

Reporting from the Field: India

Eco-industrial Networking of Sericulture Industries in Urban-Semi Rural Area Near Hosur/Bangalore, India

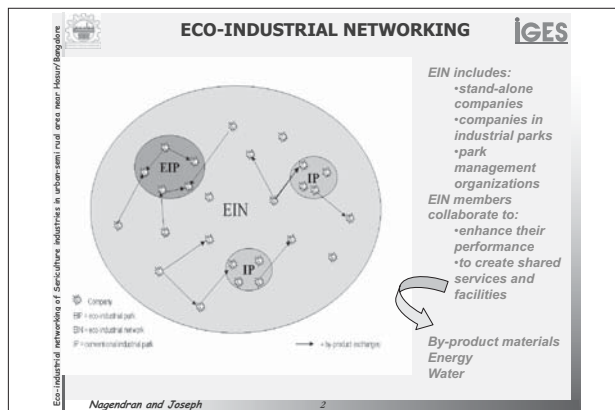
Ramachandra Murthy Nagendran

Professor of Environmental Science, Centre for Environmental Studies,
Anna University, Chennai, India



Good afternoon. First, I would like to thank Institute for Global Environmental Strategies (IGES) for making it possible for me to come here and present the findings of our study. I will be presenting our findings on the Eco-industrial Networking of Sericulture Industries in urban-semi rural area near Hosur/Bangalore, India.

Unlike in many other parts of the Asia, silk industry is still alive in India. It has to be supported, encouraged, and allowed to grow for the social reasons behind it, in addition to the economic gains. The concept 'eco-industrial networking' explained to us by Dr. Anbumozhi is the basis for our work.



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To give you a brief profile of India, now she is referred to as the IT Capital of the world, and world's largest democracy with agricultural force contributing a mighty 60%. Coming to the study focus, India is the second largest exporter of silk, and linked to this, its

industrial production and growth rate is about 8.2%.

Country Profile - India IGES

- ✓ Population close to 1.1 billion in 2.9 million km² divided into 28 states and 7 union territories
- ✓ Population growth rate : 1.38%
- ✓ World's largest democracy
- ✓ GDP per capita (PPP): \$3,300
- ✓ GDP composition: agriculture 18.6%, industry 27.6%, services 53.8%
- ✓ Labor force : agriculture 60%, industry 17%, services 23%
- ✓ Second-largest exporter of silk
- ✓ Fourth-largest coal reserves in the world
- ✓ Total GDP : \$3.633 trillion (world 4th)
- ✓ Industrial production growth rate : 8.2%

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Slide ③

Industrial development in India has made strides, as reflected by a huge 5,500 million US\$ Foreign Direct Investment (FDI) in the last and the current financial years. I am very happy to tell that Japan has been playing a significant role in this as you can see in the table. During the period, 1991-2006 Japan's contribu-

Industrial Development in India IGES

- ✓ One of the most preferred nations in Asia for FDI
- ✓ FDI in FY 2005-06 US\$ 5,500 million
- ✓ Electrical Equipments, Telecommunication and Transportation - top 3 sectors attracting FDI
- ✓ Japan is the 3rd major investor in India
- ✓ Japan is a major supplier of technology to India with 837 collaborations (about 11% of total)
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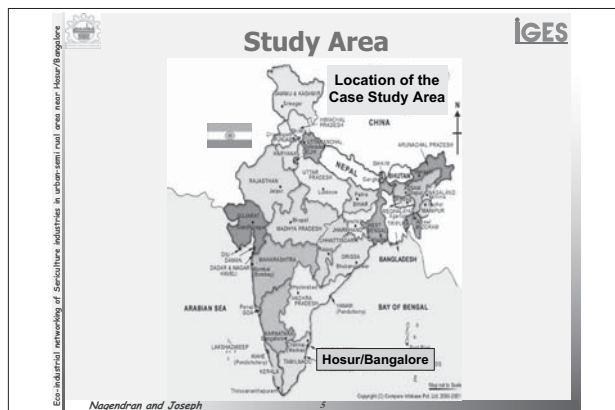
Country	1991 - 2006 (Billion US\$)
Mauritius	13.3
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Slide ④

