

The Historical Journey of Sericulture: Insights into Sustainability from Past to Present

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This study looks at the role of sericulture resources, in increasing the GDP of silk-dominant regions. It examines sericulture sustainability, growth, and silk crafts utilizing Scopus and Web of Science databases. The study underlines the significance of sericulture's contribution to the UN Sustainable Development Goals for inclusive regional growth. For thousands of years, sericulture, or the ancient practice of producing silk, has played an important part in civilizations' socioeconomic and cultural development. This study examines the historical history of sericulture, beginning in China and spreading throughout Asia and Europe, focusing on the cultural exchanges and inventions that affected

its expansion. Through an assessment of ancient techniques, the study reveals the inherent sustainability qualities of early sericulture, such as low environmental impact and dependence on natural resources like mulberry trees and silkworms.

Keywords: Sericulture, Historical Roots, Silk Route, Silk Production Sustainability.



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1. INTRODUCTION

Natural fibers like silk were among the first materials that humans found; other early materials were wool, hemp, linen, and cotton. A caterpillar known as a "silkworm" secretes a single thread of silk, a fibrin composed of proteins in a fluid form. These silkworms spin cocoons as a "protective shell" to prolong their life while feeding on the chosen food plants. The life cycle of a silkworm consists of four stages: egg, silkworm, pupa, and moth.



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To obtain silk, a continuous filament of significant commercial value used in the weaving of the dream fabric, man interrupts this life cycle at the cocoon stage. Several inherent qualities set silk apart from all other fibers, synthetic and natural.Its qualities include a natural sheen, an innate affinity for vibrant colors, high absorption, light weight, strength compared to a steel filament of similar size, low static current production, resilience, and an exceptional drape. Numerous varieties of silk are manufactured for a wide range of uses, including upholstery and furniture, carpets and rugs, fashion clothing, and the blending of silk with other fibers to create fabrics. The industries of sewing knitting, and embroidery are among the other significant uses of silk. Silk is a natural fiber and was amongst the earliest fibers discovered by man with others being wool, hemp, linen, and cotton. Silk is a fibroin made of proteins secreted in the fluid state as a single filament by a caterpillar, popularly known as a 'silkworm' .Based on historical data, the industry of silk production extended from China to other regions of the world when it was discovered there. Since the Chinese Empress Shiling Ti found it in her teacup in 2640 BC, humanity has been enamored this glittering fiber of unmatched with magnificence. The Chronicles of Chou-King (2200 BC) include the oldest known mention of silk. In these chronicles, silk was used extensively as a tribute to the emperors in public rituals. The province of Chan-Tong gave rise to the silk industry, which the Chinese fiercely guarded for roughly three millennia. The export of raw silk and silk products gained prominence when trade connections were made between China and Persia and other nations. Ancient Persia (modern-day Iran) traders would travel perilous roads laced with treacherous mountainous regions, challenging passes, arid deserts, and dense woods to bring beautifully colored and finely textured silks from Chinese merchants. Although silk was traded with other goods including amber, glass, spices, and tea, it quickly became the mainstay of the Chinese economy, earning the trading route the moniker "SILK ROUTE."



Some accounts claim that Korea, where Chinese immigrants began sericulture in approximately 1200 BC, was the first nation to discover the secret after China. Japan later became a part of the industry. In another account, the invasion and conquest of Korea by Semiramus. a general in Empress Singu-Kongo's army, in the third century B.C., is credited with introducing the silk industry to Japan. Some sericulturists that he returned to Japan with were among his prisoners. The industry was supported by the royal family and operated sporadically until the Meiji Restoration in 1868. Japan applied contemporary machinery and improved procedures, conducted extensive sericulture research, and showed serious attention to the industry's development in the later part of the 19th century.

Silk fabrics manufactured in the East started to arrive in southern European markets by the first century B.C.Around 140 B.C., Western historians claim that mulberry tree cultivation had made its way from Tibet to India through Tibet. Mulberry tree cultivation and silkworm rearing had their start in the regions bordering the Brahmaputra and Ganges rivers. Certain Indian experts assert that the domestication of silkworms (Bombyx mori) originated in the Himalayan foothills. Ancient Sanskrit literature provides additional proof that a certain type of wild silk has been grown in India for a very long period. Following the British invasion of India, the silk industry developed and extended to other regions, including Mysore and Jammu & Kashmir. Even before Islam, the Arabs were acquainted with silkworms and had studied their life cycle. Based on old traditions, it has been proposed that in the early Christian era, the Arabs imported mulberry tree seed and silkworm eggs from India.

