CHAPTER III

GEOGRAPHICAL ENVIRONMENT AND SERICULTURE

Environmental Factors:

Natural environment plays an important role in the development of sericulture in West Bengal. Sericulture involves a combination of agricultural, biological and manufacturing processes. It is imperative to propagate the cultivation of mulberry plants, rearing of silkworms and subsequent manufacturing operations in the process. Natural environment has a direct influence on the cultivation of mulberry and rearing of cocoons. It exerts an indirect influence on manufacturing operations as well. Of the several physical variables, the following are important for mulberry cultivation and silkworm rearing:

1) Terrain.
2) Drainage.
3) Climate.
4) Soils.

Terrain Pattern:

The basic requirement for sericulture is the supply of mulberry leaves, which are the principal food
of the silkworms. Therefore mulberry cultivation or 'Moriculture' is an integral part of sericulture. For the cultivation of mulberry, slightly raised upland surfaces are required. Although mulberry is a hardy crop and can be grown on any terrain type, it prefers slightly raised alluvial flat-lands. On rough mountainous terrain, it can also be grown as it is in case of Darjeeling district, particularly at Kalimpong subdivision at an altitude of about 900—1650 m.

Low lying flood plains are unsuitable for mulberry cultivation because the plant cannot sustain water-logging. Therefore, preferably the uplands and river embankments are selected for its cultivation.

In West Bengal, mulberry is usually grown in the plains with average elevations varying between 10—40 m, while in the plateau sections in between 60 to more than 280 m.

Everywhere, the average elevation of mulberry lands is 1 m. to 2 m. above the general surface of the surrounding land. Mulberry cultivation is usually concentrated in the districts of Malda, Murshidabad, Bankura, Birbhum, West Dinajpur and Darjeeling. Excepting in Darjeeling, mulberry is cultivated on the alluvial lands, either on raised surfaces or on the river embankments.
CLIMATIC PARAMETERS OF MAJOR SERICULTURE STNS.
(WEST BENGAL)

MALDA

BERHAMPUR

BANKURA

SURU (BIRBHUM)

PURULIA

MIDNAPORE

KALIMPONG

JALPAURI

COOCH-BIHAR

Temperature °C

Precipitation

Relative Humidity

LEGEND

Fig. 2
Drainage Pattern

Mulberry prefers well-drained surface as the plants are damaged in water-logging. The plant needs plenty of water during the growing season. As such, a perennial supply of water throughout the year results in good leaf harvest. The crop can be grown mostly round the year. In West Bengal, however, both in the plains as well as in the hills, there is paucity of irrigation water. In the plains supply of water during the pre-monsoon and in winter months is scanty. Lack of adequate irrigation water during these periods results in plant decay. Incidentally it may be mentioned that only 5% of the total mulberry land of the State gets the benefit of irrigation. Bulk of this irrigated land is, however, located in Birbhum district.

Climatic Characteristics

The various components of climate play important role in mulberry cultivation and silkworm rearing. Any variation in temperature, rainfall or humidity conditions, therefore, may affect the cultivation of mulberry plants or rearing of cocoons at different harvesting seasons (Vide Fig. 2).
Mulberry prefers mild temperature, generally not exceeding 26°C. Formerly mulberry was considered as a plant of the temperate regions. But now it thrives quite well in tropical and sub-tropical climates.

For the rearing of silkworms, high humidity is found to be injurious. As such, there is a need to maintain an optimum level of temperature and humidity within the rearing chamber during the rearing season. The average room temperature should be within 20—25°C and humidity between 70—90% at the various stages of the life cycle of silkworms. Because of their climatic preferences, the types of mulberry plants as well as the variety of silkworms are carefully selected to fit in the local climate.

