Executive Summary

The North East India, comprising of eight states namely Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura is home to the world's richest diversity of sericigenous fauna (silk producing insects). This is the only region where all four varieties of commercial silk namely mulberry, Muga, Eri and Oak Tasar are produced. The silk culture has taken deep roots in the socio-cultural milieu of the region and has significance as it is entwined with the day-to-day lives of the people especially the tribal communities and their rich and diverse weaving traditions.

This study which was carried out under North Eastern Development Finance Corporation Ltd.(Nedfi's)-Techno Economic Development Fund (TEDF) was proposed by North Eastern Council (NEC) in its right earnest to give further impetus to the industry. The objective of the study is to develop a 'Regional Master Plan and Strategy for Development of Sericulture in Increasing the Eri, Muga, Tasar and Mulberry silk production and marketing in the NER. As per the terms of reference, the scope of the study comprises twelve specific objectives. The study was commissioned to M/s Spectrum Planning (India) Ltd through a competitive selection process and executed under the close watch and guidance of a panel of eminent experts in the field.

An exhaustive cross-sectional field survey in all eight states, covering every aspect of sericulture and silk industry was undertaken and the findings were subjected to qualitative and quantitative appraisal. The outcome of the study is presented in this report. The report is organised into Fourteen Chapters each dealing with a major objective set for the study. Chapter-wise summary with key recommendations is presented here as an overview of the report. Detailed analyses of of a few case-studies (conducted across the region) on interesting and important issues, stake-holders and products are presented in Annexures 9 and 10. These case studies may not be representative of the entire NER. However, these qualitative analyses narrate real-life situations and the multiplicity of factors determining their status, which may not be captured by numerical data. In this respect these case studies provide the policy maker important insights into the issues in their social contexts especially in real-life situations.

Following paras present the Chapter-wise summary with key recommendations as an overview of the report. The introductory chapter presents the scope of work and methodology adopted for the study.

Key Findings

1. Production, Productivity and Area Covered Under Silk Cultivation

The first chapter undertakes a detailed analysis of the secondary data on silk production in the North Eastern Region and also attempts to re-validate the official production data, in the light of primary data generated from field survey.

1.A. Predominance of Ericulture

The North Eastern sericulture is predominantly ericulture based. According to the official data Eri silk accounts for more than 90% of the total silk output of NER. There are very strong region specific socio-economic, ethno-cultural and agro-climatic factors that support ericulture. The primary survey and interaction with practitioners of ericulture reveal that in comparison with mulberry and muga, the eri sector receives less R&D and extension support. Assam and Meghalaya are the strong-holds of ericulture (Assam-65% and Meghalaya-15.6%). Ericulture in these two states need to be given priority status with respect to financial supports, R&D focus and extension support.

The growth rate of muga production in Assam over 7 years is 9%. Meghalaya in this period has increased its production almost 10 times, which is a promising trend. In fact, the high-altitude regions in Meghalaya, fringing forest lands hold great potential for expanding muga culture and for muga seed production. Possibilities of strengthening the muga culture in Meghalaya with special reference to muga seed production need to be explored.

Manipur is the largest mulberry silk producer in the region (accounting for 40.6% of NER)[1]. Tripura is an exclusive mulberry zone with a high adoption rate of bivoltine hybrids. The cooperative model through which Tripura achieved self sufficiency in mulberry sericulture and created all necessary backward and forward linkages, is an example that other states could emulate.

1.B. Women and Youth Participation

Women participation in sericulture is high in NER[2]. The NERTPS[3] already has a component for enhancing women participation through Joint Liability Groups. The survey results indicate that there is further scope for strengthening this component by focusing on ericulture. Our primary survey reveals that there is a high degree of participation of youth in sericulture[4]. This is a promising trend, especially for the non-mulberry sector. Manipur has the highest percent participation of youth in non-mulberry sector. During personal interviews with farmers, it is felt that the young entrepreneurs are more progressive in adoption of technologies and in keeping good liaison with the state and central government establishments. NERTPS apparently has played a major role in enhancing youth participation in sericulture. Hence more project components encouraging the youth to participate in sericulture need to be brought in.