In India and Central Asia, sericulture had become well-established by the fourth century A.D. From the East, raw silk and silken products were exported to Persia and then to Rome. Some of the most valuable silk products in Roman society were exclusively owned by the Persians, but in the sixth century A.D., two Roman monks who had studied sericulture in Tibet brought the practice to Constantinople. As a result, the Romans were able to manufacture raw silk on their own, which launched European silk production.

For three or four centuries, the Roman Empire's eastern regions were the only places where silkworms could be raised, and factories were established in Athens, Corinth, and the Aegean Islands. The industry gradually moved from the east to the Venetian Republic, where it reached its pinnacle of development by the end of the ninth century. The Venetians went on to meet nearly all of Europe's needs during the tenth and eleventh centuries. After leaving Italy, the enterprise made its way to France, where French aristocrats brought mulberry tree seeds and silkworm eggs to start a silkworm-raising operation in 1340.

By the end of the 17th century, the industry had become well-established in France, and the 18th century saw its heyday. When sericulture was at its height in France in the 19th century, an epidemic known as pebrine—a deadly disease of silkworms—broke out and destroyed sericulture over most of Europe and the Middle East in addition to France. By studying mother moths, Sir Louis Pasteur found in 1870 that pebrine could be regulated, which prevented the industry from going extinct. Even if the French industry partially recovered, there was not a full recovery due to socio-economic changes.

2. GLOBAL SILK INDUSTRY

The world's leading producers of silk include China, India, Iran, Uzbekistan, Brazil, Japan, the Republic of Korea, Thailand, Vietnam, and DPR Korea. A small number of other nations, such as Kenya, Botswana, Nigeria, Zambia, Zimbabwe, Bangladesh, Colombia, Egypt, Japan, Nepal, Bulgaria, Turkey, Uganda, Malaysia, Romania, Bolivia, and so on, also produce cocoons and raw silk in tiny amounts. The USA, Italy, Japan, India, France, China, United Kingdom, Switzerland, Germany, United Arab Emirates, Korea, Vietnam, and other countries are the world's top consumers of silk.

Though silk accounts for less than 0.2% of the world's textile market (it is difficult to determine the exact worldwide value since most importing countries lack reliable data on completed silk products), the world's production base for silk is distributed over 60 countries. Although Asia is the primary producer (90% of mulberry production and nearly 100% of nonmulberry silk .Recently, industries related to sericulture have been formed in Brazil, Bulgaria, Egypt, and Madagascar. Sericulture requires a lot of labor.

China's silk industry employs almost a million people. In India, the silk industry employs 7.9 million people, and in Thailand, it supports 20,000 weaving families. China is the primary global producer and supplier of silk to international markets. India is the second-largest producer in the world. Sericulture takes little investment and provides raw materials for the textile industries, which helps keep the rural population employed and discourages migration to larger cities.

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#	Countries	2016	2017	2018	2019	2020	2021	2022	2023*
1	Bangladesh	44	41	41	41	41	41	41	41
2	Brazil	650	600	650	469	377	373	300	330
3	Bulgaria	9	10	10	10	10	9	7	7
4	China	1,58,400	1,42,000	1,20,000	68,600	53,359	46,700	50,000	50,000
5	Colombia	2 			1	1	1	1	1
6	Egypt	1	া	1	2	2	2	1	1
7	Ethiopia	2. 1985			-	283	10 0 36		10
8	India	30,348	31,906	35,468	35,820	33,770	34,903	36,582	38,913
9	Indonesia	4	3	3	3	3	3	3	3
10	Iran	125	120	110	227	270	272	275	276
11	Japan	32	20	20	16	16	10	10	10
12	Madagascar	6	7	7	8	8	8	8	8
13	North Korea	365	365	350	370	370	370	370	370
14	Philippines	2	2	2	2	2	2	1	1
15	Romania	2. 			1	1	1	1	1
16	South Korea	1	1	1	1	1	1	1	1
17	Syria	0	0	0	1	1	1	1	1
18	Tajikistan	(S)	1996	12	25	8 <u>15</u>	5 <u>2</u> 5	52	227
19	Thailand	712	680	680	700	520	503	435	291
20	Tunisia	2	2	2	2	2	2	1	1
21	Turkey	32	30	30	5	5	5	5	5
22	Uganda	1917		12	3	3	3	3	3
23	Uzbekistan	1,256	1,200	1,800	2,037	2,037	2,037	2,037	2,037
24	Vietnam	523	520	680	795	969	1,067	1,236	1,448
	Total	1,92,512	1,77,507	1,59,855	1,09,111	91,765	86,311	91,319	93,986

