0</b>	<b>136,628.1</b>
<b>I. RECURRENT COSTS</b>																
A. SALARIES, ALLOWANCES, WAGES	46,485.8	81,131.4	125,953.3	167,183.6	205,387.9	227,256.6	237,402.7	1,090,801.4	3,105.3	5,316.6	8,032.7	10,371.2	12,455.3	13,471.1	13,754.5	66,506.7
B. OTHER INCREMENTAL OPERATING COSTS	31,275.7	52,565.4	81,949.9	109,804.8	122,533.5	126,417.4	129,657.4	694,204.1	2,089.2	3,444.7	5,226.4	6,811.7	7,430.8	7,493.6	7,512.0	40,608.4
<b>Total RECURRENT COSTS</b>	<b>77,761.5</b>	<b>133,696.8</b>	<b>207,903.2</b>	<b>276,988.4</b>	<b>327,921.4</b>	<b>353,674.0</b>	<b>367,060.2</b>	<b>1,745,005.5</b>	<b>5,194.5</b>	<b>8,761.3</b>	<b>13,259.1</b>	<b>17,182.9</b>	<b>19,886.1</b>	<b>20,964.7</b>	<b>21,266.5</b>	<b>106,515.1</b>
<b>Total PROJECT COSTS</b>	<b>289,033.0</b>	<b>633,745.1</b>	<b>864,511.7</b>	<b>653,588.1</b>	<b>545,465.5</b>	<b>482,328.0</b>	<b>430,750.2</b>	<b>3,899,421.6</b>	<b>19,307.5</b>	<b>41,529.8</b>	<b>55,134.7</b>	<b>40,545.2</b>	<b>33,078.6</b>	<b>28,590.9</b>	<b>24,956.6</b>	<b>243,143.1</b>

**INDIA**  
**NATIONAL SERICULTURE PROJECT-CSB**  
**Summary Accounts by Year**  
**(RS. '000)**

	Base Costs							Foreign Exchange		
	1	2	3	4	5	6	7	Total	%	Amount
<b>I. INVESTMENT COSTS</b>										
A. LAND ACQUISITION	12,316.3	4,843.1	742.7	66.3	87.9	54.4	14.0	18,224.8	0.0	0.0
<b>B. CIVIL WORKS</b>										
1. LAND DEVELOPMENT	9,153.9	6,337.8	3,434.2	816.8	194.1	118.2	30.3	20,085.4	0.0	0.0
2. BUILDINGS	23,896.8	110,892.1	143,296.8	73,052.2	29,508.7	8,836.9	3,378.4	393,861.8	5.5	21,782.6
Sub-Total CIVIL WORKS	33,050.5	117,229.9	146,731.0	73,869.0	29,702.8	9,955.1	3,408.8	413,947.2	5.3	21,782.6
C. MACHINERY AND EQUIPMENT	32,673.7	68,632.6	121,392.7	74,071.9	35,745.3	14,343.6	4,982.9	371,842.6	10.9	40,416.9
D. VEHICLES	8,353.7	9,712.4	10,207.9	6,942.0	2,260.0	929.9	213.9	38,619.9	21.7	8,389.7
E. SAPPLINGS DISTRIB.	545.0	1,296.7	2,177.6	2,795.0	3,242.8	2,921.5	2,281.4	15,260.0	0.0	0.0
F. TECHNICAL ASSISTANCE	1,601.7	4,390.3	7,346.1	7,195.2	8,198.3	5,012.8	1,736.7	35,481.3	90.9	32,259.2
G. TRAINING	9,772.0	11,511.8	15,310.9	15,522.2	16,688.8	13,909.1	9,585.0	92,299.8	84.0	77,572.7
H. WOMEN/NGO ASSIST.	5,214.3	5,214.3	5,214.3	5,214.3	5,214.3	5,214.3	5,214.3	36,500.0	0.0	0.0
I. WORKING CAPITAL	1,872.4	8,845.6	15,569.2	10,952.1	4,172.9	520.3	67.5	42,000.0	0.0	0.0
J. RAW MATERIAL BANK	1,907.4	8,619.1	8,877.4	1,192.1	8,877.4	8,619.1	1,907.4	40,000.0	0.0	0.0
<b>Total INVESTMENT COSTS</b>	<b>107,307.0</b>	<b>260,395.8</b>	<b>333,569.9</b>	<b>197,820.2</b>	<b>114,190.7</b>	<b>61,480.3</b>	<b>29,411.8</b>	<b>1,104,175.6</b>	<b>18.3</b>	<b>180,421.1</b>
<b>II. RECURRENT COSTS</b>										
A. SALARIES, ALLOWANCES WAGES	21,224.9	32,692.6	44,889.1	50,265.5	52,497.0	53,428.9	53,743.5	308,682.6	0.0	0.0
B. OTHER INCREMENTAL OPERATING COSTS	10,488.4	14,670.4	20,880.7	27,003.5	30,944.3	31,501.7	30,380.7	165,869.7	0.0	0.0
<b>Total RECURRENT COSTS</b>	<b>31,713.3</b>	<b>47,363.0</b>	<b>65,769.7</b>	<b>77,269.0</b>	<b>83,441.4</b>	<b>84,931.6</b>	<b>84,124.2</b>	<b>474,552.2</b>	<b>0.0</b>	<b>0.0</b>
<b>Total BASELINE COSTS</b>	<b>139,020.3</b>	<b>307,758.7</b>	<b>399,339.6</b>	<b>275,029.2</b>	<b>197,632.0</b>	<b>146,411.8</b>	<b>113,536.0</b>	<b>1,578,727.8</b>	<b>11.4</b>	<b>180,421.1</b>
Physical Contingencies	11,736.1	31,591.8	41,158.4	26,477.7	16,409.2	11,389.4	9,354.9	148,117.6	5.2	7,728.6
Price Contingencies	5,483.0	36,704.5	79,865.0	78,947.6	71,095.5	64,200.2	62,568.0	398,863.8	11.2	44,632.4
<b>Total PROJECT COSTS</b>	<b>156,239.4</b>	<b>376,055.1</b>	<b>520,363.1</b>	<b>380,454.5</b>	<b>285,136.8</b>	<b>222,001.4</b>	<b>185,458.8</b>	<b>2,125,709.1</b>	<b>11.0</b>	<b>232,782.0</b>
Taxes	4,341.9	12,292.0	17,547.8	11,878.3	8,492.7	3,571.3	2,243.0	58,167.0	0.0	0.0
Foreign Exchange	13,754.0	36,248.8	54,538.1	45,176.7	39,337.6	27,567.0	16,159.9	232,782.0	0.0	0.0

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**INDIA**  
**NATIONAL SERICULTURE PROJECT-CSB**  
 Project Components by Year  
 (RS. '000)

	Base Costs							Total	
	1	2	3	4	5	6	7	RS.	(US\$ '000)
<b>A. RESEARCH AND DEVELOPMENT (BREEDING)</b>									
1. RESEARCH	32,290.8	63,316.5	69,428.7	35,354.4	27,757.0	24,394.0	21,526.1	274,067.4	18,307.8
2. UNIVERSITY	3,462.8	5,289.2	7,994.3	9,784.4	8,467.6	5,314.9	3,564.3	43,877.5	2,931.0
Sub-Total RESEARCH AND DEVELOPMENT (BREEDING)	35,753.6	68,605.7	77,422.9	45,138.8	36,224.5	29,708.9	25,090.4	317,944.9	21,238.8
B. BASIC SEED PROD/MULTY (P2, P3, P4)	18,938.1	52,958.8	70,260.8	48,473.9	31,451.4	22,179.7	16,340.8	260,603.5	17,408.4
C. COMM. SEED PROD. (F1 GRAINAGES)	25,989.4	84,976.7	123,622.4	80,812.7	29,733.0	3,683.8	477.0	349,294.9	23,333.0
D. PRIVATE CHAWKI REARING	7,709.5	7,157.1	7,094.0	7,248.1	5,483.9	3,315.7	2,010.0	40,018.3	2,673.2
E. MULBERRY PLANTATIONS	545.0	1,296.7	2,177.6	2,795.0	3,242.8	2,921.5	2,281.4	15,260.0	1,019.4
F. COCOON MARKETS	1,228.4	3,109.2	8,822.3	13,608.3	6,344.6	5,628.6	4,622.7	43,364.1	2,896.7
G. COCOON DRYING	393.9	846.4	1,761.6	2,899.7	3,790.7	4,965.1	6,004.9	20,662.3	1,380.2
H. SILK TESTING HOUSES	8,644.3	28,623.2	34,507.1	10,205.0	8,837.4	7,814.9	5,319.9	103,951.8	6,944.0
I. EXTENSION	10,798.1	15,727.6	20,514.5	21,670.6	20,421.6	20,116.8	20,085.5	129,334.6	8,639.6
J. TRAINING CENTERS	324.5	1,483.7	1,888.0	440.6	487.4	448.9	422.3	5,495.4	367.1
K. CSB/DOS ADMINISTRATION	6,604.5	10,267.5	11,936.9	10,049.5	10,069.0	10,320.8	9,883.8	69,131.9	4,618.0
L. TECH. ASSIST./TRAINING	10,516.3	15,044.7	21,799.7	21,860.1	24,029.8	18,064.6	10,464.4	121,779.5	8,134.9
M. NGOs/WOMEN	5,214.3	5,214.3	5,214.3	5,214.3	5,214.3	5,214.3	5,214.3	36,500.0	2,438.2
N. SMOKELESS CHULAS	971.5	1,017.8	1,122.6	1,040.3	1,040.0	1,046.8	1,040.8	7,279.8	486.3
O. ADVANCES TO REELERS	1,907.4	8,619.1	8,877.4	1,192.1	8,877.4	8,619.1	1,907.4	40,000.0	2,672.0
P. BENEFICIARY ASSESSMENT	2,703.1	2,031.7	1,539.1	1,601.6	1,605.7	1,583.9	1,591.7	12,656.9	845.5
Q. SOCIO ECONOMIC SURVEY	778.6	778.6	778.6	778.6	778.6	778.6	778.6	5,450.0	364.1
<b>Total BASELINE COSTS</b>	<b>139,020.3</b>	<b>307,758.7</b>	<b>399,339.6</b>	<b>275,029.2</b>	<b>197,632.0</b>	<b>146,411.8</b>	<b>113,536.0</b>	<b>1,578,727.8</b>	<b>105,459.4</b>
Physical Contingencies	11,736.1	31,591.8	41,158.4	26,477.7	16,409.2	11,389.4	9,354.9	148,117.6	8,894.3
Price Contingencies	5,483.0	36,704.5	79,665.0	78,947.6	71,095.5	64,200.2	62,568.0	398,863.8	18,515.1
<b>Total PROJECT COSTS</b>	<b>156,239.4</b>	<b>376,055.1</b>	<b>520,363.1</b>	<b>380,454.5</b>	<b>285,136.8</b>	<b>222,001.4</b>	<b>185,458.8</b>	<b>2,125,709.1</b>	<b>133,868.9</b>
Taxes	4,341.9	12,292.0	17,547.8	11,678.3	6,492.7	3,571.3	2,243.0	58,167.0	3,685.5
Foreign Exchange	13,754.0	36,248.8	54,538.1	45,176.7	39,337.6	27,567.0	18,159.9	232,782.0	14,612.2

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INDIA  
NATIONAL SERICULTURE PROJECT-KARNATAKA  
Summary Accounts by Year  
(RS. '000)