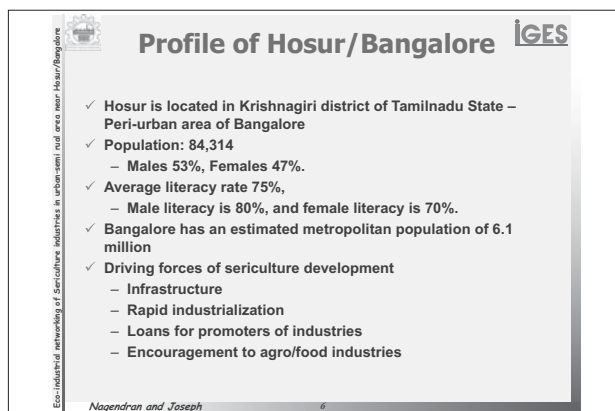
tion has been at whopping 2.1 billion US\$. The Official Development Assistance (ODA) policy of Japan and bilateral technical cooperation initiatives through such organizations like Japan International Cooperation Agency (JICA) have played and are playing a significant role in this.

Our study area included the city of Bangalore, the Silicon valley of India, and Hosur district in the State of Tamil Nadu. This is a perfect example of an area sandwiched between two urban areas. The fringe area between Hosur and Bangalore was our study area.



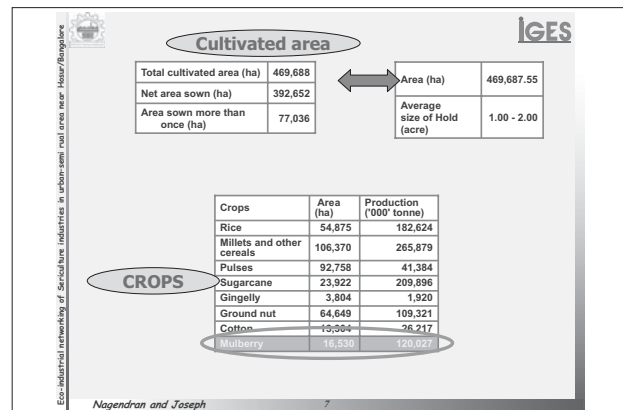
Slide ⑤

To just tell you about our study area, the urban part of it, the Bangalore is a highly populated city. It is one of the biggest cities in the country with a population of over 6.1 million, whereas the rural-fringe area has low population of about 83,000, and it is situated in the geographical border between the two states of Karnataka and Tamil Nadu.

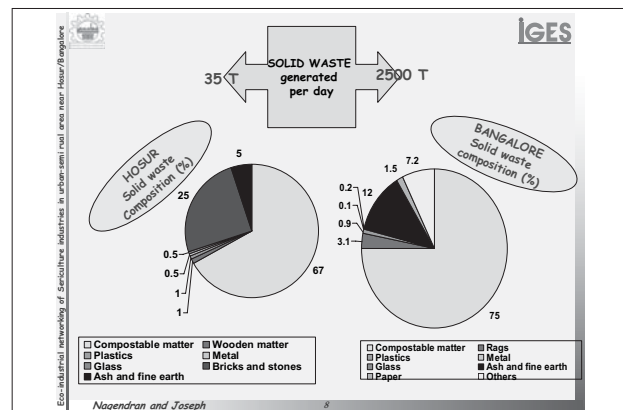


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In this area, sericulture has been a tradition for



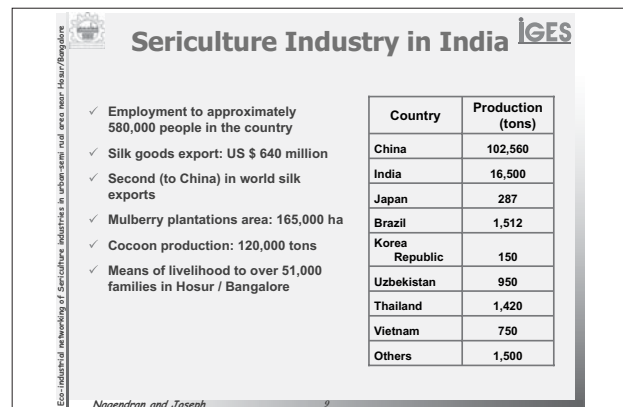
Slide ⑦



Slide ⑧

over a century, thanks to its ecological conditions, the available infrastructure, and encouragement to this sector by the government.

As you can see in the slide, among the crops in our study area, mulberry takes the cake with huge cultivated area. This is the food of silkworm that produces the wonder thread called silk and the sericulture industry in India is providing jobs to over 580,000 peo-



Slide ⑨

ple; in our study area alone nearly 50,000 families depend on this industry for their survival. As I mentioned earlier, our study area contributes to a mighty percentage of silk production in the country.