In West Bengal the Morus indica variety of mulberry is usually cultivated. The Kosen variety of Japan is, however, preferred in Darjeeling hills. Depending on their species, mulberry plants may be of i) bush, ii) high bush, and iii) tree type. Of these the most common are the bush and high bush types which are cultured throughout the plain region but tree types are occasionally found in the hill region. In the plains of West Bengal rearing of cocoons is much affected by
high temperature and high humidity. During summer, the temperature occasionally shoots up to 40°C and during the monsoon season the humidity is above 90%. To cope with this high temperature and humidity conditions an indigenous variety of cocoon is usually reared here. This is known as 'Nistari' variety which is a multi-voltine, heat-resistant type. The cocoons raised from this species do not, however, give uniform yield. During the summer harvest (April-May), the crop yield is much less, and the rearing operations are practically confined in the hill region limited to high-yielding bi-voltine silkworms. In recent years, due to persistent efforts of the sericulturists, it has been possible to rear high-yielding bi-voltine variety of cocoons in the plains during winter months.

Soil Characteristics

It has been found that dry clay loam soils having a pH value of 6.5 to 7.0 are ideal for mulberry. But as mulberry is a hardy crop, it can be grown on any kind of soils ranging from laterite to alluvium provided sufficient water is made available to the fields. The plants are deep-rooted and therefore can extract soil-moisture from depth. The soils do not require extensive soil-water treatment.
However, as has been studied (Roy Choudhuri, S. P. (1963) 'Soils of India', pp 45) that N, P, K status should be at certain fixed level, and any deviation from this may result in either an increase or decrease in the metabolic activities of the plants, making them susceptible to insect or fungal attacks. A dose of Phosphorus helps the formation of carbohydrates and calcium maintains physiological stability.

**Economic Factors**

There are a wide range of economic factors, that determine the growth or success of sericulture in any particular region. These are taken into consideration and an attempt has been made to study the influence of these factors on the growth and development of sericulture in West Bengal. Of the economic factors the following are most important:

1) Supply of raw materials, particularly for mulberry culture,
2) Availability of labour,
3) Facilities for obtaining cheap power or fuel for reeling operations of silk,
4) Presence of a good transport network,
5) Presence of an organised market for the commodity produced,
6) Profitability of sericulture compared to other food and cash crop production,
7) Availability of capital to carry out sericultural operations on a commercial scale.

1) **Raw Materials:** Supply of raw material is vital for the development of industry. In this context, supply of good quality mulberry leaf and disease-free layings are extremely important. If the quality of mulberry leaf is inferior, the cocoons are of inferior quality thereby producing inferior grade of thread. Therefore, not only the quantity of leaves but the quality should also be maintained. Most of the silkworm rearers of this State have their own mulberry fields, but during crop failure, the leaves are to be purchased from outside. Mulberry cuttings are usually supplied to the cultivators by the government nurseries in every mulberry producing districts of the State. The Central Sericulture Research Station at Berhampore is carrying various experiments on evolving new strains of mulberry seeds like C-776, S 642, S 792, S 1301 and S 1531.

- These improved strains give higher yield over the indigenous varieties by about 60—70 per cent. These
improved varieties are now supplied to the sericulturists in the State.

It has also been found that mulberry responds well to irrigated water and nitrogen (Vide Table 3.1).

<table>
<thead>
<tr>
<th>Mode of culture</th>
<th>Average yield rate kg/ha</th>
<th>Percentage increase of production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unirrigated</td>
<td>12,400</td>
<td>--</td>
</tr>
<tr>
<td>Irrigation every 15 days</td>
<td>15,200</td>
<td>22.4</td>
</tr>
<tr>
<td>Irrigation once in a month</td>
<td>13,500</td>
<td>8.9</td>
</tr>
</tbody>
</table>

(Source: Central Sericulture Nursery, Berhampore).