International Sericultural Commission Report, 2023.

3. SILK GROWTH IN INDIA

Karnataka is one of the leading mulberry sericulture-producing states, followed by Andhra Pradesh, Tamil Nadu, West Bengal, and Jammu and Kashmir, which collectively account for 98.5 percent of the country's silk output. India's raw silk need was around 27,005 metric tonnes, while the country only produced 19,696 metric tonnes and imported 8,000–9,000 metric tonnes from China (Qadri et al., 2010). Developed countries are currently increasing their usage of silk goods. It creates high demand on the worldwide market and contributes significantly to emerging nations' foreign exchange earnings, culminating in the move from sericulture to manufacturing.

India is the world's second largest producer and user of raw silk and silk textiles. In India, the silk industry is driven by both exports and strong local demand. Silk textiles are commonly utilized in the domestic market for ceremonies, religious rites, weddings, festivals, and other special occasions. Silk is used as a basic material for both clothing and furniture. Although silk is currently considered a luxury item in India, with a far higher price than other textiles, we expect consumption of silk fabrics to increase as disposable incomes.

4. SILK PERFORMANCE IN KASHMIR

Practically, silk is produced across the Kashmir valley. The silk industry, founded by Emperor Zain-ul-Abidin, is a modest and mediumsized industry that plays an important role. It is crucial for the long-term viability of tiny and marginalized families. Mulberry silk cocoons are well-known in the Kashmir valley for producing a very fine fiber that may be compared to the best in the world (Global Investor Summit 2020).

Jammu and Kashmir is a bivoltine sericulture union territory of India with a diversity of agro-climatic zones and distinct mulberry genetic resources that are recognized all over the globe for producing exceptional and appealing silken goods (Trag et al., 2011; Bhat et al., **2014**). It has enormous potential for sericulture growth. Mulberry is farmed on 9,066 hectares in Jammu and Kashmir, yielding 939 metric tonnes of cocoons and 212 metric tons of raw silk in 2018-19. (J&K Economic Survey 2018-19). Sericulture contributes significantly to the J&K economy, employing over 25,000 people and producing an annual revenue of Rs 7.28 crores. (Annual Plan 2010-11, Planning and Development Department, Jammu and Kashmir. In the Kashmir Valley, Silk cocoon production has witnessed an annual compound growth rate of 1.59%, indicating positive development from 1990-91 to 2019-20, as opposed to a decreasing trend in mulberry planting, which is -1.14% (Mushtag et al., 2021; Mir et al 2018; Ganaie et al., 2012). Jammu and Kashmir has enormous potential to manufacture and use raw silk locally, establishing a strong backward and forward link that can revitalize our industrial sector, improve the sericulture industry for cocoon growers, and create sustainable growth by coordinating cocoon silk production and marketing (Jammu and Kashmir Trade and Export Policy Report 2018; Khan et al., 2015). Trade and Export Policy Report 2018; Khan et al., 2015.

Silk goods have a ready market in Kashmir, both domestically and globally; nevertheless, the government must pay immediate attention to this order to improve weavers' industry in socioeconomic situation (Yousuf et al., 2013). The Central Silk Board of India launched Silk Samagra to promote sericulture growth across the country, including Jammu and Kashmir (J&K), with the purpose of enhancing quality and output. (Press Information Bureau, 2019). Sericulture is an agricultural allied industry that creates revenue through backward and forward linkages that offer a variety of value-added products (Barcelos, 2021). It promotes Kashmir's artisanal and cultural industries. (Chouhan et al., 2016; Trag et al., 2011; Bhat et al., 2020). Sericulture is presently seeing a rebirth, owing to the World Bank's aid in restoring the glory of the silk industry in the Kashmir valley, which encourages farmers and stakeholders to invest in this sector. It promotes sericulture's long-term growth. (Global Investor Summit, 2020).