2. Economic Feasibility of Cluster Based Cultivation

The second chapter discusses the economic feasibility analysis[5] conducted for the four cultivable species[6]. Mulberry sericulture is still in the infancy and doesn't show signs of economic feasibility. Of all

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[1] Followed by Tripura (18.9%), Mizoram (16.4%), Assam (13.1%), Meghalaya (7.1%), Nagaland (2%), Sikkim (1.5%) and Arunachal Pradesh (0.5%)

[2] Women participation in Ericulture is 54.7% and in mulberry: 44%. Among the various states Assam has highest women participation (65%) followed by Arunachal Pradesh (57.8%) and Meghalaya (57.3%).

[3] NERTPS: North Eastern Region Textile Promotion Scheme

[4] Participation of youth (40 years and below) in sericulture in NER is 51.4% in mulberry, 85% in eri, 83% in muga and 74.5% in tasar.

[5] The analysis used three discounted measures namely Net Present Value (NPV), Benefit Cost Ratio (BCR) and Internal Rate of Return (IRR), on primary data collected through a cross sectional survey.

the states Tripura shows the highest feasibility in mulberry sericulture, followed by Assam, Manipur and Mizoram. Mulberry farmers incur net losses in Arunachal Pradesh, Sikkim, Meghalaya and Nagaland. The Internal Rate of Returns experienced by farmers in Arunachal Pradesh and Sikkim is negative, implying the heavy financial loss incurred. Ericulture is yet to attain the status of a commercially viable enterprise in NER. In Assam and Meghalaya[7] the activity is only marginally feasible. Average cut cocoon production (per unit) in these states is only 9.8 kgs per annum. This is a very meagre scale of production, not amenable for any systematic, meaningful long or short-term planning. Returns from pupa contribute to 69.5% of the total returns. Around 15% of the pupa produced is consumed by the producers themselves as a rich source of protein. Muga and tasar culture are profitable and economically viable when the family labour is not accounted for as a cost component. However, these sectors are constrained by qualitative and quantitative deficiencies and shortcomings in seed production and distribution. Research projects for evolving / identifying suitable castor and tapioca varieties for cultivation need to be taken up in collaboration with institutes dedicated for these crops. Role of eri pupa in nutrition need to be taken seriously. Intensive research in this area and efforts to popularise consumption of pupa is the need of the hour.

3. Prospects of Intercropping Mulberry with Cash Crops

From the sample survey, 89% of farmers who did any intercropping were mulberry sericulturists. This indicates the vast potential of intercropping in mulberry. Intercropping with cash crops such as cole crops, spices and solanaceous crops is found to be highly profitable. However, it is necessary to scale up the level of intercropping, as it is practiced in the NER now. The Central Sericulture Research and Training Institute (CSR&TI) Berhampur may take up a research project for field trials of the cash crops and evolve package of practices for raising them as intercrop with mulberry and the host plants of non-mulberry silkworms. A crop rotation calendar for intercrops and a convergence plan for utilising the labour and material components under Mahatma Gandhi National Rural Employment Guarantee Scheme are needed. The Sericulture Information Linkages and Knowledge System (SILKS[8]) may incorporate a section to map various agro-climatic zones in the NER where a select number of potential intercrops can be cultivated. It is also proposed that CSB and NEC may join hands to evolve a call-centre facility (in local languages), to serve as a front-line technology communication channel. A forewarning system for pest and disease attack of intercrops may also be evolved.