	Base Costs								Foreign Exchange	
	1	2	3	4	5	6	7	Total	%	Amount
<b>I. INVESTMENT COSTS</b>										
A. LAND ACQUISITION	1,177.9	393.6	133.6	11.6	15.4	9.5	2.4	1,744.0	0.0	0.0
B. CIVIL WORKS										
1. LAND DEVELOPMENT	1,579.1	820.3	546.8	38.0	50.4	31.2	8.0	3,073.8	0.0	0.0
2. BUILDINGS	4,540.1	43,849.7	52,664.1	7,311.6	2,434.8	1,502.7	385.3	112,688.3	5.5	6,232.2
Sub-Total CIVIL WORKS	6,119.3	44,670.0	53,210.8	7,349.6	2,485.2	1,533.9	393.3	115,762.1	5.4	6,232.2
C. MACHINERY AND EQUIPMENT	1,714.1	8,167.5	11,278.4	4,717.4	2,731.2	1,746.0	410.7	30,765.3	11.0	3,381.4
D. VEHICLES	779.0	2,224.5	3,554.4	3,060.7	2,921.3	1,918.6	426.0	14,884.4	21.7	3,233.4
E. SAPLINGS DISTRIB.	34.1	65.1	81.0	76.2	101.7	60.7	12.9	431.6	0.0	0.0
F. WORKING CAPITAL	8,104.9	2,708.0	919.3	79.8	105.8	65.5	16.8	12,000.0	0.0	0.0
<b>Total INVESTMENT COSTS</b>	<b>17,929.2</b>	<b>58,228.7</b>	<b>69,177.5</b>	<b>15,295.2</b>	<b>8,360.5</b>	<b>5,334.2</b>	<b>1,262.1</b>	<b>175,587.4</b>	<b>7.3</b>	<b>12,847.1</b>
<b>II. RECURRENT COSTS</b>										
A. SALARIES, ALLOWANCES, WAGES	652.0	5,159.8	12,000.3	23,291.1	36,498.5	41,035.0	38,886.9	157,523.5	0.0	0.0
B. OTHER INCREMENTAL OPERATING COSTS	4,031.0	9,838.8	16,454.9	20,472.5	21,529.6	21,022.2	20,306.4	113,655.4	0.0	0.0
<b>Total RECURRENT COSTS</b>	<b>4,682.9</b>	<b>14,998.6</b>	<b>28,455.2</b>	<b>43,763.6</b>	<b>58,028.1</b>	<b>62,057.3</b>	<b>59,193.2</b>	<b>271,178.9</b>	<b>0.0</b>	<b>0.0</b>
<b>Total BASELINE COSTS</b>	<b>22,612.1</b>	<b>73,227.3</b>	<b>97,632.7</b>	<b>59,058.8</b>	<b>66,388.6</b>	<b>67,391.4</b>	<b>60,455.4</b>	<b>446,766.3</b>	<b>2.9</b>	<b>12,847.1</b>
Physical Contingencies	1,596.5	9,128.3	12,132.7	6,103.6	6,594.8	6,706.3	6,040.7	48,303.0	3.0	1,434.6
Price Contingencies	634.6	9,304.2	21,256.9	18,180.6	26,652.9	33,630.7	36,507.5	146,167.3	1.8	2,688.1
<b>Total PROJECT COSTS</b>	<b>24,843.2</b>	<b>91,659.8</b>	<b>131,022.3</b>	<b>83,343.0</b>	<b>99,636.3</b>	<b>107,728.5</b>	<b>103,003.5</b>	<b>641,236.6</b>	<b>2.6</b>	<b>16,969.8</b>
Taxes	453.1	2,423.2	3,520.1	1,864.2	1,646.6	1,471.5	1,151.5	12,530.6	0.0	0.0
Foreign Exchange	691.5	4,713.1	6,528.2	2,192.5	1,550.8	1,043.6	250.1	16,969.8	0.0	0.0

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INDIA  
NATIONAL SERICULTURE PROJECT-KARNATAKA  
Project Components by Year  
(RS. '000)

	Base Costs							Total	
	1	2	3	4	5	6	7	RS.	(US\$ '000)
<b>A. RESEARCH AND DEVELOPMENT (BREEDING)</b>									
<b>I. RESEARCH</b>	617.8	2,784.9	3,868.3	1,852.7	1,680.2	1,543.7	1,456.8	13,804.5	922.1
Sub-Total RESEARCH AND DEVELOPMENT (BREEDING)	617.8	2,784.9	3,868.3	1,852.7	1,680.2	1,543.7	1,456.8	13,804.5	922.1
<b>B. BASIC SEED PROD/MULT (P2, P3, P4)</b>	2,778.8	23,386.1	30,521.1	10,801.6	7,725.7	8,155.0	7,068.2	90,434.5	6,041.1
<b>C. COMM. SEED PROD. (F1 GRAINAGES)</b>	8,104.9	2,708.0	919.3	79.8	105.8	65.5	16.8	12,000.0	801.6
<b>D. PRIVATE CHANKI REARING</b>	1,050.0	4,382.9	8,170.3	9,380.2	6,774.3	4,849.8	4,618.3	39,223.7	2,620.2
<b>E. DOS CHANKI REARING</b>	3,203.7	4,860.4	6,900.6	4,898.8	4,703.9	4,602.9	4,581.8	33,752.0	2,254.6
<b>F. MULBERRY PLANTATIONS</b>	34.1	45.1	81.0	78.2	101.7	60.7	12.9	431.6	28.8
<b>G. COCOON MARKETS</b>	835.4	6,000.0	8,238.1	1,953.6	1,125.6	862.3	613.8	20,219.9	1,350.7
<b>H. EXTENSION</b>	505.3	4,575.1	10,771.2	18,577.9	33,123.0	36,957.3	32,373.0	136,882.7	9,143.8
<b>I. TRAINING CENTERS</b>	2,246.1	18,467.2	21,408.6	5,743.1	5,344.4	4,564.4	4,044.7	61,818.5	4,129.5
<b>J. CSB/DOS ADMINISTRATION</b>	3,236.1	5,406.6	6,754.3	5,695.0	5,704.1	5,729.8	5,673.1	38,199.0	2,551.7
<b>Total BASELINE COSTS</b>	22,612.1	73,227.3	97,632.7	59,058.8	66,388.6	67,391.4	60,455.4	446,766.3	29,844.1
Physical Contingencies	1,586.5	9,128.3	12,132.7	6,103.6	6,594.8	6,706.3	6,040.7	48,303.0	3,226.7
Price Contingencies	634.8	9,304.2	21,256.9	18,180.6	26,652.9	33,630.7	36,507.5	146,167.3	6,943.1
<b>Total PROJECT COSTS</b>	24,843.2	91,659.8	131,022.3	83,343.0	99,636.3	107,728.5	103,003.5	641,236.6	40,013.9
Taxes	453.1	2,423.2	3,520.1	1,864.2	1,646.8	1,471.5	1,151.9	12,530.6	788.1
Foreign Exchange	691.5	4,713.1	6,528.2	2,192.5	1,550.8	1,043.6	250.1	16,969.8	1,079.9

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**INDIA**  
**NATIONAL SERICULTURE PROJECT-ANDHRA PRADESH**  
**Summary Accounts by Year**  
**(RS. '000)**

	Base Costs							Foreign Exchange		
	1	2	3	4	5	6	7	Total	%	Amount
<b>I. INVESTMENT COSTS</b>										
<b>A. CIVIL WORKS</b>										
1. LAND DEVELOPMENT	1,178.9	1,583.7	1,385.2	481.2	163.3	100.1	25.7	4,918.1	0.0	0.0
2. BUILDINGS	7,959.7	17,510.2	18,556.9	7,479.2	2,152.5	1,315.6	337.3	55,311.5	5.5	3,059.0
Sub-Total CIVIL WORKS	9,138.7	19,093.9	19,942.1	7,960.4	2,315.9	1,415.7	363.0	60,229.6	5.1	3,059.0
<b>B. MACHINERY AND EQUIPMENT</b>	4,758.1	8,118.1	11,370.7	8,334.1	2,150.4	861.8	230.6	35,823.7	11.0	3,937.3
<b>C. VEHICLES</b>	1,122.1	1,048.1	2,399.9	1,504.1	631.5	213.8	48.6	7,868.1	21.7	1,709.2
<b>D. WORKING CAPITAL</b>	541.5	2,513.6	3,705.3	1,384.9	145.9	86.6	22.2	8,400.0	0.0	0.0
<b>E. JT. VENT. EQ. PART.</b>	1,890.0	1,890.0	1,890.0	1,890.0	1,890.0	1,890.0	1,890.0	13,230.0	0.0	0.0
<b>Total INVESTMENT COSTS</b>	<b>17,450.4</b>	<b>33,563.7</b>	<b>39,307.9</b>	<b>21,073.5</b>	<b>7,133.6</b>	<b>4,467.8</b>	<b>2,554.4</b>	<b>125,551.3</b>	<b>6.9</b>	<b>8,705.6</b>
<b>II. RECURRENT COSTS</b>										
<b>A. SALARIES, ALLOWANCES, WAGES</b>	3,278.5	6,257.3	9,817.8	12,068.2	12,102.7	11,875.7	11,984.7	67,384.9	0.0	0.0
<b>B. OTHER INCREMENTAL OPERATING COSTS</b>	2,186.7	4,288.4	6,730.2	9,549.2	7,984.8	6,176.5	5,663.8	42,579.8	0.0	0.0
<b>Total RECURRENT COSTS</b>	<b>5,465.2</b>	<b>10,545.7</b>	<b>16,548.1</b>	<b>21,617.4</b>	<b>20,087.5</b>	<b>18,052.2</b>	<b>17,648.5</b>	<b>109,964.7</b>	<b>0.0</b>	<b>0.0</b>
<b>Total BASELINE COSTS</b>	<b>22,915.6</b>	<b>44,109.4</b>	<b>55,856.0</b>	<b>42,690.9</b>	<b>27,221.1</b>	<b>22,520.0</b>	<b>20,202.9</b>	<b>235,516.0</b>	<b>3.7</b>	<b>8,705.6</b>
Physical Contingencies	2,449.2	4,827.9	5,903.2	4,264.4	2,662.7	2,114.4	1,844.8	24,006.7	3.9	938.0
Price Contingencies	898.2	5,199.1	10,964.1	12,191.4	10,160.6	10,292.5	11,056.8	60,762.6	2.7	1,648.3
<b>Total PROJECT COSTS</b>	<b>26,263.1</b>	<b>54,136.4</b>	<b>72,723.3</b>	<b>59,146.6</b>	<b>39,984.5</b>	<b>34,926.9</b>	<b>33,104.4</b>	<b>320,285.2</b>	<b>3.5</b>	<b>11,291.9</b>
Taxes	758.4	1,514.7	2,106.6	1,643.1	732.7	466.1	336.3	7,557.8	0.0	0.0
Foreign Exchange	1,372.9	2,794.0	3,666.5	2,310.0	728.6	331.8	88.2	11,291.9	0.0	0.0

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**INDIA**  
**NATIONAL SERICULTURE PROJECT-ANDHRA PRADESH**  
 Project Components by Year  
 (RS. '000)

	Base Costs							Total	
	1	2	3	4	5	6	7	RS.	(US\$ '000)
<b>A. RESEARCH AND DEVELOPMENT (BREEDING)</b>									
<b>I. RESEARCH</b>	4,060.9	6,266.3	7,942.1	6,734.9	2,603.8	2,187.2	1,678.1	31,473.2	2,102.4
Sub-Total RESEARCH AND DEVELOPMENT (BREEDING)	4,060.9	6,266.3	7,942.1	6,734.9	2,603.8	2,187.2	1,678.1	31,473.2	2,102.4
B. COMM. SEED PROD. (F1 GRAINAGES)	2,457.3	9,400.8	13,961.3	8,432.7	2,248.9	748.5	195.3	37,444.8	2,501.3
C. PRIVATE CHANKI REARING	1,918.3	3,885.3	6,196.2	6,624.0	3,582.5	2,160.2	1,126.2	25,492.7	1,702.9
D. COCOON MARKETS	4,158.1	5,111.4	4,667.0	2,772.2	2,619.6	2,543.9	2,457.3	24,329.6	1,625.2
E. SILK EXCHANGE	58.2	278.3	592.4	731.9	573.2	535.9	519.1	3,289.0	219.7
F. EXTENSION	1,120.9	1,808.8	3,625.7	5,566.4	5,030.6	1,771.2	4,786.3	26,709.8	1,784.2
G. TRAINING CENTERS	2,836.7	10,257.5	11,975.9	7,007.5	5,711.0	4,729.8	4,692.5	47,210.9	3,153.7
H. CSB/DOS ADMINISTRATION	4,415.2	5,211.1	5,005.4	2,931.2	2,961.5	2,953.4	2,858.2	26,336.0	1,759.3
I. EQ. PART. IN JT. VENT.	1,890.0	1,890.0	1,890.0	1,890.0	1,890.0	1,890.0	1,890.0	13,230.0	883.8
<b>Total BASELINE COSTS</b>	22,915.6	44,109.4	55,856.0	42,690.9	27,221.1	22,520.0	20,202.9	235,516.0	15,732.5
Physical Contingencies	2,449.2	1,827.9	5,903.2	4,264.4	2,602.7	2,114.4	1,844.8	24,006.7	1,603.7
Price Contingencies	898.2	5,199.1	10,964.1	12,191.4	10,160.6	10,292.5	11,056.8	60,762.6	2,823.3
<b>Total PROJECT COSTS</b>	26,263.1	54,136.4	72,723.3	59,146.6	39,984.5	34,926.9	33,104.4	320,285.2	20,159.5
Taxes	758.4	1,514.7	2,106.6	1,643.1	732.7	466.1	336.3	7,557.8	479.3
Foreign Exchange	1,372.9	2,794.0	3,668.5	2,310.0	728.6	331.8	88.2	11,291.9	721.6