The most important issues as indicated by our study in this industry are more of social in nature, especially the gender-related ones. Unlike many other industries, sericulture industry is more or less controlled by the women folk to the best part of its supply chain. Many of the programs floated by the government are focusing the issues of social importance. This fact notwithstanding, like in many other cases that we have heard, there has been migration of people from this area to the nearby biggest city, Bangalore, mainly due to social compulsions.

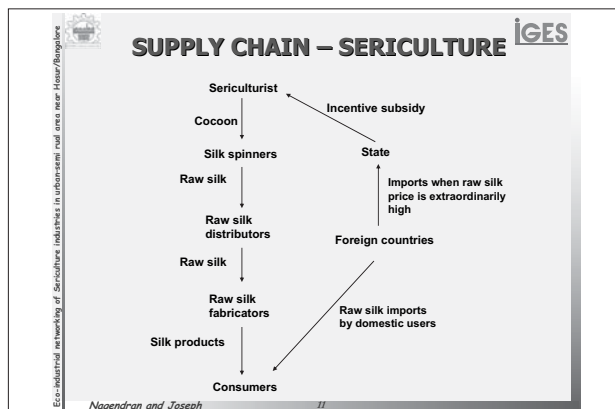
Social Issues

- ✓ Gender-related
 - Significant involvement of women in silk rearing and farming activities – in tending mulberry plants, feeding silkworms and removing waste
 - Poverty programs based on data that do not adequately capture the extent of women's work in sericulture
 - The double-burden faced in working at home and outside
- ✓ Others
 - Migration (labour) from the dry, drought-prone areas of the Karnataka State to Ramanagaram district
 - Increase in the number of sub-schemes in the area, which are low-cost and can be set up with micro-credit facilities that government departments and schemes offer.

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This slide gives an overall view of the supply chain in sericulture, which starts with the sericulturist, the micro entrepreneur, who is linked to the spinners, the raw silk producer and distributor, then raw silk fabri-



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cator or the weaver, and then the consumers. The other side of the supply chain is the one that has a lot of business opportunities for exporting the products to other countries. I use this supply chain slide to show you that many of the actors or stakeholders in this chain are linked. The link has been very strong between sericulturist and spinners on one side, raw silk fabricators and the State on the other side, and finally the industries and the foreign countries on the other. But there appears to be some gaps, which are to be linked, and it is hoped that during our research, we would try to establish this link.

To take you through the process of silk production, this starts with cultivating the mulberry plant, and then feeding the silkworm *Bombyx mori*. This is the species used in India, and rearing them to make them produce the cocoons.

TECHNOLOGY/PROCESSES IN SERICULTURE INDUSTRY

Mulberry cultivation: Mulberry sericulture consists of rearing the silkworms in a domesticated environment using harvested mulberry leaves.

Rearing of silkworms: The rearing of silk worms requires a specific environmental condition, particularly proper temperature and humidity.

Cocoon Markets: Cocoon markets facilitate the securing of good prices for cocoons produced in the district.

Video of process

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The next step will be reeling the silk from the cocoon, winding them to the required strength, and

TECHNOLOGY/PROCESSES IN SERICULTURE INDUSTRY (Contd.)

Reeling of Cocoons: Reeling of cocoons to produce the raw silk is the ultimate industrial destiny for the products.

Winding and Doubling: The next stage of processing the silk yarn is winding of yarn from the cocoons and doubling it for strength.

Twisting: This is the process whereby individual silk threads obtained after doubling are twisted into a strong multi-ply thread.

Video of process

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Slide 13

twisting them to make the raw material ready for making textiles of various kinds.

Many of the silk farms are supported by the government. They are playing a major role in giving training to the farmers. The cooperative societies play a role in addressing the socio-economic issues related to this industry.

Eco-Industrial Network of Sericulture Industries in urban semi rural area near Hosur/Bangalore

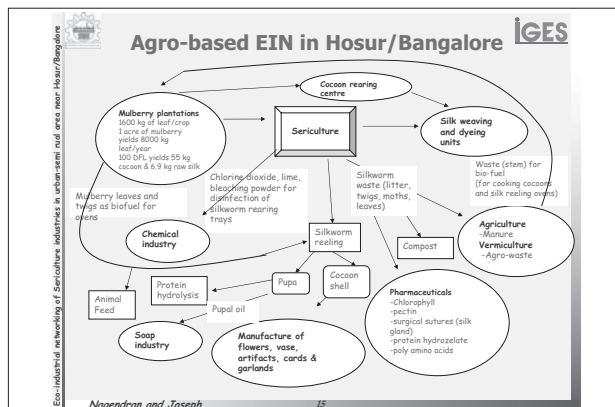
TECHNOLOGY/PROCESSES IN SERICULTURE INDUSTRY (Contd.)