4. Possibilities of Scaling Up

The fourth chapter discusses the possibilities and prospects of large-scale sericulture farming in the NER. Labour saving technologies and mechanisation in farm operations have reduced labour requirement in silkworm rearing operations, complimenting large-scale farming in South India. In this context the performance of large-scale sericulture in NER is evaluated under three size classes: small, medium and

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[6] Cultivable species refers to the four different species of silkworms that are commercially exploited or cultivated such as mulberry silkworm, Eri silkworm, Muga silkworm and Tasar silkworm

[7] Assam and Meghalaya together produce 80% of eri silk of NER

[8] SILKS portal is Jointly hosted by Central Silk Board and North Eastern Space Application Centre-NESAC

large. While medium scale holdings are economically viable, small and the large-scale sericultural farms are economically non-viable at the existing operational mode. Various constraints operating on large scale farming might be partially responsible for the yield gap. Timely availability of necessary and adequate labour and increase in wages are some of the important problems. Fluctuations in the cocoon price, crop instability and inadequate technical guidance from the extension workers were the other constraints as expressed by the large-scale rearers. labour saving technologies and mechanisation are need of the hour. Pausity (sometimes total absence) of extension support and technical gudance is a serious lapse.

5. Analysis of the Initiatives Taken by CSB in NER

The fifth chapter attempts to analyse the impact of Central Silk Board's initiatives in the NER. The chapter gives an overview of CSB's mandate and the various schemes implemented in the North East, over various five-year-plans. Central Silk Board plays a key and vital role in the region's sericulture promotion. However, changing national-level policies regarding financial discipline, disinvestment and public expenditure have reflected on CSB's manpower and infrastructure.

A regional organization should be formed and should be empowered to take policy initiatives applicable to all states cross sectionally and bring together all states periodically to discuss and evolve policies favouring the sector[9]. Other major recommendations include:

- Need to strengthen MSSO
- Need of a Regional Seed Act
- Need to establish seed areas
- Need of a Regional Directorate
- Providing adequate scientific staff to research units
- Revamping extension network with modern communication methods

6. Organizational Set Up of Stakeholders and Infrastructure

The sixth chapter evaluates the organisational set up of the various state departments of sericulture and other organizations responsible for sericulture promotion in the NER. Assessment of infrastructure, manpower and technical capacity in the sericulture sector of NER is constrained by data availability. The NER possess a huge sericulture infrastructure, considerable proportion of which is in Assam. Most of these resources are highly under-utilised and not properly maintained.

The chapter discuses in detail major issues constraining the sector such as: weakness of muga seed sector, under-utilised resources and the necessity of inter-state coordination for seed production

7. Marketing Strategies of Stakeholders

The seventh chapter analyses the marketing strategies adopted by various stake-holders in the NER sericulture sector. It is understood that traders play an important role in the sericulture value chain and in

[9] One major concern here is the disproportionate distribution of infrastructural resources across NER. The regional body may evolve suitable mechanisms for proper utilisation of these resources for the shared benefit of all the NER states.

marketing of each and every product, starting from silkworm seed to silk yarn and finished fabrics. In fact, they are an integral part of the sector, though their role is not acknowledged at the policy level.

The problems faced in the marketing of cocoons are identified to be: capital bleeding, lack of transparency, lack of quality control parameters, absence of bale press in storage, improper sorting mechanisms (especially that of muga cocoons), lack of optimal storage conditions etc.

The constraints identified in the supply of yarns are: monopolistic competition, improper supply network, improper buying channels, price inconsistency with respect to changes in cocoon price, lack of quality control (hand-spun), lack of proper infrastructure for training, lack of hand-holding and capacity development, lack of implementation of proper business model, a fragmented market and a total lack of awareness regarding count / denier (yarn fineness) of yarn.

Constraints Faced in Marketing of Finished Goods are found to be: lack of proper utilization of sales channels, presence of multiple small-medium traders, un-optimized market linkages, infestation of 'fake' goods and imitation silks, poor management of product category and product life cycle, lack of proper utilization of digital media for communication and lack of proper efforts towards branding of raw materials and finished goods

8. Standardization of Silk Products, Quality Control and Certification

The eighth chapter makes an analysis of the system of standardization, quality control and certification as existing in the silk industry of the NER. The majority of silk products available in the generic market of the NER constitutes Mekhela Chadors, Sarees, Shawls and Bor-kapur among others. As manufacturing is carried out in various different handloom pockets, each manufacturing hub has a distinct and unique quality as its hall mark. Lack of quality administration is a reason for existence of these many product niches in the NER. This prevents the industry from maintaining any particular quality specific parameters.