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**INDIA**  
**NATIONAL SERICULTURE PROJECT-TAMIL NADU**  
**Summary Accounts by Year**  
**(RS. '000)**

	Base Costs							Foreign Exchange		
	1	2	3	4	5	6	7	Total	%	Amount
<b>I. INVESTMENT COSTS</b>										
<b>A. LAND ACQUISITION</b>	9.0	41.1	48.8	3.0	4.0	2.5	0.6	109.0	0.0	0.0
<b>B. CIVIL WORKS</b>										
<b>1. LAND DEVELOPMENT</b>	534.6	789.6	602.3	35.3	46.8	28.9	7.4	2,044.8	0.0	0.0
<b>2. BUILDINGS</b>	1,135.5	5,191.6	7,784.9	5,646.7	8,319.2	5,229.0	1,121.0	34,427.8	5.5	1,904.0
Sub-Total CIVIL WORKS	1,670.1	5,981.2	8,387.1	5,681.9	8,366.0	5,257.9	1,128.4	36,472.7	5.2	1,904.0
<b>C. MACHINERY AND EQUIPMENT</b>	4,619.5	3,469.4	2,913.6	2,272.4	1,113.5	641.7	148.2	15,176.3	11.0	1,668.0
<b>D. VEHICLES</b>	1,322.2	2,466.5	2,478.4	723.2	213.5	131.5	33.7	7,369.0	21.7	1,600.8
<b>E. WOMEN/NGO ASSIST.</b>	503.0	503.0	503.0	503.0	503.0	503.0	503.0	3,520.7	0.0	0.0
<b>F. WORKING CAPITAL</b>	6,509.4	2,265.9	898.5	687.7	247.7	151.9	38.9	10,800.0	0.0	0.0
<b>Total INVESTMENT COSTS</b>	14,633.1	14,727.0	15,229.4	9,871.2	10,447.7	6,688.4	1,850.9	73,447.7	7.0	5,172.9
<b>II. RECURRENT COSTS</b>										
<b>A. SALARIES, ALLOWANCES, WAGES</b>	9,734.4	12,747.0	15,939.6	17,891.2	19,940.2	20,101.7	19,073.6	115,427.7	0.0	0.0
<b>B. OTHER INCREMENTAL OPERATING COSTS</b>	3,603.4	4,229.8	4,966.7	5,396.2	5,490.3	5,444.1	5,392.0	34,522.5	0.0	0.0
<b>Total RECURRENT COSTS</b>	13,337.8	16,976.9	20,906.3	23,287.4	25,430.5	25,545.8	24,465.6	149,950.2	0.0	0.0
<b>Total BASELINE COSTS</b>	27,970.9	31,703.9	36,135.7	33,158.6	35,878.2	32,234.2	26,316.5	223,398.0	2.3	5,172.9
Physical Contingencies	2,112.3	3,065.1	3,764.0	3,444.4	3,920.0	3,414.0	2,632.1	22,352.0	2.4	532.4
Price Contingencies	909.3	3,745.1	7,526.2	9,894.7	14,279.0	15,892.3	15,597.7	67,844.4	1.6	1,093.2
<b>Total PROJECT COSTS</b>	30,992.6	38,514.1	47,425.8	46,497.7	54,077.2	51,540.6	44,546.4	313,594.4	2.2	6,798.5
Taxes	647.3	810.6	914.4	701.4	655.3	526.6	337.9	4,593.6	0.0	0.0
Foreign Exchange	957.0	1,443.8	1,669.6	1,010.4	959.6	617.1	141.1	6,798.5	0.0	0.0

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**INDIA**  
**NATIONAL SERICULTURE PROJECT-TAMIL NADU**  
**Project Components by Year**  
**(RS. '000)**

	Base Costs							Total	
	1	2	3	4	5	6	7	RS.	(US\$ '000)
<b>A. RESEARCH AND DEVELOPMENT (BREEDING)</b>									
B. BASIC SEED PROD/MULT (P2, P3, P4)	4,927.7	4,648.9	4,329.1	3,214.1	3,580.8	3,147.9	2,579.9	26,428.2	1,765.4
C. COMM. SEED PROD. (F1 GRAINAGES)	8,023.8	5,992.2	5,754.0	4,014.2	4,368.3	2,751.5	801.9	31,506.0	2,104.6
D. PRIVATE CHANKI REARING	390.9	447.4	506.1	553.8	624.0	512.7	400.0	3,435.0	228.5
E. COCODON MARKETS	1,870.5	2,289.0	3,041.7	3,319.5	3,582.2	2,699.3	1,588.8	18,391.1	1,228.5
F. EXTENSION	7,288.2	8,730.0	10,671.0	12,129.9	13,282.2	13,522.6	13,051.9	78,675.8	5,255.6
G. TRAINING CENTERS	2,972.2	3,570.7	4,116.5	3,701.8	3,755.2	3,394.8	2,888.4	24,399.3	1,629.9
H. CSB/DOS ADMINISTRATION	1,994.6	5,522.7	7,214.3	5,722.2	6,182.7	5,702.8	4,702.6	37,041.9	2,474.4
I. NGOS/WOMEN	503.0	503.0	503.0	503.0	503.0	503.0	503.0	3,520.7	235.2
<b>Total BASELINE COSTS</b>	<b>27,970.9</b>	<b>31,703.9</b>	<b>36,135.7</b>	<b>33,158.6</b>	<b>35,878.2</b>	<b>32,234.2</b>	<b>26,316.5</b>	<b>223,398.0</b>	<b>14,923.0</b>
Physical Contingencies	2,112.3	3,065.1	3,764.0	3,444.4	3,920.0	3,414.0	2,632.1	22,352.0	1,493.1
Price Contingencies	909.3	3,745.1	7,526.2	9,894.7	14,279.0	15,892.3	15,597.7	67,844.4	3,193.5
<b>Total PROJECT COSTS</b>	<b>30,992.6</b>	<b>38,514.1</b>	<b>47,425.8</b>	<b>46,497.7</b>	<b>54,077.2</b>	<b>51,540.6</b>	<b>44,546.4</b>	<b>313,594.4</b>	<b>19,609.6</b>
Taxes	647.3	810.6	914.4	701.4	655.3	526.6	337.9	4,593.6	290.4
Foreign Exchange	957.0	1,443.8	1,669.6	1,010.4	959.6	617.1	141.1	6,798.5	431.9

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**INDIA**  
**NATIONAL SERICULTURE PROJECT-WEST BENGAL**  
 Project Components by Year  
 (RS. '000)

	Base Costs							Total	
	1	2	3	4	5	6	7	RS.	(US\$ '000)
<b>A. RESEARCH AND DEVELOPMENT (BREEDING)</b>									
B. BASIC SEED PROD/MULT (P2, P3, P4)	1,261.3	1,315.9	1,290.7	1,010.8	1,014.4	1,015.2	1,002.0	7,910.3	528.4
C. COMM. SEED PROD. (F1 GRAINAGES)	7,416.4	12,643.7	15,753.0	11,382.1	2,474.4	1,504.3	385.7	51,558.6	3,444.2
D. PRIVATE CHANKI REARING	1,516.6	2,692.8	4,170.1	4,540.6	2,570.2	1,625.7	981.4	18,097.4	1,208.9
E. COCOON MARKETS	1,564.4	3,667.1	5,641.2	5,616.2	4,308.7	3,152.5	2,352.6	26,292.8	1,756.4
F. SILK EXCHANGE	79.5	302.8	454.4	330.7	336.4	321.2	317.0	2,142.0	143.1
G. EXTENSION	3,599.5	5,516.0	8,524.0	10,278.5	8,584.1	8,158.7	7,987.7	52,648.6	3,516.9
H. TRAINING CENTERS	6,899.6	8,387.0	8,160.9	8,242.1	6,638.2	6,580.2	6,283.6	49,191.7	3,288.0
I. CSB/DOS ADMINISTRATION	2,809.4	2,901.6	2,981.5	2,601.4	2,619.5	2,589.4	2,557.6	19,020.5	1,270.6
J. EQ. PART. IN JT. VENT.	1,071.4	1,071.4	1,071.4	1,071.4	1,071.4	1,071.4	1,071.4	7,500.0	501.0
<b>Total BASELINE COSTS</b>	<b>26,208.0</b>	<b>38,498.3</b>	<b>48,027.3</b>	<b>43,074.0</b>	<b>29,617.4</b>	<b>25,998.6</b>	<b>22,939.2</b>	<b>234,362.8</b>	<b>15,655.5</b>
Physical Contingencies	2,717.8	4,216.7	5,031.2	4,088.2	2,674.8	2,498.1	2,218.7	23,643.6	1,578.4
Price Contingencies	1,082.7	4,759.2	9,527.9	11,575.8	11,094.6	12,154.7	13,128.1	63,320.9	2,945.9
<b>Total PROJECT COSTS</b>	<b>30,008.6</b>	<b>47,474.2</b>	<b>62,586.3</b>	<b>58,736.0</b>	<b>43,586.9</b>	<b>40,651.4</b>	<b>38,283.9</b>	<b>321,327.3</b>	<b>20,180.8</b>
Taxes	1,128.4	1,512.7	1,737.0	1,406.7	922.6	794.5	638.7	8,140.5	515.4
Foreign Exchange	1,766.0	2,416.0	2,788.0	2,000.3	785.0	516.1	224.7	10,498.1	670.6

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**INDIA**  
**NATIONAL SERICULTURE PROJECT-WEST BENGAL**  
 Summary Accounts by Year  
 (RS. '000)

	Base Costs							Foreign Exchange		
	1	2	3	4	5	6	7	Total	%	Amount
<b>I. INVESTMENT COSTS</b>										
A. LAND ACQUISITION	232.7	345.7	369.1	237.8	69.4	42.4	10.9	1,308.0	0.0	0.0
B. CIVIL WORKS										
1. BUILDINGS	6,675.8	13,504.3	15,940.2	9,550.2	3,206.6	1,814.7	1,078.6	51,768.4	5.5	2,863.1
Sub-Total CIVIL WORKS	6,675.8	13,504.3	15,940.2	9,550.2	3,206.6	1,814.7	1,078.6	51,768.4	5.5	2,863.1
C. MACHINERY AND EQUIPMENT	7,357.3	8,155.3	7,208.7	4,078.9	2,182.0	1,510.3	558.3	31,048.8	11.0	3,412.5
D. VEHICLES	1,789.9	1,538.8	2,077.8	2,108.5	504.6	307.4	78.8	8,405.8	21.7	1,826.0
E. WORKING CAPITAL	168.5	897.1	3,206.4	4,623.4	1,079.1	657.0	168.5	10,800.0	0.0	0.0
F. JT. VENT. EQ. PART.	1,071.4	1,071.4	1,071.4	1,071.4	1,071.4	1,071.4	1,071.4	7,500.0	0.0	0.0
<b>Total INVESTMENT COSTS</b>	<b>17,285.6</b>	<b>25,512.7</b>	<b>28,871.7</b>	<b>21,670.2</b>	<b>8,113.1</b>	<b>5,403.2</b>	<b>2,864.4</b>	<b>110,831.0</b>	<b>7.3</b>	<b>8,101.6</b>
<b>II. RECURRENT COSTS</b>										
A. SALARIES, ALLOWANCES, WAGES	3,021.6	5,148.8	7,856.4	9,614.2	9,838.0	9,746.5	9,791.0	55,014.5	0.0	0.0
B. OTHER INCREMENTAL OPERATING COSTS	5,890.9	7,838.8	10,299.2	11,789.6	11,666.3	10,848.9	10,183.8	68,517.4	0.0	0.0
<b>Total RECURRENT COSTS</b>	<b>8,912.4</b>	<b>12,985.7</b>	<b>18,155.6</b>	<b>21,403.8</b>	<b>21,504.3</b>	<b>20,595.4</b>	<b>19,974.7</b>	<b>123,531.9</b>	<b>0.0</b>	<b>0.0</b>
<b>Total BASELINE COSTS</b>	<b>26,208.0</b>	<b>38,498.3</b>	<b>48,027.3</b>	<b>43,074.0</b>	<b>29,617.4</b>	<b>25,998.6</b>	<b>22,939.2</b>	<b>234,362.8</b>	<b>3.5</b>	<b>8,101.6</b>
Physical Contingencies	2,717.8	4,216.7	5,031.2	4,086.2	2,874.8	2,498.1	2,218.7	23,643.6	3.6	882.0
Price Contingencies	1,082.7	4,759.2	9,527.9	11,575.8	11,094.6	12,154.7	13,126.1	320.9	2.4	1,534.4
<b>Total PROJECT COSTS</b>	<b>30,008.6</b>	<b>47,474.2</b>	<b>62,586.3</b>	<b>58,736.0</b>	<b>43,586.9</b>	<b>40,651.4</b>	<b>38,283.9</b>	<b>321,327.3</b>	<b>3.3</b>	<b>10,498.1</b>
Taxes	1,128.4	1,512.7	1,737.0	1,406.7	922.6	794.5	638.7	8,140.5	0.0	0.0
Foreign Exchange	1,768.0	2,416.0	2,788.0	2,000.3	785.0	516.1	224.7	10,498.1	0.0	0.0