- ✓ **Silk Farms:**
These farms perform several functions such as maintenance and propagation of breeder stock of silk worm races, propagation of high yielding variety of mulberry, maintaining the mulberry garden, preservation of mulberry leaves, rearing of silk worms, mounting and harvesting of cocoons, control of diseases and imparting training to the farmers.
- ✓ **Co-operative Societies:**
Several silk co-operative societies have been working for promoting the silk industry in the state.

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This is a diagram, which tries to explain the various actors in the sericulture industry and also the possibilities of business opportunities and commercial entrepreneurship. From this diagram, it becomes evident that sericulture industry in this area has a link starting with the micro entrepreneur or household level. Then they are linked to the small and medium scale people leading to or feeding the material for the big industries or the macro entrepreneurs. In addition to this, you will see that there is plenty of business potential existing to get the by-product from this industry especially in the form of pharmaceutical products



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to get products such as chlorophyll, pectin, protein hydrozolate, poly amino acids, and so on. These are high-tech areas, and in this study area, transfer of technologies from developed countries like Japan would go a long way in strengthening and achieving the objective of eco-industrial cluster. There are other areas also. For example, extraction of pupa oil and supporting small industries making soap, and so on.

Eco-Industrial Network of Sericulture Industries in urban semi rural area near Hosur/Bangalore

SWOP

Strengths

- ✓ Present
 - Support from society
 - Family labour available
 - Foreign investment capital
 - Co-operation with other institutions in country
 - Program training to develop employee skills
 - Complete of machine processing and high capacity
- ✓ Ideal
 - Handmade silk products
 - Improvement of employee skills by community training
 - Better sericulture activities with a farming example
 - Decreased production cost
 - Quality product and service within industries
 - Expanded market compartment

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Eco-Industrial Network of Sericulture Industries in urban semi rural area near Hosur/Bangalore

SWOP

Weaknesses

- ✓ Present
 - Low farmer education / awareness / knowledge
 - Intermediate technology
 - Limited fund
 - Low expertise in marketing
- ✓ Ideal
 - More industries in cluster may exert increased pressure for raw material requirements
 - Increased farmer / people awareness – insight into gains
 - Expansion of urban 'tentacles' into rural
 - Improved quality of industry through broad-based and revitalized research – need for more expansion

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Eco-Industrial Network of Sericulture Industries in urban semi rural area near Hosur/Bangalore

SWOP

Opportunities

- ✓ Present
 - Conservative and hence judicious use of resources
 - Self sufficient and self-dependent rural economies
 - Can have better quality of cocoon / eggs
- ✓ Ideal
 - Creation of more businesses
 - Attraction of new investments
 - Prevention of population migration to urban areas
 - Socialization of silk and its products

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Potential SWOP

- ✓ Present
 - Increased number of industries / businesses
 - Mulberry improvement
 - Silkworm care
- ✓ Ideal
 - Increased silk production and quality to take on competition in the WTO regime
 - Add fillip to handloom sector of India
 - Sericulture-based agro-forestry
 - Agro waste as manure for agriculture
 - Biofuel from organic waste

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We subjected our findings to SWOP analysis to address the strengths, weaknesses, opportunities, and potentials.

I have summarized the findings of SWOP in this slide. As you can see here, the major strength of is that already family labor is available. As was mentioned in the case study of wood biomass, the human capital as well as foreign investment capital is already available in this area. For example, JICA investment in this sector has played a significant role in strengthening the cluster. The major weakness appears to be the lack of policies that encourage exchanging of resources and materials, and I will talk more about it a little later. Due to unstable financial conditions, their utilization appears to be slightly distorted. Coming to the opportunities regarding establishment of EIC, our SWOP findings suggest that it would create additional jobs and also would attract external investments, especially in the form of technology transfer