Application of irrigation water at an interval of 2 weeks, increases the yield of mulberry. The sericulturists of West Bengal, both in the plains as well as in the hills, however, do not get usually the facility of irrigation water. But for winter harvest, irrigation is essential, otherwise the production decreases. Winter is also the ideal season for rearing. Therefore, if the
supply of leaf is to be maintained throughout the year, irrigation facilities seem imperative. As such, the rearers of the State are often confronted with the problem of shortage of good quality leaves. Another important factor is the supply of disease-free eggs. Unless the eggs are healthy, the yield of cocoon is likely to remain low. At present, the government of West Bengal has made storage arrangements for the preservation of disease-free layings. So that these can be supplied to the sericulturists in the villages. At Kalimpong, a seed station has been established, with a view to preserve and multiply foreign races of worms. The Central Sericulture Research Station, has also taken up experiments on hybridisation. The Government Nursery and Grainage Farm at Malda also is now trying to evolve a new hybrid variety of worm which will yield more silk thread. The hybrid varieties of eggs are now supplied to the rearers.

2) Labour: The availability of cheap labour is one of the pre-requisites for the industry. Since sericulture is entirely a cottage based industry, it is best suited for an agrarian economic structure. This explains one of the reasons for its heavy concentration in Malda and
There are some organisations operated by registered bodies and Khadi Commission, at Malda, Murshidabad, Birbhum and Bankura districts where reeling is carried on improved basins. By and large reeling operations in the State are carried on cottage basins by the reelers in the villages. In the latter case, domestic fuel is utilised. Therefore, the availability of cheap fuel is essential for sericulture in the rural areas. The reeling sector requires a large-scale modernisation for which availability of power is essential. But in view of the present power crisis that has gripped the entire country, supply of power appears to be a costly proposition.

4) **Transport**: The presence of a good transport network is a vital pre-requisite for expansion and development of any industry, and more so in case of sericulture because of its spatial disintegration. One of the characteristics of sericulture in West Bengal is that the individual sectors like rearing, reeling, weaving and manufacturing are scattered in space. Therefore, transport is the only link through which the different sectors are integrated. The supply of high-yielding
variety of mulberry and seed cocoons are from northern hills and plains of West Bengal. Efficient transport system is, therefore, necessary for the supply of mulberry leaves to the cocoon rearers in fresh state. Subsequently, the cocoons need to be carried to the reeling centres and finally to the market. The commercial rearing and reeling operations are mainly concentrated at Malda, from where the reeled yarn is supplied to the weavers of different centres scattered in Murshidabad, Bishnupur, Bankura and Birbhum districts. Finished fabrics are then sent to selected centres like Serampore and Calcutta for dyeing and printing. The printed sarees and other categories of silk fabrics are ultimately produced for the market. These products are meant for the consumers of the State, as well as for other centres of India and overseas.

5) Market: As there is no organised market in West Bengal, the sericulturists have to face difficulties in the marketing of their products. The entire business initiating from mulberry cultivation to silkworm rearing and production of silk fabrics are carried in open market. This is primarily a buyer's market and hence the control of middlemen is total. In a mixed rural economy, large-scale exploitation by the money-lending class is quite common. As a result a two-tier and even a three-tier transaction systems are in operation,
thereby depriving the primary producers of their fair share of produce. Such practice can be minimised by providing raw-materials (i.e., cocoons and yarn) to the primary producers (i.e., reelers and weavers) and ensuring the disposal of the finished fabrics through government agencies, co-operative societies, Khadi Commission etc. In recent years, the artisans and weavers working within registered bodies have escaped from the clutches of money-lenders.

Since sericulture is a rural cottage industry, the sericulturists with little contact with the market, have to expose themselves to all kinds of exploitation by the traders. The organised sectors, however, cover only 30% of the total industry and bulk of the remaining 70% are in the hands of private sector. Furthermore, as the products are mostly consumed in urban areas, the industry is highly susceptible to market demand. The products are also exported. So, any change in international demand determines the price of the finished fabrics. Therefore, the industry needs market protection.

There is a good demand of silk fabrics both at home and abroad. The products because of their good texture, strength and durability can compete well with
synthetic fabrics. The domestic demand depends on State and National policies, while the international demand depends on the production of quality fabrics at a competitive price and diversification of production lines. The international demand fluctuates widely, depending on the change in the international political, economic and social environment.