5. SUSTAINABILITY DEVELOPMENT GOALS

The Millennium Development Goals (MDGs) are eight anti-poverty targets that the world committed to attaining by 2015. By 2030, the 17 Sustainable Development Goals (SDGs) set forth by the United Nations are intended to promote a balance between environmental preservation and human well-being (UN, 2015). All of the SDGs are built on the biosphere, but maintaining biodiversity is still a worldwide issue (Arroyo-Zeledón, 2018). Following their adoption in 2000, the Millennium Development Goals (MDGs) sought to reduce poverty, hunger, disease, gender inequality, and barriers to accessing clean water and sanitation. Significant advancements have been made toward the MDGs, demonstrating the importance of a unified agenda supported by objectives. Even with this progress, not everyone is free from the shame of poverty. Beyond the MDGs, the new SDGs and the larger sustainability agenda address the underlying causes of poverty and the need for development that benefits everyone. The International Sericultural Commission (ISC), a developmental organization dedicated to enhancing rural residents' quality of life, has made it a priority to assist its member nations and nations with a silk industry in achieving a few of the aforementioned objectives through its different programs. The following objectives, which can be accomplished through the activities of the silk industry and sericulture, are the core emphasis of the Commission. Silk industry and sericulture are regarded as useful strategies for reducing poverty. When compared to other comparable rural occupations, sericulture has the greatest labor force participation rate. This sector offers employment prospects to all members of the family, particularly women and older adults. It is special in that it turns family labor into money the family may use. Therefore, this line of work has the potential to significantly increase household income, which would benefit several rural impoverished families-particularly those who are marginalized and live in forests.

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6. CLIMATIC ACTION

The agro-based industry of sericulture requires the cultivation of silkworm food plants in order to carry out animal husbandry operations. Since the majority of food plants are perennial in nature, there is a significant amount of green cover in the cultivated area. Because the sector relies heavily on labor, very little carbon is released during production. Since sericulture can be practiced on terrain unsuitable for food crop cultivation, the industry need not compete with other crops. As a result, the sector supports environmental sustainability through environmentally friendly manufacturing methods, increased green space, aids in soil conservation, and reduces soil erosion.

7. DECENT WORK AND ECONOMIC GROWTH

Many underprivileged people have turned to sericulture as an alternative source of income since it offers work chances to people across many age groups. The industry consistently produces steady, reliable income regularly. A good occupation for a variety of age groups and social classes is one in which the majority of the activities may be done indoors. The financial benefits of the profession directly support the needs of the family because family members are closely involved in all of its activities. In the end, this would help the family's financial situation.

8. PARTNERSHIPS FOR THE GOALS

A significant component of forming international alliances for regional growth is played by the silk industry. The main benefit of the silk industry is that wealthy individuals in industrialized nations and other regions are the main buyers of silk, while impoverished farmers, reelers, and weavers in developing nations are the main producers of silk. This would allow equity to move from the rich to the poor. Major and crucial partnerships were formed between these disparate sectoral groups through the equity flow system, led by government agencies and other entities. Ensuring equitable growth for all stakeholders in the silk value chain is contingent upon the International Sericultural Commission fostering partnerships with diverse sectoral groupings and other entities.

9. CONCLUSION

Sericulture, a sustainable sector, contributes significantly to the worldwide demand for silk by offering more cultivation areas, revenue. employment opportunities, and regional development. Sericulture is booming in emerging nations thanks to technical developments and the cultivation of mulberry trees. It promotes rural economic growth and a balanced economic sector. However, a thorough plan, human resource development, and efficient supply chain management are required. Sericulture also provides livelihood security for diverse population groups, which contributes to longterm growth and inclusive development. Future growth plans should prioritize long-term regional expansion in economically feasible regions, increasing female participation in the industry, and fostering gender equality and women's empowerment.

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