<p>Strengths</p> <ul style="list-style-type: none"> • Family labour available • Foreign investment capital • Program training to develop employee skills • Decreased production cost • Expanded market compartment 	<p>Opportunities</p> <ul style="list-style-type: none"> • Create additional jobs through EIC especially at the household level • Reduce production cost through waste exchanges and increase competitiveness • Attract external investments
<p>Weaknesses</p> <ul style="list-style-type: none"> • Lack of policies encouraging exchange of resource and materials • Unstable financial conditions prevent new investments • Low expertise in marketing 	<p>Potentials</p> <ul style="list-style-type: none"> • Add fillip to handloom sector of India • Enhance living standards by increasing income levels • A model eco-industrial cluster

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programs. There is huge potential to enhance living standards by increasing the income level of the people. It is also possible by establishing EIC to show that a model EIC can be established in this sector.

Unlike other industries in India, sericulture comes under the purview or jurisdiction of different ministries, namely the Ministry of Environment, the Ministry of Agriculture, and the Ministry of Industries. The driving force of the industry is contributed by all the three ministries. The National Environmental Policy has been very encouraging. One important step is towards developing what are known as silk marks to ensure the quality. We have private sector investments and sustainable agriculture in case of agricultural policy, and the promotion or the creation of eco-industrial cluster has been accepted as one of the policy interventions for this sector.

POLICY ANALYSIS

- National Environment Policy**
 - Revenue enhancing fiscal instruments
 - Setting environmental standards
 - Climate change
 - Eco-labeling and certification
 - Environmental management
 - Awareness
 - Education and information
- National Agriculture Policy**
 - Private sector investments
 - Sustainable agriculture
 - Food and nutritional security
 - Broad-based and revitalized research
 - Strengthen database for the agriculture sector
- State Industrial Policies**
 - Maximum value addition to local resources
 - Promotion of R&D
 - Employment of local population in SSIs
 - Automatic conversion of land use when the Government approves creation of industrial cluster / estate
 - development of agro/food industries

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The execution of these policies is done by a variety of institutions, and if I may say so, many of these in-

Institutions for Sericulture

Main Research Institutes

- Central Sericultural Research and Training Institute (Mysore, Karnataka)
- Central Sericultural Germplasm Resource Centre (Hosur, Tamil Nadu)
- Silkworm Seed Technology Laboratory (Bangalore, Karnataka)
- Seri-biotech Research Laboratory (Bangalore, Karnataka)
- Central Muga Eri Research and Training Institute (Lahdogarh, Assam)
- Central Tasar Research and Training Institute (Ranchi, Jharkhand)

Regional Research Stations

- 10 for Mulberry
- 8 for Tasar
- 1 each for Eri and Muga

Research Extension Centres (RECs)

- 38 for Mulberry
- 12 for Tasar
- 3 each for Eri and Muga

One Satellite Silkworm Breeding Station

- 19 Sub-RECs for Mulberry
- 1 Sub-REC for Muga

Basic and Commercial Silkworm Seed Support

- National Silkworm Seed Organisation, Bangalore
- 19 Silkworm Seed Production Centres, 22 Basic Seed Farms
- Basic Tasar Silkworm Seed Organisation
- Muga Silkworm Seed Organisation
- Eri Silkworm Seed Organisation

Post-Cocoon Support and Eco-testing

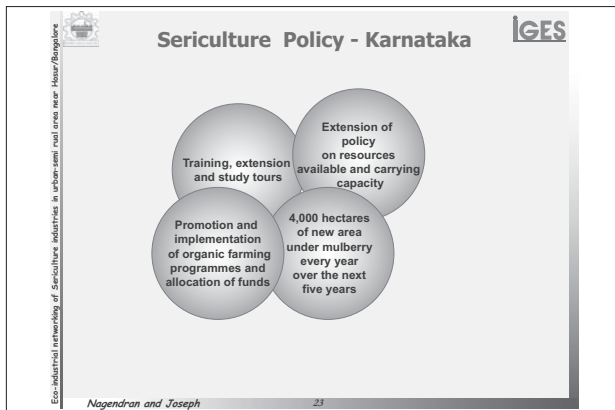
- Central Silk Technological Research Institute
- Silk Conditioning and Testing House
- Textile Testing Laboratories
- 15 Demonstration cum Technical Service Centres
- 2 Raw Silk Testing Centers
- 2 Cocoon Testing Centers

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stitutions that you see in this slide have been established by the generous grant of JICA.