6) Sericulture in Relation to Other Crops: Mulberry cultivation and associated sectors of sericulture should accrue enough profit compared to other cash or field crops of the area. Cultivation of mulberry is found to be more profitable than sugarcane, jute, tobacco, turmeric and chillies. A survey conducted by the Gramin Bank in Malda District in 1977 reveals that the net cash return from a rainfed field is estimated as Rs.5000/- per hectare, as against Rs.2,000/- for jute, paddy and pulses, Rs.2,700/- from pulses, paddy and mustard, Rs.4,000/- for sugarcane. Of these crops, sugarcane cultivation needs use of the land for more than a year while mulberry takes only 4-5 months' time to reap the harvest. It has also been found that an investment of about Rs.2000.00 per hectare of rainfed mulberry land, can realise a net income of Rs.5,000/- to Rs.8,000/- per annum, whereas in the irrigated
mulberry plantations, an annual investment of Rs.10,000 may accrue an additional income of Rs.12,000 to Rs.15,000.

7) **Capital:** Availability of capital is an important prerequisite, particularly in case of mulberry sericulture as it requires a fairly large sum of investment during the initial stage of production. However, under the existing economic conditions of the villagers, supply of capital remains poor. The cultivators are mostly small and marginal farmers who can spare little capital for investment in the mulberry sector. Therefore the majority of the rearers of silkworm are dependent on money-lender from generations, although, there are a good number of wealthy rearers in Malda. Similarly, the reelers as well as weavers are traditional village craftsmen/artisans who earn their living from reeling and weaving clothes. Quite often these artisan classes do not possess any land and are left with little surplus to carry out the necessary weaving operations independently. Moreover, the highly specialised nature of a luxury commodity like silk requires particular information on design and fashion.

* (Source: Government of West Bengal, Directorate of Sericulture and Silk Weaving, 1979)
This cannot be achieved by the isolated weavers of the rural areas. Therefore they are still more dependent on the master weavers and traders for final marketing of the woven fabrics who are knowledgeable in this field. The capital market on the other hand is a seller's market, hence the growers are at a disadvantage. But both the markets are interlinked. All these factors have given rise to a very unique feature in the production of handloom materials and consequently the mode of operation in this sector is distinguished from others. This sector falls within the preliminary stages of capitalist production where the weaving operations are carried out by two methods, one being 'putting out system' where the weavers work in his own home at piece rates on materials put out by and belonging to the merchant capitalist and the second being 'finance and order system' where the merchant capitalists employ several thousand families by giving them cash advance in return for an agreement to sell their products exclusively to them. This advance is paid without interest, allowing the worker freedom to buy raw materials and have his own or his employees wages.

Both these systems continue to exist in West Bengal. The mode of sericulture production at various sectors falls within the category of dependency phase
Murshidabad region which happens to be the major prosperous agricultural regions of the State. A large number of seasonally employed agricultural labourers or cultivators are available for sericulture. It is of interest to note that female labour participation in this industry is high in West Bengal. In this economy, the entire family is involved. Therefore, sericulture offers an additional source of income because of its labour-intensive nature.

However, it must be mentioned that as rearing of silkworm is a highly specialised job, it requires certain amount of skill. The art of rearing is indigenous in Bengal and it is an age-old practice. These are the reasons for the continued survival of sericulture in the regional economy of the State, despite the periods of adversity or prosperity faced by this economy.

3) Power: The mechanical reeling operations need cheap power. In West Bengal, the reeling sector, however, remains unscientific and disorganised. There is only one filature unit in this State, viz., at Madhughat in Malda district which is operated by power. Besides, there are several reeling units at Jalalpur in Malda district, where reeling operations are carried on improved basins.
of capitalist production where the cultivators-rearers and reelers-weavers become financially dependent on the merchant capitalists who have a total control of the market.