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INDIA  
NATIONAL SERICULTURE PROJECT-JAMMU KASHMIR  
Summary Accounts by Year  
(RS. '000)

	Base Costs								Foreign Exchange	
	1	2	3	4	5	6	7	Total	%	Amount
<b>I. INVESTMENT COSTS</b>										
A. LAND ACQUISITION	100.6	483.5	980.6	853.4	174.1	105.7	27.1	2,725.0	0.0	0.0
B. CIVIL WORKS										
1. LAND DEVELOPMENT	1,108.2	3,038.2	2,829.8	261.0	435.3	356.5	82.9	8,111.8	0.0	0.0
2. BUILDINGS	2,153.9	2,674.2	2,406.1	1,104.0	1,020.3	1,069.7	773.3	11,201.5	5.5	619.5
Sub-Total CIVIL WORKS	3,262.0	5,712.4	5,235.9	1,365.0	1,455.6	1,426.1	856.3	19,313.3	3.2	619.5
C. MACHINERY AND EQUIPMENT	4,804.9	5,860.1	6,834.1	5,803.3	3,677.4	3,905.8	4,025.6	34,911.3	11.0	3,837.1
D. VEHICLES	1,682.7	1,634.1	1,295.5	492.9	142.0	86.8	22.2	5,356.3	21.7	1,163.6
E. WORKING CAPITAL	4,862.9	1,824.8	551.6	47.9	63.5	38.3	10.1	7,200.0	0.0	0.0
<b>Total INVESTMENT COSTS</b>	<b>14,713.2</b>	<b>15,315.0</b>	<b>14,897.7</b>	<b>8,562.6</b>	<b>5,512.5</b>	<b>5,563.7</b>	<b>4,941.3</b>	<b>69,505.9</b>	<b>8.1</b>	<b>5,620.1</b>
<b>II. RECURRENT COSTS</b>										
A. SALARIES, ALLOWANCES, WAGES	2,723.1	3,979.5	5,231.4	5,689.6	5,807.4	5,817.9	5,813.1	35,062.0	0.0	0.0
B. OTHER INCREMENTAL OPERATING COSTS	1,209.3	1,955.2	3,027.6	3,880.1	4,000.4	4,072.4	4,218.9	22,343.9	0.0	0.0
<b>Total RECURRENT COSTS</b>	<b>3,932.4</b>	<b>5,934.7</b>	<b>8,259.0</b>	<b>9,569.7</b>	<b>9,807.8</b>	<b>9,890.3</b>	<b>10,032.0</b>	<b>57,405.9</b>	<b>0.0</b>	<b>0.0</b>
<b>Total BASELINE COSTS</b>	<b>18,645.7</b>	<b>21,249.7</b>	<b>23,156.7</b>	<b>18,112.2</b>	<b>15,320.2</b>	<b>15,453.9</b>	<b>14,973.3</b>	<b>126,911.8</b>	<b>4.4</b>	<b>5,620.1</b>
Physical Contingencies	1,447.2	2,118.0	2,359.5	1,764.7	1,574.0	1,597.9	1,535.3	12,396.5	4.3	534.8
Price Contingencies	593.3	2,537.8	4,874.8	5,533.3	8,149.7	7,706.2	9,012.1	36,407.2	3.5	1,282.4
<b>Total PROJECT COSTS</b>	<b>20,686.1</b>	<b>25,905.5</b>	<b>30,391.0</b>	<b>25,410.3</b>	<b>23,043.9</b>	<b>24,758.0</b>	<b>25,520.7</b>	<b>175,715.5</b>	<b>4.2</b>	<b>7,437.3</b>
Taxes	632.8	814.0	972.6	853.6	640.3	707.2	756.7	5,377.3	0.0	0.0
Foreign Exchange	1,130.9	1,376.7	1,506.6	1,118.4	729.8	785.2	789.6	7,437.3	0.0	0.0

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INDIA  
NATIONAL SERICULTURE PROJECT-JAMMU KASHMIR  
Project Components by Year  
(RS. '000)

	Base Costs							Total	
	1	2	3	4	5	6	7	RS.	(US\$ '000)
<b>A. RESEARCH AND DEVELOPMENT (BREEDING)</b>									
B. BASIC SEED PROD/MULT (P2, P3, P4)	350.4	587.3	996.7	883.4	303.1	239.0	174.7	3,534.5	236.1
C. COML SEED PROD. (F1 GRAINAGES)	7,019.2	6,599.7	5,447.6	705.5	507.8	313.4	80.4	20,673.6	1,381.0
D. PRIVATE CHAMRI REARING	2,064.1	2,115.3	2,363.2	2,825.7	3,329.6	4,096.5	4,780.5	21,574.9	1,441.2
E. MULBERRY PLANTATIONS	1,234.2	2,168.2	3,269.2	3,293.6	2,443.3	2,231.5	2,122.2	16,762.2	1,119.7
F. COCOON MARKETS	1,276.3	1,797.7	1,620.4	712.5	1,398.6	1,817.0	1,226.7	9,649.3	644.6
G. COCOON DRYING	1,208.1	909.5	2,265.4	4,333.6	2,428.7	2,091.8	1,851.2	15,088.2	1,007.9
H. SILK EXCHANGE	275.3	333.0	356.4	286.0	255.1	250.0	242.9	1,998.7	133.5
I. EXTENSION	1,638.8	2,603.1	2,933.1	2,310.7	2,373.5	2,402.3	2,381.4	16,623.0	1,110.4
J. TRAINING CENTERS	545.1	935.7	1,064.8	752.1	623.2	607.4	593.4	5,121.6	342.1
K. CSB/DOS ADMINISTRATION	3,034.0	3,200.3	2,839.9	2,009.0	1,657.4	1,605.0	1,540.0	15,825.6	1,061.2
<b>Total BASELINE COSTS</b>	<b>18,645.7</b>	<b>21,249.7</b>	<b>23,156.7</b>	<b>18,112.2</b>	<b>15,320.2</b>	<b>15,453.9</b>	<b>14,973.3</b>	<b>126,911.6</b>	<b>8,477.7</b>
Physical Contingencies	1,447.2	2,118.0	2,359.5	1,764.7	1,574.0	1,597.9	1,535.3	12,398.5	828.1
Price Contingencies	593.3	2,537.8	4,874.8	5,533.3	6,149.7	7,706.2	9,012.1	36,407.2	1,734.6
<b>Total PROJECT COSTS</b>	<b>20,686.1</b>	<b>25,905.5</b>	<b>30,391.0</b>	<b>25,410.3</b>	<b>23,043.9</b>	<b>24,758.0</b>	<b>25,520.7</b>	<b>175,715.5</b>	<b>11,040.5</b>
Taxes	632.8	814.0	972.6	853.6	640.3	707.2	756.7	5,377.3	338.2
Foreign Exchange	1,130.9	1,376.7	1,506.6	1,118.4	729.8	785.2	789.6	7,437.3	471.0

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**INDIA**  
**NATIONAL SERICULTURE PROJECT**

**SCHEDULE OF ESTIMATED DISBURSEMENTS (IBRD/IDA)**

<b>FY/Semester</b>	<b>Disbursement (US\$ M)</b>	<b>Cum. Disbursement (US\$ M)</b>	<b>% of Loan/ Credit</b>
<b>1990 I</b>	<b>0.0</b>	<b>0.0</b>	<b>0%</b>
<b>II</b>	<b>3.5</b>	<b>3.5</b>	<b>2%</b>
<b>1991 I</b>	<b>7.1</b>	<b>10.6</b>	<b>6%</b>
<b>II</b>	<b>8.9</b>	<b>19.5</b>	<b>11%</b>
<b>1992 I</b>	<b>12.4</b>	<b>31.9</b>	<b>18%</b>
<b>II</b>	<b>12.4</b>	<b>44.3</b>	<b>25%</b>
<b>1993 I</b>	<b>12.4</b>	<b>56.6</b>	<b>32%</b>
<b>II</b>	<b>12.4</b>	<b>69.0</b>	<b>39%</b>
<b>1994 I</b>	<b>12.4</b>	<b>81.4</b>	<b>46%</b>
<b>II</b>	<b>17.7</b>	<b>99.1</b>	<b>56%</b>
<b>1995 I</b>	<b>15.9</b>	<b>115.1</b>	<b>65%</b>
<b>II</b>	<b>14.2</b>	<b>129.2</b>	<b>73%</b>
<b>1996 I</b>	<b>21.2</b>	<b>150.5</b>	<b>85%</b>
<b>II</b>	<b>26.6</b>	<b>177.0</b>	<b>100%</b>

## **India**

### **National Sericulture Project**

#### **Key Data and Indicators to be included in Progress reports of Participating States and CSB**

Items mentioned below will be reported in columnar form, as appropriate, to indicate and compare total targets under the project, those for the year in progress, completed during the reporting period and cumulative progress since commencement of the project. Units for reporting physical progress and/or amounts will vary depending upon the nature of the item being reported. Reporting by CSB will include all project activities in Pilot States. Format and contents of initial Progress Report(s) will be reviewed in detail by the first supervision missions and modified as appropriate. (Headings below generally follow the Implementation Program per Schedule to the Project Agreement).

#### **I. Key Silk production Indicators**

- (a) Area under mulberry cultivation, broken down by irrigated and rain fed.
- (b) F1 seed production broken down by (i) public sector and private grainages and by (ii) bivoltine and multi-voltine seeds.
- (c) Cocoon production (or marketed) distinguishing by bivoltine and multi-voltine.
- (d) Raw Silk Production also by bi-voltine and multi-voltine

#### **II. Research and Development**

- (a) Physical progress on construction (or expansions) of all research facilities under the project- i.e Seed Technology Laboratory, Germ Plasm Bank, Bio-technology laboratory, RSRs and Sericulture Development Institutes.
- (b) Research Programs of Universities; Research Projects approved and disbursement progress against approved programs.

#### **III. Basic seed Production**

Physical progress on construction of basic seed farms programmed under the project (para 3.16 of SAR)

#### **IV Private Sector CRCs**

Number of Private Sector CRCs being established during project implementation, distinguishing between conversion of existing ones and those newly established.

#### **V. Cocoon markets, Drying chambers and Testing units**

Physical progress on construction and establishment of the units under the project.