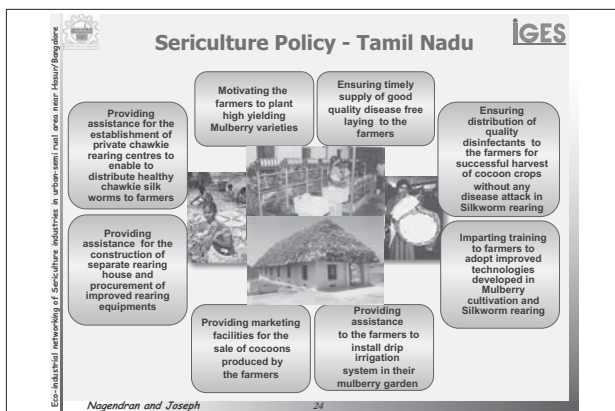
Based on the findings and the constructive work of these institutions both the States - State of Karnataka,



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and the State of Tamil Nadu, have come out with special policies for sericulture.

Especially in the case of Tamil Nadu, the JICA funds and the ODA policy of Japan have helped real-



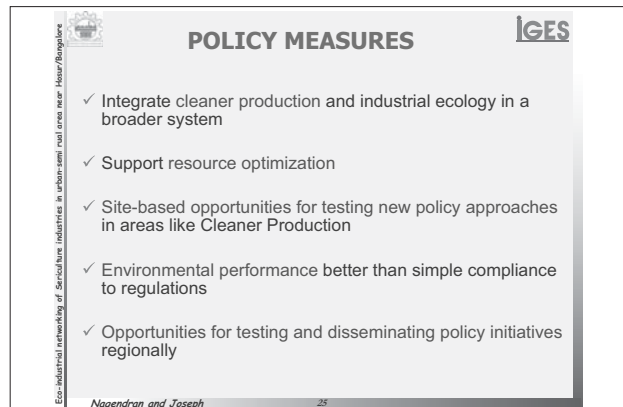
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ize many Chawkie rearing centres, training centres, and other similar organizations.

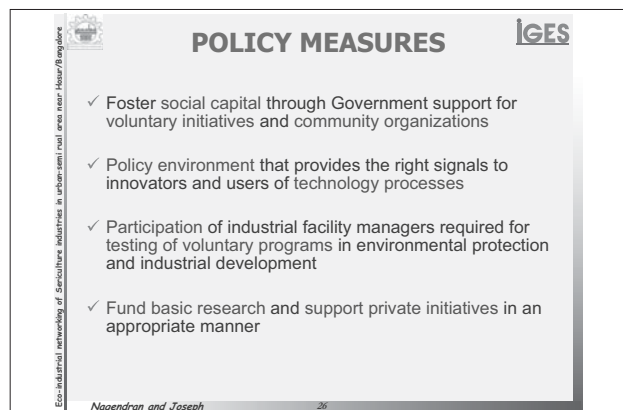
When we analyzed these policy measures in relation to our specific work, we realized that these measures help integrate the modern industrial ecology and cleaner production.

The measures also address and develop the social capital through the government support for various organizations, provide research for basic research requirements, and support private initiatives wherever

applicable.

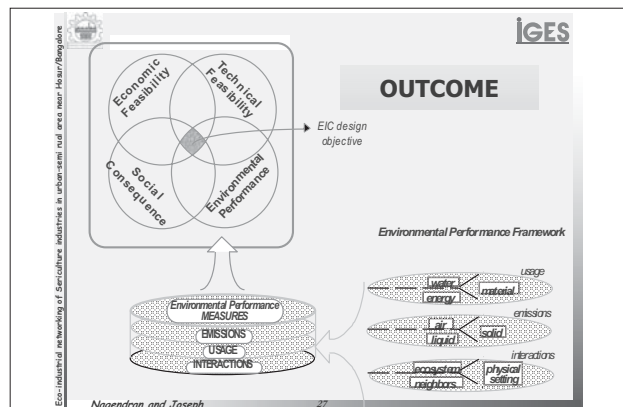


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The outcome of this kind of exercise to establish or combine the policies in the right mixture would lead to economic and the technical feasibility of industry, and the environmental performance of sericulture to develop and strengthen the social consequence. As a result of the efforts, the objectives of eco-industrial cluster design are most likely to be achieved.