In rural areas a double monopoly market exists since the time of East India Company. They have implanted the seeds of market imperfections through their 'agency system' which is being continued till today. Presently, market is operated in the following ways: First, mulberry growers and silkworm rearers sell their products to a buyer's market. The buyers have the advantage over several sellers. Secondly, in case of capital and labour markets too, the producers are at a disadvantage. They have to borrow money/capital on the one hand and at the same time when necessary they offer themselves as daily-wage labourers to the same set of merchants. Therefore, the capitalist merchants become both the owners of capital as well as buyers of the products. Thus due to market imperfections, in this way, the control of the middlemen on sericulture becomes total.

Socio-Cultural Attributes

Social factors also play dominant role in the growth and development of sericulture in West Bengal. These factors may be institutional, or may be related
to caste, land tenure system etc.

1) Institutional Factors: This acts as the chief constraint for growth and development, particularly in the rural areas. Here the villagers are reluctant to accept the new devices like the introduction of better strains of mulberry leaf or rearing of bi-voltine cocoon instead of nistary varieties, application of chemical fertiliser etc. These devices are capital intensive and profit margin is not appreciably high compared to the traditional varieties. In some non-traditional areas, like some places of Bankura and Birbhum district, an apparent resistance within the local people to the introduction of new technology like introduction of a new strain of mulberry leaf, rearing of bi-voltine cocoon instead of indigenous 'nistary' etc. has been observed. Such a resistance has its genesis in the high input and better care needed in the improved technology and a relatively less return due to the presence of a monopolistic market structure. As such, in many occasions the shy behaviour of the farmers to modern innovations is justified. In non-traditional areas of silk culture, the institutional factors act in a different way from the traditional areas. In both the areas market conditions continue to be imperfect. In non-traditional areas like in case of southern
Birbhum where sericulture has been recently introduced with government subsidies, bi-voltine cocoons are usually raised. But these superior grade cocoons are usually sold at a much lower rate as the local market is controlled by traders. As a result, the farmers have now become rather reluctant to adopt mulberry culture and silkworm rearing as subsidiary occupations. They have doubts about the profitability of sericulture. In the traditional areas on the other hand, sericulture continues to survive despite market imperfections, because of historical momentum and specialisation.

2) Castes or Tribes: This factor also determines the nature of sericultural practices. Some of the castes or tribes have acquired specialisation in either reeling or weaving. This explains the regional concentration of different components of sericulture in different regions. For example regional concentration of Pundro-Khatriya and allied castes at Kaliachak in Malda District has led to the concentration of reeling activity in that region. Weaving is similarly localised at Bishnupur and Sonamukhi in Bankura, Baswa and Tantipara in Birbhum and Chak areas of Murshidabad. Incidentally there is a heavy concentration of weaving caste ('Tanti') in these regions. Likewise rearing of eri cocoons is confined...
within the "Mech" communities of Cooch-Behar and Jalpaiguri districts. Tasar rearing is carried on by the Santhals and other tribal groups of Bankura, Purulia and Birbhum. These castes and tribes have acquired specialisation through ages and presently have become rather reluctant to impart their techniques of rearing, reeling and weaving to others belonging to other castes or tribal groups.

3) Land Tenure System: The land tenure system is not of particular importance in mulberry cultivation in West Bengal. Most of the mulberry cultivators of West Bengal have their own land. In Malda and Murshidabad districts, the sericulturists own their mulberry land. Only a handful of them do not possess any land. So they have to buy mulberry leaves for rearing purposes from others. In Bankura district, however, some farmers raise mulberry on the fallow lands owned by the Forest Department. This involves an element of risk, because the land might be taken by the forest authorities any time.

In the non-traditional regions of North Bengal, the State Government is providing land to the sericulturists for mulberry cultivation on a lease basis.
Therefore in Darjeeling, Jalpaiguri, Cooch-Behar and West Dinajpur districts, there is no question of tenancy.