#### **VI. Extension Services**

**Progress on number of Technical Service Centers (TSCs) being set up compared to Project targets.**

**VII. Silk Testing Houses**

- (a) Progress on construction and commencement of operations of Silk testing.**
- (b) Indication of quantities of raw silk being tested and summary results by grades of silk yarn coming into the exchange.**

**VIII. Credit.**

- (a) Description (in narrative form), of actions being taken to ensure flow of credit to eligible borrowers through the banking system - both reelers and farmers. (Indicate for eg., schemes promoted, amounts disbursed, etc.)**
- (b) Indication of amounts and number of loans made under the 'Advances to Reelers' component of the project.**

**IX. Conversion of Chullas**

**Progress on number of chullas converted compared to project targets.**

**X. Role of Women and NGOS**

- (a) Indication of progress on recruitment and training of women compared against project targets (annex 6 of SAR).**
- (b) Brief description of actions taken for support of NGOs in sericulture (number of NGOs assisted, types of assistance, results attained or expected etc.).**

**XI. Technical Assistance & overseas training**

**Description and data on technical**

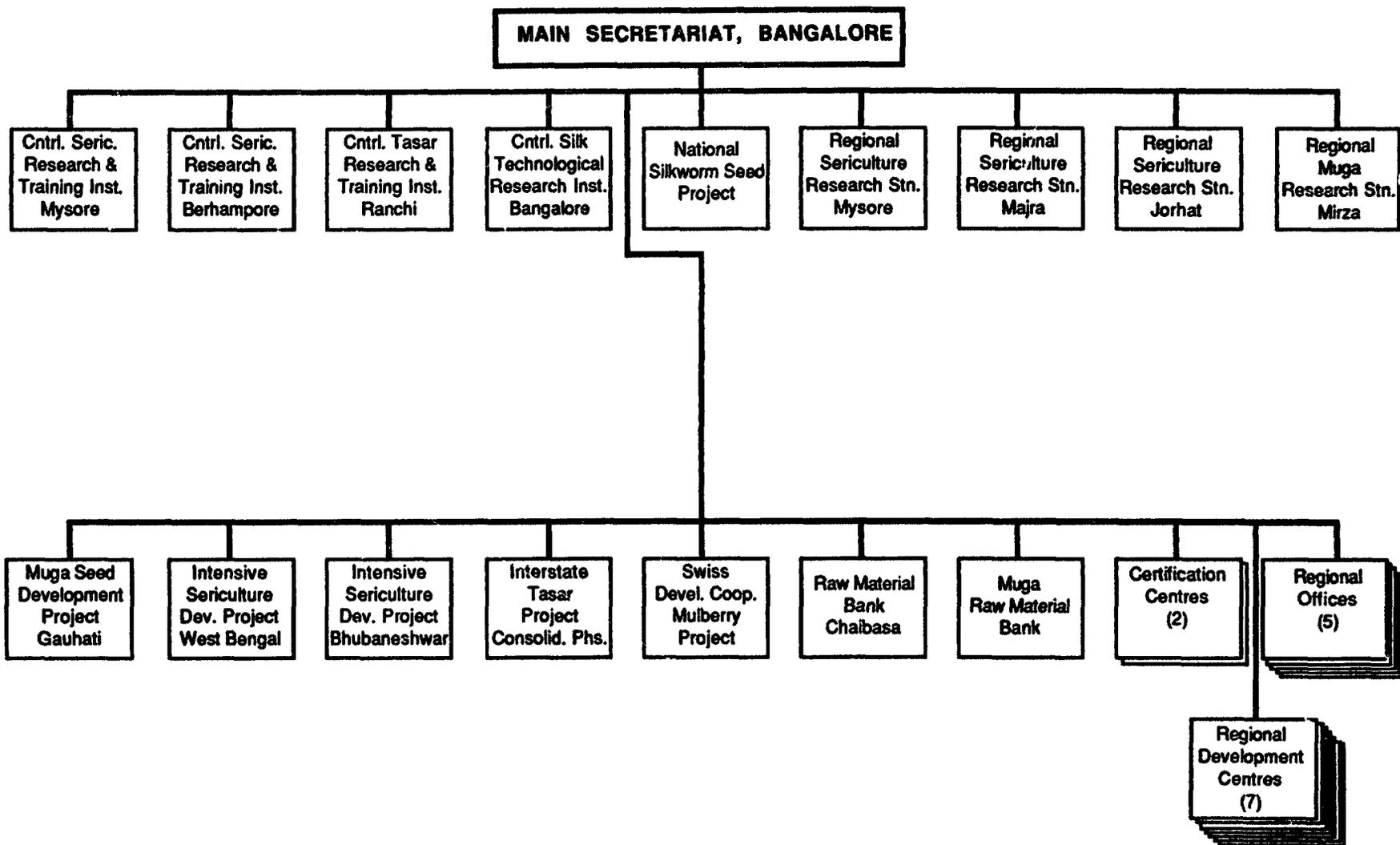
**XII. Joint Ventures in Reeling**

**Indicate number, types of establishments and amounts (and share of state participation ) invested in share capital of joint ventures.**

**INDIA  
NATIONAL SERICULTURE PROJECT**

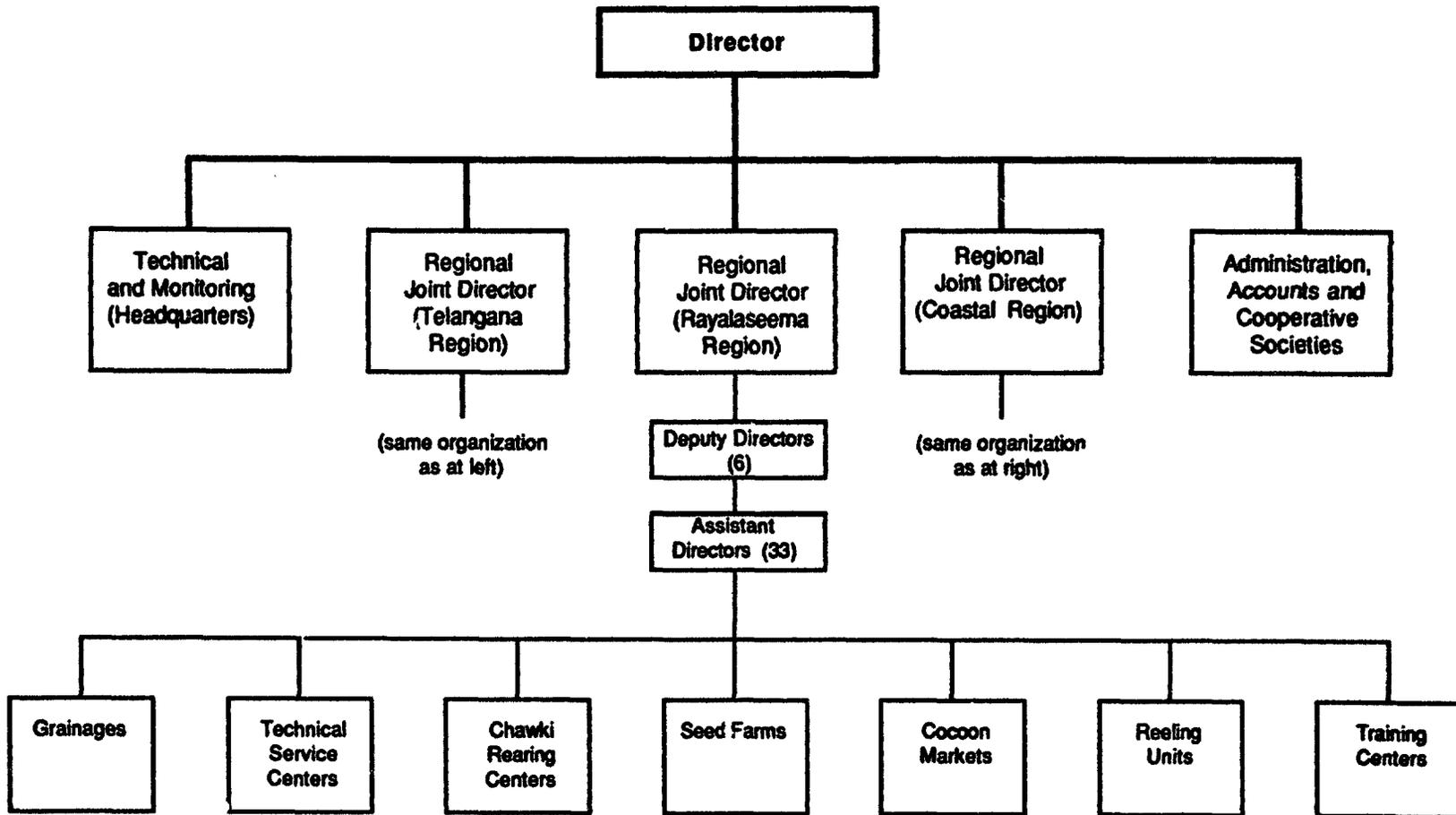
**CENTRAL SILK BOARD**

**ORGANIZATION CHART**



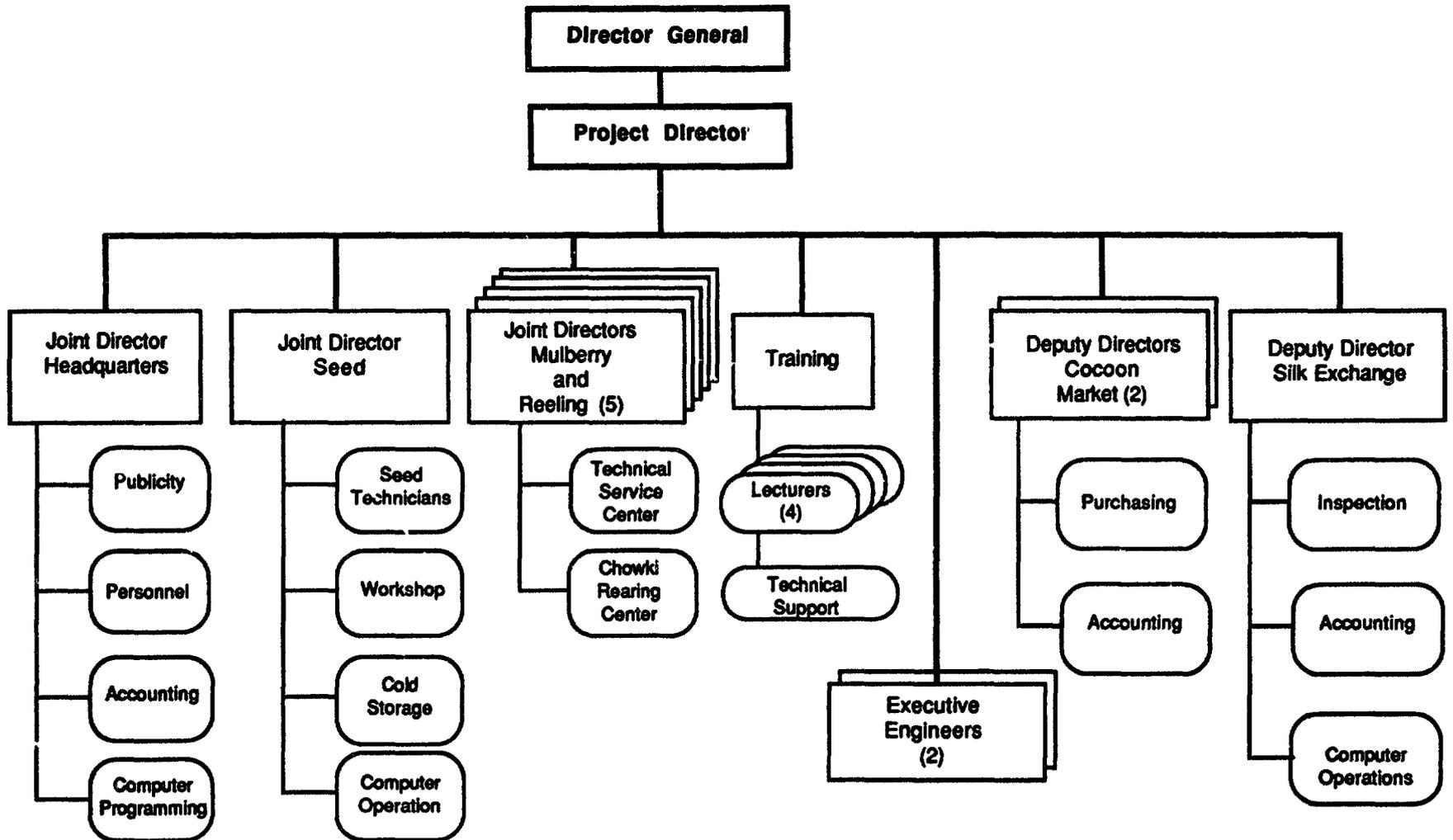
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NATIONAL SERICULTURE PROJECT**