8.a. Quality Control

As there is no proper system of authentication, markets are flooded with imitation fabric which create a severe imbalance in the industry. For instance, Tasar silk is often sold as 'pure muga'. The cost at which it is sold gives the buyer a false perception of the value of muga. Being able to purchase the 'so-called' muga at less than half the real market price, leads to a decline in sale of pure muga. Furthermore, the benefit of selling tasar silk as muga, by increasing the price further, gives such traders an undue advantage.

8.b. SMOI and Silk Mark

The only quality control mechanism existing in silk is the "Silk Mark" labeling initiative by the Central Silk Board. While there are dedicated chapters of SMOI for every other sericulturally important state, the entire NER is dependent on a single unit, located at Guwahati, severely under-staffed and heavily loaded with responsibilities. The Guwahati chapter of SMOI needs to be strengthened. Preferably each of the eight states in the NER should have separate chapters of SMOI. To begin with, chapters may be established in

Meghalaya, Manipur and Mizoram, in addition to the existing one in Assam.

8.c. Compulsory Subscription to Silk Mark and Consumer Awareness

It is recommended to create compulsory programs to motivate the vast majority of unregistered dealers to sign up for Silk Mark. An aggressive campaign through print and e-media needs to be initiated towards this end. A suitable media plan need be drafted towards this end.

As consumer awareness is the key to the success of Silk Mark, more and more awareness programmes are to be conducted to enlighten general public about it. Rather than forcing silk mark from the seller's end, efforts should be made to create the demand from consumers end. The awareness campaign should also be planned in the sub-urban as well as in rural areas so that the coverage could be broadened

There should be concerted efforts towards promoting Silk Mark at international level. Promotional activities need to be initiated at international platforms so that the silk mark could be internationally acclaimed. Funds should be allocated to advertise silk mark in international exhibitions. When silk manufacturers, dealers and retailers are selected for participation in international textile exhibitions preference for financial support may be given to the authorized users of silk mark.

8.d. Regular Surveillance Against Misuse of Silk Mark

Regular surveillance of the premises of authorized users is required to rule out any kind of possible misuse of silk mark. A vigilance and monitoring team may be constituted to effect surveillance against misuse of the mark on spurious silk products. This vigilance and monitoring team needs to conduct periodical visits to textile shops and other retailers to ensure that the misuse of silk mark is not happening.

8.e. Raw Material Testing Centres and Incentives to Traders

There is a need for installing at-least one cocoon testing centre at each of the identified sericulture clusters and at the cocoon banks (Udalguri, Lakhimpur, Sivasagar and Boko). A quality linked cocoon purchase system wherein the cocoon quality plays an important role in pricing of cocoon; is vital in educating the primary producer about the importance of maintaining cocoon quality. In the present, un-organised cocoon marketing system the role of organised cocoon collection may be limited. Yet it is still important as a best practice to be emulated even by the traders and other private cocoon buyers.

One step further, the prominent cocoon traders in the NER may be given incentives or monetary support for buying cocoons based on quality standards. Mobile cocoon testing facility can be provided for this purpose. All the major cocoon traders in the region may be identified and empaneled so that they can be trained to segregate cocoons (of all varieties) according to quality standards and further sort the cocoons rigorously to ensure uniform quality / grade of cocoons in various lots.

Similarly, raw silk testing and conditioning centres (for each of the four varieties) need to be set up at the rate of one central unit in each state. The CSTRI Bangalore and CMER&TI Jorhat may evolve suitable protocols for grading cocoons and raw silk (as collected from the field by traders)

especially for the NER.