**Economic Constraints**

Sericulture in West Bengal so far has remained in a highly disorganised and disintegrated state—both spatially and sectorally. There is no functional linkage between rearing, reeling and weaving sectors. In the absence of a good communication system and an organised market, the sectoral transactions become hazardous—both from physical and economic standpoints. Imperfect market conditions at each stage of silk processing are responsible for the present disorganised condition of sericulture. As a result the intermediaries and traders take full advantage of the system. Each sector of the industry because of its specialisation and linkage with particular section of people is localised in selected areas. Such linkages are difficult to uproot and is not economically desirable. For example, rearing and reeling at Kaliachak, weaving at Chak-Islampur, Bishnupur, Bankura, and Baswa-Tantipara have become particularly important since a long period. The socio-cultural and economic factors of localisation have taken a deep root and therefore spatial integration cannot be expected in
the near future. In view of this, the Government of West Bengal along with some philanthropic organisations, have taken up several integrated projects in recent years. In these new areas the spatial and functional integration of various sericultural operations have been emphasised. Example of such projects is Ambari-Falakata in Jalpaiguri and Matigara in Siliguri etc. At present market imperfections are acting as detrimental forces to its complete adoption.

Regional Variations in Sericulture and Silk-Weaving

Depending on the various interplay of physical, economic and social factors, eight major regions and four minor regions can be deciphered in West Bengal each of which has attained a pattern of specialisation in sericulture and silk-weaving. The analysis of growth and development of sericulture will remain incomplete without taking into account of these regional variations.

The regions with their individual characteristics are discussed below. Apparently the various methods of cultivation, rearing, reeling and weaving are same but according to local variations of climate there are variations in mulberry and silkworm species within the different regions.
1) **Ganga-Mahananda Doab:** Here the heat resistant indigenous, multivoltine nistari worm is reared. They are nurtured on mulberry leaf of *Morus indica* variety of both bush and high-bush form. In winter months bi-voltine worms are reared.

2) **Murshidabad and its Neighbourhood:** This region specialises in weaving which also has a distinctive regional pattern both in the method of weaving and in the nature of fabrics produced. Here weaving is carried on in pit looms and the fabric produced include matka, garod, korial, various dress materials, scarves and stoles.

3) **Halhati-Bolpur Region:** The region has a long tradition in weaving of non-mulberry (tasar) and mulberry silk fabrics and is also characterised by rearing and reeling activities.

4) **Taldanga-Bishnupur Region:** This region is characterised by mulberry and non-mulberry sericulture with special emphasis on weaving of various categories of fabrics. Weaving is done in Jacquard looms and the famous 'baluchari sarees' are produced here. Here tasar culture predominates over mulberry culture and the former
has a bright prospect because of its forest resources and tribal population.

5) West Dinajpur Region: This is essentially mulberry producing region where the methods of mulberry culture and silkworm rearing are more or less similar to that of Malda.

6) Darjeeling Hills: Here exotic Kosen variety of mulberry leaf is cultivated along with Morus alba both in bush and tree form and high yielding bi-voltine silkworm is reared. The region because of its favourable ecological environment holds greater prospect for the growth and development of sericulture.

7) The Terai and Duars Plain: This region is predominantly a non-mulberry area where eri-culture is in vogue from a very long time. In recent years with government assistance sericulture is being introduced and several pilot projects have been undertaken. Eri-culture is on the decline because of non-availability of eri cocoons and depletion of tribal population, who have special skill in the same.
8) Purulia-Raghunathpur Region: The region specialises exclusively in the weaving of tasar fabrics of various categories. Rearing and reeling are also carried here. Other regions holding promise are:-

(a) Debra-Jhargram area having prospects of mulberry and tasar culture.
(b) Ranaghat area (in Nadia) with ideal ecological environment for silk-worm rearing and mulberry culture.
(c) Barasat area (24-Parganas) having an identical prospects in sericulture, being a continuation of the former area.
(d) Burdwan-Katwa noted for its decaying sericultural practices, though famous in earlier days.

Greater emphasis is now given on the growth and development of sericulture in the drought prone areas of Bankura, Birbhum, Purulia, Midnapur districts and also in the non-traditional regions of North Bengal.