**GOVERNMENT OF ANDHRA PRADESH - DEPARTMENT OF SERICULTURE  
ORGANIZATION CHART**



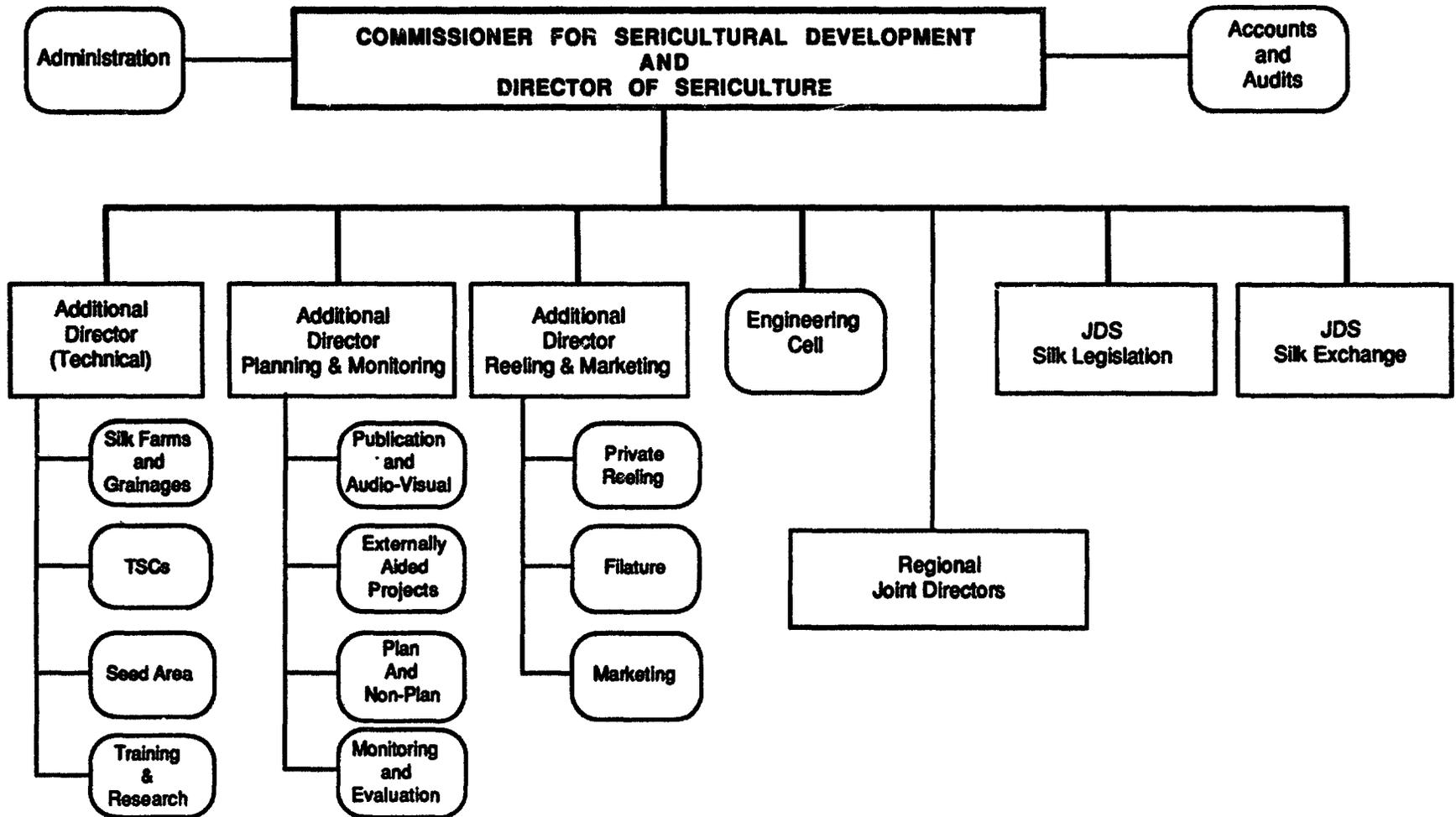
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GOVERNMENT OF JAMMU & KASHMIR - DEPARTMENT OF SERICULTURE  
ORGANIZATION CHART



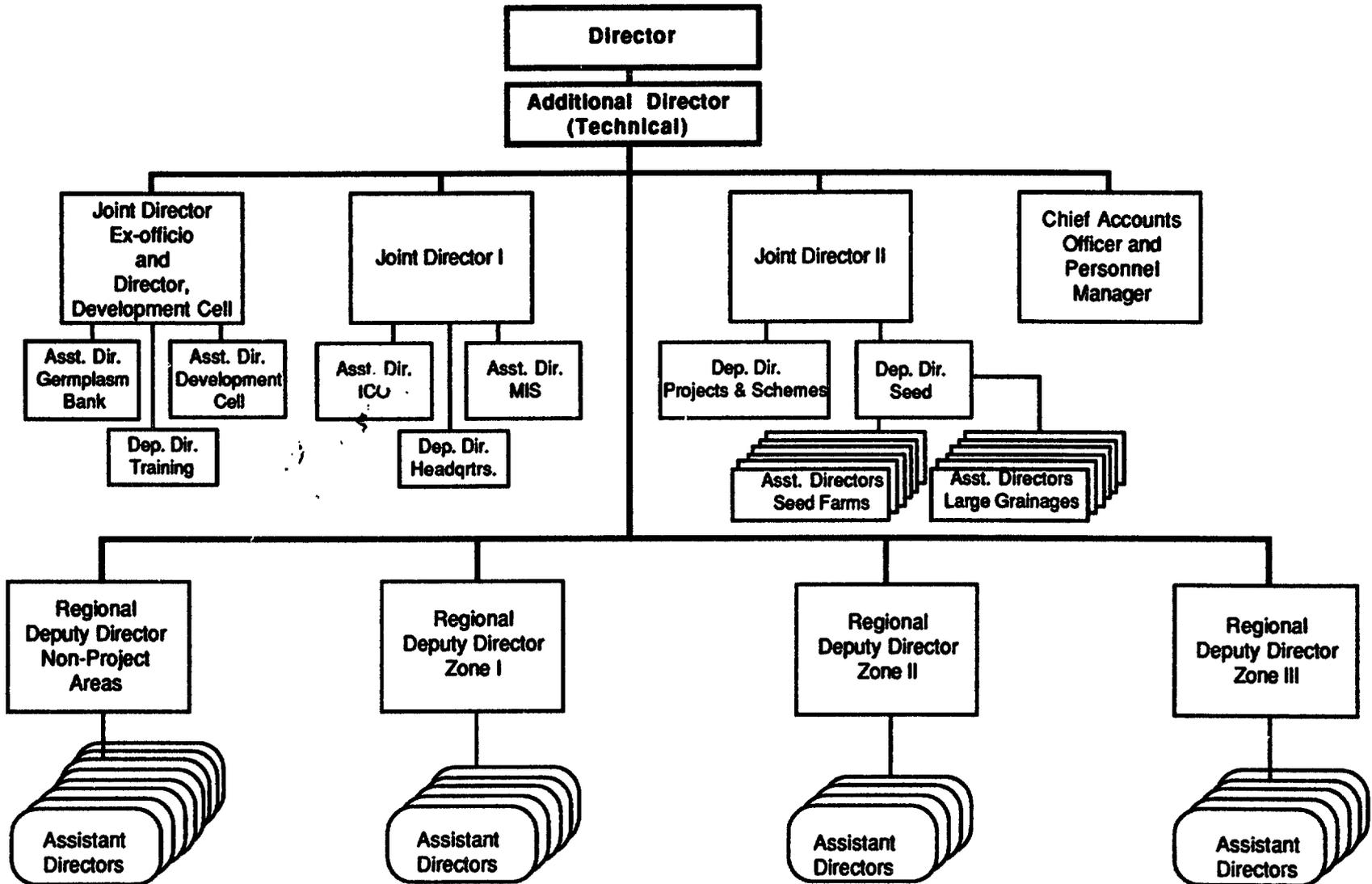
**INDIA  
NATIONAL SERICULTURE PROJECT**

**GOVERNMENT OF KARNATAKA - DEPARTMENT OF  
SERICULTURE  
ORGANIZATION CHART**

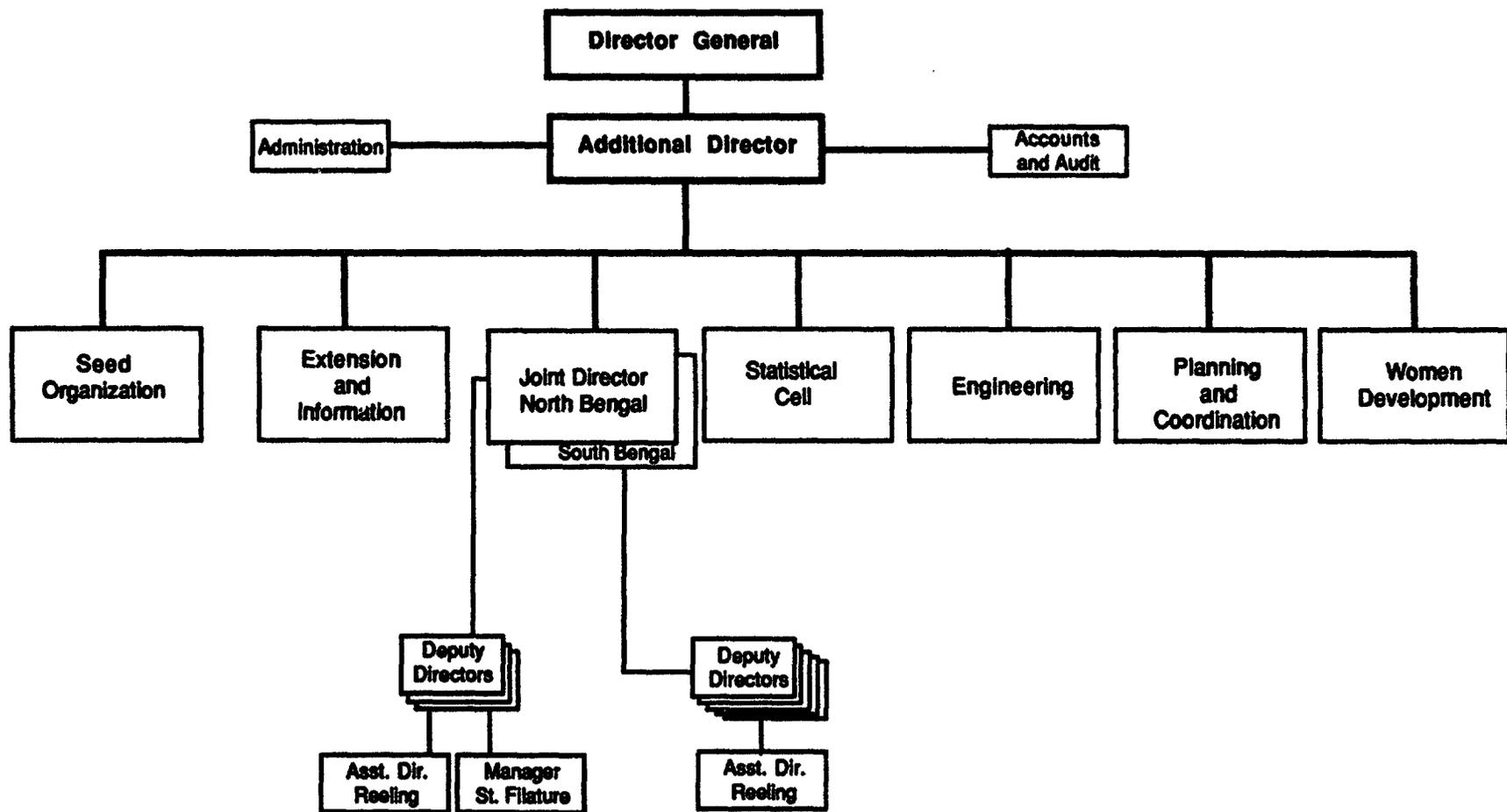


**INDIA  
NATIONAL SERICULTURE PROJECT**

**GOVERNMENT OF TAMIL NADU - DEPARTMENT OF SERICULTURE  
ORGANIZATION CHART**



**INDIA**  
**NATIONAL SERICULTURE PROJECT**  
**GOVERNMENT OF WEST BENGAL - DEPARTMENT OF SERICULTURE**  
**ORGANIZATION CHART**



## INDIA

### National Sericulture Project

#### Women's Role in Sericulture

1. An important feature of sericulture industry is the very high proportion (about 60%) of female labor involved. The share of female labor is particularly high (as much as 80%) in silkworm rearing and cocoon reeling. These operations in the production cycle are of critical importance for the project objectives of quality-improvement of Indian silk over the next few years.