8.f. Muga and Eri Silk Marks:

For generic promotion of Muga and Eri silks and for preventing sale of their spurious alternatives, especially that of muga, it is recommended to install a separate quality control label for each of these silks. This would enable the exclusive drive to keep vigilance against tasar silk being passed on as muga and check any spun silk from being sold as eri silk. A specific advantage of the Muga and Eri silk marks would be to invite more popular attention to the unique physical and the thermal properties of these wild silks. Exclusive muga and eri expos are necessary to spread information on these silks to people outside the NER and even abroad. Consumer awareness about the differential properties of these silks in India, especially outside the north-eastern region is not adequate. The vast majority of the South Indian silk consumers do not understand the difference between muga and other silks and the comparative advantage. Advent of the exclusive muga and eri silkmarks would also help the SMOI to initiate devoted propaganda drives for promotion of these silks.

9. Constraints Affecting Production and Marketing - Value Chain Analysis

The ninth chapter undertakes detailed value chain analyses of the vanya sector with reference to production of eri and muga covering their entire value chain. Eri seed sector is challenged by absence of proper distribution channels, prevalence of seed production by private/individual seed farmers, predominantly traditional nature of production etc. The rearing infrastructure is minimal and marked by lack of hygiene & sanitation, inefficiencies and losses in cocoon spinning stage, un-scientific opening/cutting of the cocoons, deterioration of cocoon quality due to un-scientific handling and storage etc. The multi layered distribution mechanism is riddled with problems affecting cocoon trading.

Muga silkworm's inherent character of preferring outdoor rearing exposes it to vagaries of nature, specifically during seed crops yielding low production. Lack of nucleus seed stock for multiplication, low fecundity,egg-sterility,summer-hatching failure, poor seed recovery etc are issues pertaining to low productivity in muga seed sector. Climatic factors[10] and Atmospheric pollution[11] cause crop losses which in turn has displaced muga seed rearers. Poor extension and technical support and absence of microscopes and technical incapability in using available ones add to the disease prevalence in muga sector.

In the Muga cocoon Supply Chain there is no Standard Operating Procedures (SOP) for measuring moisture content: As muga is sold 'per piece', and as in most cases they are sold with the pupae inside, estimating their moisture content with the moisture meter is futile. There is no proper mechanism in place to gauge moisture content in muga cocoons. Absence of cocoon sorting practice, lack of optimal storage

[10] High temperature (34-40-degree Celsius), high humidity (81-95%) and high fluctuations in these commensurate with heavy rain fall during summer hamper the summer seed crop. Out of the six seasonal crops, Dec-Jan and Feb- March are the winter seed crops, marked by low temperature (12-25 degree Celsius), wide variation in humidity (48-80%) & short photoperiod (6-8 hrs) causing prolonged larval period (40-45 days). High incidence of uzi fly (pest) infestation (40-80%) and high incidence of other pests and predators cause sever crop losses.

[11] By factories, oil companies and pesticide spray in tea gardens etc

conditions, and prevalence of pierced and damaged cocoons decreases the value of the final product. Muga yarn is never sold as per denier, but as dig and bani (warp and weft). There is no means of measuring the linear density of the yarns, leading to problems in the engineering of the fabrics woven. A short term practical remedy will be advisable to improve production planning aspects of the muga silk industry.

10. Catalysing Large-Scale Silk Production: Possibilities, Prospects and Constraints

The tenth chapter makes an assessment of the silk weaving sector based on a primary survey conducted in the Sualkuchi silk weaving cluster and also by reviewing secondary data and literature on the industry. The study reveals serious deficiencies with respect to effective utilization of the huge administrative set up, awareness on existing supporting schemes among beneficiaries, utilization of convergence possibilities in schemes implementation, credit facilities to entrepreneurs, extension support, fixation of minimum wages and training of weaving workers etc. Recommendations include: a drive to registration of weaving artisans, revision and enforcement of payment of minimum wages and creation of a centralised training institute for weavers, with regional centres

11. Marketing Interventions for Promotion of Indigenous Silks in the Domestic and International Markets

An important handicap of the silk industry in the NER is lack of well-organised marketing strategies. There is a vast scope for commercially exploiting the niche value enjoyed by the non-mulberry silks. The unique and traditional weaving styles, designs and dyeing techniques of the NER are held in high esteem in other parts of the country. However, NER is yet to adopt suitable marketing strategies towards exploiting these potential markets.