2. This important contribution by women and the significant role played by them has, so far not been explicitly recognised by the state agencies in formulating their procedures and guidelines for field operations, training programs, recruitment policies etc. Measures need to be taken to ensure more ready access by women to production resources, inputs, know-how and supporting services. To this end, CSB and the state DOSs have identified several specific actions to be taken under this project in various aspects of their operations. However, much remains to be done; it is also evident that identification of, and making conscious efforts to, address these within project agencies and state and central administration generally is a continuous effort, requiring senior staff devoted specifically for such efforts. As part of the actions foreseen under this project, each of the participating states will employ a senior female officer who will be responsible for all tasks related to support of women in sericulture. These officers will, in addition, also co-ordinate and direct project agencies' efforts to support and provide assistance to non-government organizations engaged in sericulture activities.

3. Agreements, to be confirmed at negotiations, for specific actions envisaged under the project will consist of the following:

- a) Each of the participating states shall, by the latest September 30, 1989, employ a senior, female officer, reporting directly to the Director of the DOS whose qualification, and terms of reference shall be acceptable to IDA.
- b) CSB and DOSs will issue appropriate guidelines to their extension staff to (i) pay special attention to identification of female-headed households for expansion of mulberry/sericulture coverage under the project and provision of services, training and other benefits under the project, and (ii) to include women in their regular extension-service dialogue and contacts with sericulture households.
- c) As part of the expansion of sericulture extension service, Karnataka will commence appointing 'female para-extension agents' who will work with and supplement the work of regular extension staff. While not on regular DOS payrolls, these agents will be paid a small honorarium for their work. By the final project year, Karnataka will deploy 300 such women agents. West Bengal will seriously consider similar actions.

- d) In order to encourage women to bring cocoons to the market on their own, DOSs shall allocate special separate space in cocoon market halls for women and make the necessary changes in the auction procedures to have their cocoon lots auctioned first.
- e) DOSs will ensure that the names of female sericulturists are written next to their husband's name in the sericulture pass-books and that all facilities normally available on production of pass books are also allowed to women.
- f) CSB and DOSs will ensure that all new buildings to be constructed under the project (DOS headquarters, research institutes, training schools, grainages, cocoon markets, silk exchanges and testing houses, etc.) shall have separate, adequate sanitary facilities for women, and make provision for such facilities in their existing facilities.
- g) CSB and participating states shall make reasonable efforts to attain the following targets for recruitment of women:

CSB: (i) 20% of its total staff in TSCs (Technical Service Centers) shall be women by the end of the third project period. (ii) By the end of the project, women shall constitute at least 15% of the staff of its grainages and at least 7 grainages shall be headed by women.

Karnataka and West Bengal: At least 30% of new staff to be recruited under the project shall be women: DOSs will attempt to have this target distributed evenly to all its main operations (management, extension and technical activities).

Tamil Nadu: (i) 25% of its new extension staff to be recruited under the project shall be women. (ii) It will, by June 1990, recruit the 50 women trained by the Ford Foundation as extension workers.

Andhra Pradesh: In respect of new recruitment under the project, it will fulfill the present requirement of the state government to allocate at least 30% of recruitment under each main category of posts for women.

J&K would make reasonable efforts to allocate 50% of recruitment of additional staff under the project to women

- h) The CSB and the participating states will make a reasonable attempt to realize the following targets in their training programs financed under the project:

CSB: 20% of the candidates sponsored by CSB for training abroad will be women and 25% of the trainees from NGOs will be women. For training courses in rearing and reeling, all states shall give priority to women and aim to have a majority of women out of the total number of trainees over the project period. Karnataka and West Bengal will organize special training from women at village level. Farmers training in J&K will include at least 100 women on the first year, increasing to 500 in the fifth year of the project.

- i) **Group Formation:** CSB and participating states will give all possible support to local groups (NGOs, mahila mandils, etc.) involved in organizing landless women, female heads of households, etc. in helping them to benefit from the project activities (e.g. assistance in land acquisition for group mulberry cultivation, access to inputs, search for support from government programs, provision of training and technical advice, organization of mulberry nurseries, private grainages and CRCs, organizations of cooperatives, etc.).
- j) **Technological Development:** Special attention will be paid to the promotion of improved technology (improved charkas, smokeless chulhas, efficient stifling ovens, etc.) to women and women's groups. Further research will also be promoted by CSB to reduce health hazards and improve working conditions.

## INDIA

NATIONAL SERICULTURE PROJECT  
PRODUCTION DETAILSAREA UNDER MULBERRY

PARTICULARS	UNITS	KARNATAKA	ANDRHA PRADESH	TAMIL NADU	WEST BENGAL	JAMMU & KASHMIR	CSB PILOT STATES	TOTAL
<b>1. Mulberry Area</b>								
<b>a) Present</b>								
i) Rainfed	ha	60,959	0	3,876	14,050	982	2,960	82,827
ii) Irrigated	ha	79,497	43,289	27,876	486	559	3,670	155,377
<b>Total</b>		<b>140,456</b>	<b>43,289</b>	<b>31,752</b>	<b>14,536</b>	<b>1,541</b>	<b>6,630</b>	<b>238,204</b>
<b>b) Project Additions</b>								
i) Rainfed	ha	0	0	2,800	4,700	1,925	0	9,425
ii) Irrigated	ha	15,000	10,000	8,660	2,500	825	11,200	48,185
<b>Total</b>		<b>15,000</b>	<b>10,000</b>	<b>11,460</b>	<b>7,200</b>	<b>2,750</b>	<b>11,200</b>	<b>57,610</b>
<b>c) Project and Total</b>								
i) Rainfed	ha	60,959	0	6,676	18,750	2,907	2,960	92,252
ii) Irrigated	ha	94,497	53,289	36,536	2,986	1,384	14,870	203,562
<b>Total</b>		<b>155,456</b>	<b>53,289</b>	<b>43,212</b>	<b>21,736</b>	<b>4,291</b>	<b>17,830</b>	<b>295,814</b>

## INDIA

## NATIONAL SERICULTURE PROJECT

## ECONOMIC AND FINANCIAL ANALYSIS

Economic Analysis

1. Economic rates of return were estimated for a 20-year period. Costs and benefits were expressed in border price equivalents and in constant 1989 Rupees. The results are summarised in Table 1, with sensitivity analysis in Table 2.
2. Costs include the capitalized net benefits foregone (from other uses) on land used for new mulberry plantations, on-farm investments for mulberry plantations and rearing, on-farm recurrent costs, buildings, equipment and operating costs for reeling, the production cost of silkworm eggs and young silkworms - which incorporates the direct costs of seed farms, grainages and chawki rearing centers<sup>1</sup> - and the relevant part of the costs of the Departments of Sericulture and the Central Silk Board (research, extension, training, technical assistance, marketing and incremental administrative expenditures). Neither the costs nor the benefits projected for pilot states have not been included in the analysis, since the very nature of a pilot makes it difficult to estimate such costs and benefits in advance. The project's support to existing sericulture areas has also been excluded from the analysis, as the investment costs in existing sericulture are largely sunk, and the incremental benefits in terms of increased cocoon production attributable to the relatively small increases in investment and operating costs would result in an ERR so high that it would distort the analysis of the value of investments in new sericulture areas. A common (standard) conversion factor of 0.8 was applied to all costs. Costs include physical contingencies.
3. Project benefits include incremental raw silk produced (see Table 1 for projections of incremental silk due to the project), silk waste, by-products and the fuelwood value of mulberry crop residues.
4. The economic price for raw silk is based on recent international contract prices for raw silk (US\$59/kg). Two adjustments have been made to this price: first, since prices have recently risen very sharply the price used in the economic analysis has been reduced by 15%. Secondly, to reflect the price preference exhibited in domestic markets for imported quality silk, the price has been further reduced by 15%. It has been assumed that the price would rise, in real terms, by 2% every year due to rapidly increasing demand and also to improving quality.

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<sup>1</sup> The direct project cost of seed production and chawki rearing was used to calculate the economic cost of eggs/silkworms to avoid double-counting, as the cost of eggs is already included under operating costs. The resulting unit costs of eggs are two to three times higher than assumed financial prices.

### Financial Analysis

5. Financial rates of return have been estimated for the main project beneficiaries - silkworm rearers - further subdivided by region and size of operation, and whether on irrigated or rainfed mulberry land. The results of the analysis are shown in Tables 3-7.

6. Silkworm Rearing: New Planting Models. The models chosen are representative of the investment alternatives in different states. Silkworm rearers' returns vary between regions depending on the cropping (rearing) pattern possible and prevalent in an area. In J & K for example, rearers presently take only one crop a year compared to four (and sometimes five) crops possible in the southern states and West Bengal. Farmers' investment and income patterns also vary depending on whether their mulberry plantation is on irrigated or rainfed land. These models are applicable to expansion of sericulture to 'new' areas (i.e. farmers undertaking sericulture for the first time, generally replacing the existing crops, usually sugarcane or paddy). The FRRs for these models were calculated for a period of 20 years and for several representative rearing models.

7. FRRs for rearing models range from 9% to 47% in real terms. They are all sufficient to cover the real interest rate on investment loans. Incremental net income to the rearing family would increase by 3 to over 5 times. The impact on family finances would be even better than indicated because switching from existing crops to sericulture significantly increases the demand for family labor which has been fully costed at market rates when calculating the FRR and net farm income.

8. Two of the models show returns substantially lower than the rest. Both assume rainfed conditions, one in the southern states (FRR 14%) and one in J&K (9%). This is due to the lower yields (and hence cocoon income) which would be obtained in the absence of irrigation. The J&K model may be considered a "worst case" scenario for sericulture development because it assumes low yield rainfed conditions, the highest investment and operating costs, and the lowest bivoltine cocoon prices of the five major project states, due largely to J&K's isolation. However, in both models returns would be more than sufficient to cover debt service payments, and incomes would exceed pre-project levels 3 to 5 times.

9. Silkworm Rearing: Improvement of Existing Mulberry Areas. The improvements in the existing mulberry areas would entail only small investment costs. Yield increases would come from increased use of fertilizer, labor, silkworm eggs and disinfectant, and thus require higher operating costs. These improvements are financially attractive in terms of incremental net income. At full development, incremental costs of Rs 812 on 0.4 ha of rainfed land lead to an incremental income of Rs 1,500. On irrigated land, Rs 1,971 in incremental costs result in Rs 4,480 additional income.

NATIONAL SERICULTURE PROJECT

Economic Rate of Return

	Total	1	2	Year 3	4	5	6-20†
<b>Investment costs</b>							
Land	2,209	312	392	475	510	520	
On-farm	1,551	224	276	325	355	371	
Reeling	138	3	12	20	25	35	25
DOS/CSB	436	68	168	99	100	2	
Subtotal	4,335	607	848	919	990	928	25
(Adjusted to December, 1988)	+6%	36	51	55	59	56	2
Subtotal	4,595	644	398	974	1,050	984	27
<b>Operating costs</b>							
On-farm	15,416	25	142	301	494	704	882
Reeling	3,470	5	25	57	95	149	187
DOS/CSB	1,848	14	31	35	38	108	108
Subtotal	20,734	45	198	393	627	962	1,177
(Adjusted to December, 1988)	+6%	3	12	24	38	58	71
Subtotal	21,978	48	210	417	665	1,020	1,247
Total base costs	26,573	691	1,109	1,391	1,714	2,003	1,274
Physical contingencies	2,436	38	72	92	120	148	127
Total financial costs	29,009	729	1,180	1,483	1,835	2,152	1,402
Total economic costs	23,207	583	944	1,186	1,468	1,721	1,121
<b>Benefits</b>							
Raw silk	45,312	56	267	609	1,043	1,671	2,131
Silk waste	516	1	4	8	14	22	28
By-products	135	0	1	2	4	6	7
Fuel wood	999	8	17	30	43	56	56
Residual value	477						
Total Benefits	47,439	64	289	649	1,104	1,755	2,222
Net Benefits	24,231	-519	-655	-537	-363	34	1,101

Base Economic Rate of Return 32%

†Note: Except economic price of raw silk, projected to increase by 2%/year.