11.A. Dedicated Regional Level Marketing Organization

The NER needs to evolve a strong policy for market intervention on the basis of market research focusing on every aspect of marketing of sericulture and silk products[12] . The sector needs to evolve suitable pricing strategies & pricing mechanism. Channels for marketing communication and product promotion activities needs to be established. Each of these ideas are elaborated in the chapter, indicating action points. A recommendation has been made in chapter 5 of this report for creating a regional organization under the direct control of NEC for bringing in major policy initiatives. This regional organization can take up the responsibility of evolving a suitable policies and action plan for the marketing interventions proposed here.

12. Project Profiles

As per the terms of reference This chapter presents a few model project proposals from soil to silk under mulberry, eri, muga and oak tasar. A detailed bankable project is prepared for mulberry as a model for prospective entrepreneurs in the sector. The rest of the projects are presented as project profiles enabling suitable modifications in the profile in line with changes in input and output costs.

[12] Market segmentation, product category management & product category life cycle, design innovation, quality assurance, packaging and presentation, sales channel optimization, experience marketing etc.

13. A Proposal for Application of Geo Spatial Techniques in Assessment of Natural Castor Flora in NER

The thirteenth chapter presents a proposal for a study for assessing the extent of natural castor flora in select pockets of the NER, by using the applications of geo-spatial techniques. it is proposed that NEC may entrust the North Eastern Space Application Centre (NESAC) to undertake a pilot study to assess the extent of naturally grown castor flora in one location, known for prevalence of wild castor depended ericulture and assess the rate of depletion of the wild castor growth over the past few years. It is proposed to use the possibilities of the remote sensing technology in assessing the extent of naturally grown castor. Such an assessment in the entire stretch of NER would involve huge technical man power and expenses. Therefore, it is suggested to confine the study to a small unit, say a few square kilometres of a block or a cluster.

14. Prospects of a Likely Market in the Neighbouring Countries for the Silk Produced in North Eastern India

The objective of this chapter is to analyse the formal silk export flows from India to the five neighbouring countries: China, Bangladesh, Bhutan, Myanmar and Nepal. All these countries have rich traditions in silk use. The analysis is done based on data collected from UNCOMTRADE[13] for five consecutive years from 2012.

China, Bangladesh and Bhutan are promising export markets for Indian silk goods. These countries import silk goods worth more than one million USD every year and the export is growing perceptibly. The commodity basket is dominated by cheap products such as silk waste, fabrics of noil silk, spun silk yarn, and to a very small extent, apparels and these four countries depend on India for their imports under these categories. The North Eastern Council and Central Silk Board may join hands in conducting a few serious and well-focussed studies to identify a range of products for which there could be a market in these countries. The focus should be on such products that suit local material availability and artisanal as well as technological capabilities: qualitatively, quantitatively and aesthetically.

14.a. Silk Duets and Over-Seas Trade Fares

Silk duvets (quilts) is a promising product category for export. Many European tourists buy silk duvets when they visit China. The possibilities and prospects of export-oriented production of duvets (quilts) needs to be explored. It is suggested that the NEC and CSB may jointly draft a project for local value addition of silk waste by private manufacturers/ entrepreneurs.

Bhutan villages import Eri silk in the form of yarn. A detailed study of the Bhutanese silk market would find opportunities for export-oriented value addition of eri cocoons. Eri silk as a non-violent silk is gaining popularity across the globe. Budhist countries such as Myanmar would be promising markets for eri silk yarn and finished products. In this context it would be useful to organise a few trade fairs in NER with active involvement of fabric producers and dealers from the neighbouring countries. This will give the local

[13] United Nations International Trade Statistics Database

manufacturers an opportunity to: establish strategic contacts and to learn about designs and fabric quality requirements etc. In a similar vein NEC and CSB may jointly launch a scheme for assisting promising local producers and designers to exhibit their produce in trade fares hosted by these countries.