**INDIA**

**NATIONAL SERICULTURE PROJECT**

**SENSITIVITY ANALYSIS**

**Overall project ERR**

base case	<b>32%</b>
investment costs & operating costs +20%	<b>23%</b>
total costs +20%	
silk price -20%	<b>22%</b>
silk price -40%	<b>10%</b>
total cost: +20% and total benefits -20%	<b>14%</b>

Switching values at a 12% discount rate	appraisal value /a -----Rs	switching value /a million-----	% change
<b>Costs</b>			
investment costs	<b>2,740</b>	<b>8,148</b>	<b>197%</b>
operating costs	<b>4,941</b>	<b>10,348</b>	<b>109%</b>
total costs	<b>7,681</b>	<b>13,089</b>	<b>70%</b>
<b>Benefits</b>			
silk value	<b>12,530</b>	<b>7,122</b>	<b>-43%</b>
total benefits	<b>13,089</b>	<b>7,681</b>	<b>-41%</b>

/a In present value terms.

**INDIA**

**NATIONAL SERICULTURE PROJECT**

**FRR CALCULATION**

**0.4 ha, New Irrigation, Karnataka,  
Multi-bivoltine  
(Rs)**

	<b>Total</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6-20†</b>
<b>Investment costs</b>							
field work	2,000	2,000					
equipment	5,200	5,200					
rearing house	18,000			18,000			
irrigation	14,000	14,000					
Subtotal	39,200	21,200	0	18,000	0	0	0
<b>Operating costs</b>	166,800	1,200	7,200	8,800	8,800	8,800	8,800
<b>Total base costs</b>	206,000	22,400	7,200	26,800	8,800	8,800	8,800
Physical contingenc	20,600	2,240	720	2,680	880	880	880
<b>Total financial costs</b>	226,600	24,640	7,920	29,480	9,680	9,680	9,680
<b>Benefits</b>							
Cocoons	421,491	3,540	14,178	18,857	19,234	19,619	20,011
Fuel wood	9,600	480	480	480	480	480	480
Residual value	7,840						
<b>Total benefits</b>	438,931	4,020	14,658	19,337	19,714	20,099	20,491
Net benefits	212,331	-20,620	6,738	-10,143	10,034	10,419	10,811
<b>Net pre-proj income</b>	20,800	1,040	1,040	1,040	1,040	1,040	1,040
<b>Net incr benefits</b>	191,531	-21,660	5,698	-11,183	8,994	9,379	9,771

†Note: Except price of raw silk, projected to increase by 2%/year.

FRR = 26%

NPV = 35,149

NATIONAL SERICULTURE PROJECT

FRR CALCULATION

0.2 ha, Rainfed, West Bengal,  
Multi-bivoltine  
(Rs)

	Total	1	2	3	4	5	6-20†
<b>Investment costs</b>							
field work	1,100	1,100					
equipment	2,200	2,200					
rearing house	8,000			8,000			
irrigation	0	0					
Subtotal	11,300	3,300	0	8,000	0	0	0
<b>Operating costs</b>	44,060	660	2,000	2,300	2,300	2,300	2,300
<b>Total base costs</b>	55,360	3,960	2,000	10,300	2,300	2,300	2,300
Physical contingencies	5,536	396	200	1,030	230	230	230
<b>Total financial costs</b>	60,896	4,356	2,200	11,330	2,530	2,530	2,530
<b>Benefits</b>							
Cocoons	144,977	2,160	4,341	6,467	6,596	6,728	6,863
Fuel wood	4,800	240	240	240	240	240	240
Residual value	2,260						
<b>Total benefits</b>	152,037	2,400	4,581	6,707	6,836	6,968	7,103
Net benefits	91,141	-1,956	2,381	-4,623	4,306	4,438	4,573
Net pre-proj income	12,800	640	640	640	640	640	640
Net incr benefits	78,341	-2,596	1,741	-5,263	3,666	3,798	3,933

†Note: Except price of raw silk, projected to increase by 2%/year.

FRR = 47%

NPV = 18,087

INDIA

NATIONAL SERICULTURE PROJECT

FRR CALCULATION

0.4 ha, New rainfed, Tamil Nadu  
Multi-bivoltine  
(Rs)

	Total	1	2	3	4	5	6-20†
<b>Investment costs</b>							
field work	760	760					
equipment	1,240	1,240					
rearing house	8,500			8,500			
irrigation	0	0					
Subtotal	10,500	2,000	0	8,500	0	0	0
<b>Operating costs</b>	56,320	520	1,800	3,000	3,000	3,000	3000
<b>Total base costs</b>	66,820	2,520	1,800	11,500	3,000	3,000	3000
Physical contingencies	6,682	252	180	1,150	300	300	300
<b>Total financial costs</b>	73,502	2,772	1,980	12,650	3,300	3,300	3300
<b>Benefits</b>							
Cocoons	102,387	762	2,056	4,428	4,754	4,849	4946.28
Fuel wood	9,600	480	480	480	480	480	480
Residual value	2,100						
<b>Total benefits</b>	114,087	1,242	2,536	4,908	5,234	5,329	5426.28
<b>Net benefits</b>	40,585	-1,530	556	-7,742	1,934	2,029	2126.28
Net pre-proj income	16,000	800	800	800	800	800	800
<b>Net incr benefits</b>	24,585	-2,330	-244	-8,542	1,134	1,229	1326.28

†Note: Except price of raw silk, projected to increase by 2%/year.

FRR = 14%

NPV = 456

INDIA  
NATIONAL SERICULTURE PROJECT

FRR CALCULATION

0.4 ha, Old Irrigation, Andhra Pradesh,  
Bivoltine  
(Rs)

	Total	1	2	3	4	5	6-20†
<b>Investment costs</b>							
field work	2,000	2,000					
equipment	4,000	4,000					
rearing house	10,000			10,000			
irrigation	0	0					
Subtotal	16,000	6,000	0	10,000	0	0	0
<b>Operating costs</b>	104,920	2,520	9,600	9,600	9,600	9,600	9,600
<b>Total base costs</b>	200,920	8,520	9,600	19,600	9,600	9,600	9,600
Physical contingencies	20,092	852	960	1,960	960	960	960
<b>Total financial costs</b>	221,012	9,372	10,560	21,560	10,560	10,560	10,560
<b>Benefits</b>							
Cocoons	438,803	3,538	14,000	19,674	20,067	20,469	20,878
Fuel wood	9,600	480	480	480	480	480	480
Residual value	3,200						
<b>Total benefits</b>	451,603	4,018	14,480	20,154	20,547	20,949	21,358
<b>Net benefits</b>	230,591	-5,354	3,920	-1,406	9,987	10,389	10,798
Net pre-proj income	62,400	3,120	3,120	3,120	3,120	3,120	3,120
<b>Net incr benefits</b>	168,191	-8,474	800	-4,526	6,867	7,269	7,678
<b>FRR =</b>	<b>40%</b>						
<b>NPV =</b>	<b>36,995</b>						
<b>::</b>							

INDIA

NATIONAL SERICULTURE PROJECT

FRR CALCULATION

0.2 ha, Rainfed, Jammu & Kashmir,  
Bivoltine  
(Rs)

	Total	1	2	3	4	5	6-20†
<b>Investment costs</b>							
field work	5,200	2,600	1,560	1,040			
equipment	3,600	3,600					
rearing house	5,000			5,000			
irrigation	0	0					
Subtotal	13,800	6,200	1,560	6,040	0	0	0
<b>Operating costs</b>	35,200	0	0	1,200	2,000	2,000	2,000
<b>Total base costs</b>	49,000	6,200	1,560	7,240	2,000	2,000	2,000
Physical contingencies	4,900	620	156	724	200	200	200
<b>Total financial costs</b>	53,900	6,820	1,716	7,964	2,200	2,200	2,200
<b>Benefits</b>							
Cocoons	70,543	0	0	3,174	3,357	3,434	3,503
Fuel wood	4,800	240	240	240	240	240	240
Residual value	2,760						
<b>Total benefits</b>	78,103	240	240	3,414	3,597	3,674	3,743
<b>Net benefits</b>	24,203	-6,580	-1,476	-4,550	1,397	1,474	1,543
Net pre-proj income	6,000	300	300	300	300	300	300
<b>Net incr benefits</b>	18,203	-6,880	-1,776	-4,850	1,097	1,174	1,243
<b>FRR =</b>	9%						
<b>NPV =</b>	-3106.5						

**National Sericulture Project**

**Documents in Project File**

**Project Preparation Reports from Central Silk Board and Project States.**

**Original project proposals and cost estimate, and subsequent revisions.**

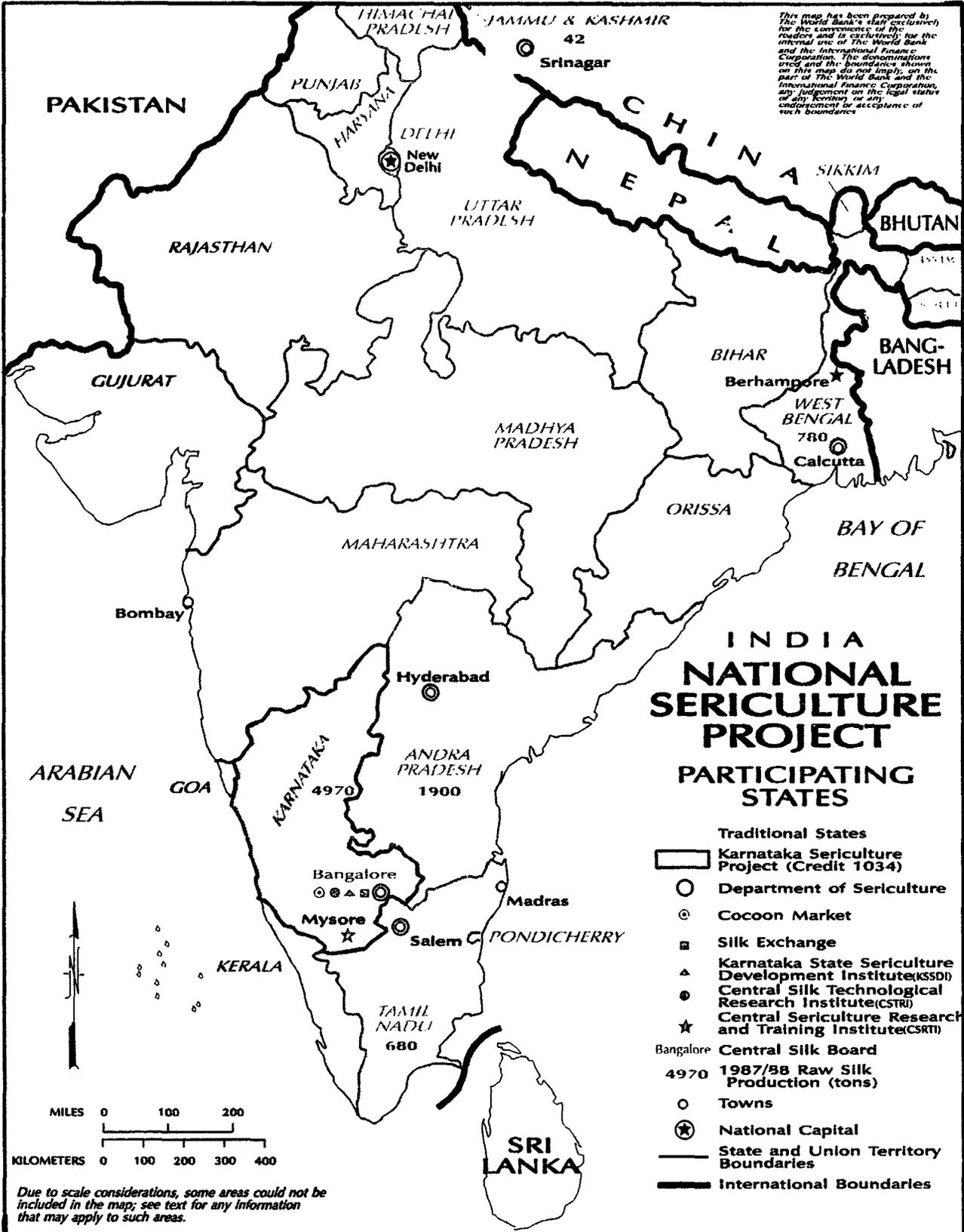
**Consultants Reports: Mr. Shivananda, (Civil engineer), Mr. Boregowda (Civil Engineer), Dr. M.S. Jolly, ( sericulture research scientist), and consultants from Toyo Trading Co.**

**Reports, studies on Bivoltine production in India.**

**Background material on silk technology, seed production etc.**

MAP SECTION

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*Due to scale considerations, some areas could not be included in the map; see text for any information that may apply to such areas.*