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Based on the work that we have done so far and the data that we have collected and analyzed, we have some specific conclusions. One is that there will be an upswing of industrial development in the region, which would lead to definite economic gains. Silk industry in this area is almost a household small entrepreneur type of industry, and in this the government-private silk entrepreneurship would go a long way in developing the industry. The findings of our study have also revealed that there is a possibility of developing eco-industrial networking. There is sufficient scope to involve women and address the social issue namely, the gender that is an important component in this particular industry, cutting across the age distribution.

CONCLUSIONS IGES

- ✓ Upswing in industrial development in the region resulting in economic gains
- ✓ Families are keeping up the traditional sericulture and are reaping the benefits of initiatives of Governmental Private silk entrepreneurs
- ✓ Findings of the study encourage networking
- ✓ Sufficient scope to involve women cutting across age distribution to develop the network

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We are pretty sure that networking would provide a platform for assessing or evaluating the role of participatory approach for social development. The existing policies and further interventions of the policies would go a long way to help retain the quality of environment in this area. It also would pave way for effective way of resource conservation and equitable sharing of whatever advantage that we are going to derive. What we require is a right mixture of local and external technologies to keep the links of the chain intact and strengthen.

In order to achieve this, it is our recommendation that we need to create micro level interactions; that is,

CONCLUSIONS IGES

- ✓ Networking would provide a platform for assessing and evaluating the role of participatory approach for social development
- ✓ Policy modifications and their integration with the growth of other industries would help retain and enhance the quality of environment
- ✓ Resource conservation and its equitable sharing is an added advantage
- ✓ Right mixture of local and external technologies are needed to keep the links of the chain intact

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micro level entrepreneurs, middle or small scale entrepreneurs, and big sericulture industries. To do this, we need a broader view of the entire value chain to establish EIC, which would be an important driving force. If sericulture has to be made a success, it is imperative that participatory approach and doing gender justice will go a long way, and the use of eco-industrial clusters would strengthen the social capital.

Recommendations IGES


- ✓ Technology for EIC
 - Creation of micro level interactions between existing units
 - A broader view of the entire value chain is essential to establish EIC
- ✓ Social Capital
 - Sericulture to be made more participatory to ensure gender justice and build social capital
 - Use Eco-industrial clusters to strengthen social capital

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To sum up, I would say that industrial clusters with reference to sericulture in the study area, do exist but they are not clustered. This approach of establishing EIC would bring these small and medium entrepreneurs physically and functionally together to achieve the social wellbeing and increase the social value. I think this is our tagline of the study. Thank you very much.

Eco-industrial networking of Sericulture industries in urban-semi rural area near Hosur/Bangalore




【インドからの報告】

Eco-Industrial Networking of Sericulture Industries in Urban–Semi Rural Area Near Hosur/Bangalore, India

養蚕業を中心とした環境調和型産業クラスターの開発における企業間ネットワークの構築


R. Nagendran and Kurian Joseph
R. ナゲンドラン K. ジョセフ
Centre for Environmental Studies
Anna University
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nag_nag@hotmail.com




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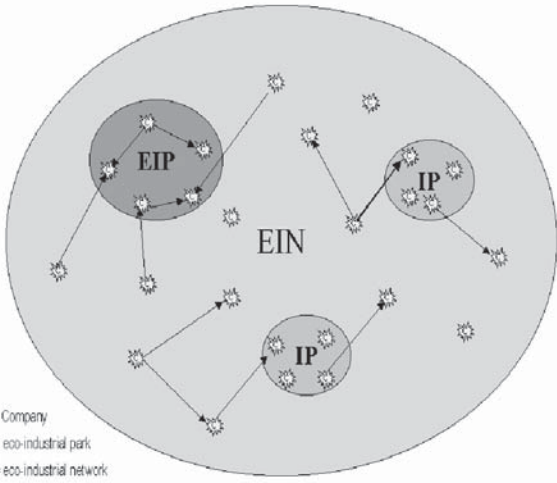
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Eco-industrial networking of Sericulture industries in urban-semi rural area near Hosur/Bangalore



ECO-INDUSTRIAL NETWORKING





☼ Company

EIP = eco-industrial park

EIN = eco-industrial network

IP = conventional industrial park


→ + by-product exchanges

EIN includes:

- stand-alone companies
- companies in industrial parks
- park management organizations

EIN members collaborate to:

- enhance their performance
- to create shared services and facilities



By-product materials
Energy
Water

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Eco-industrial networking of Sericulture industries in urban-semi rural area near Hosur/Bangalore

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Eco-industrial networking of Sericulture industries in urban-semi rural area near Hosur/Bangalore

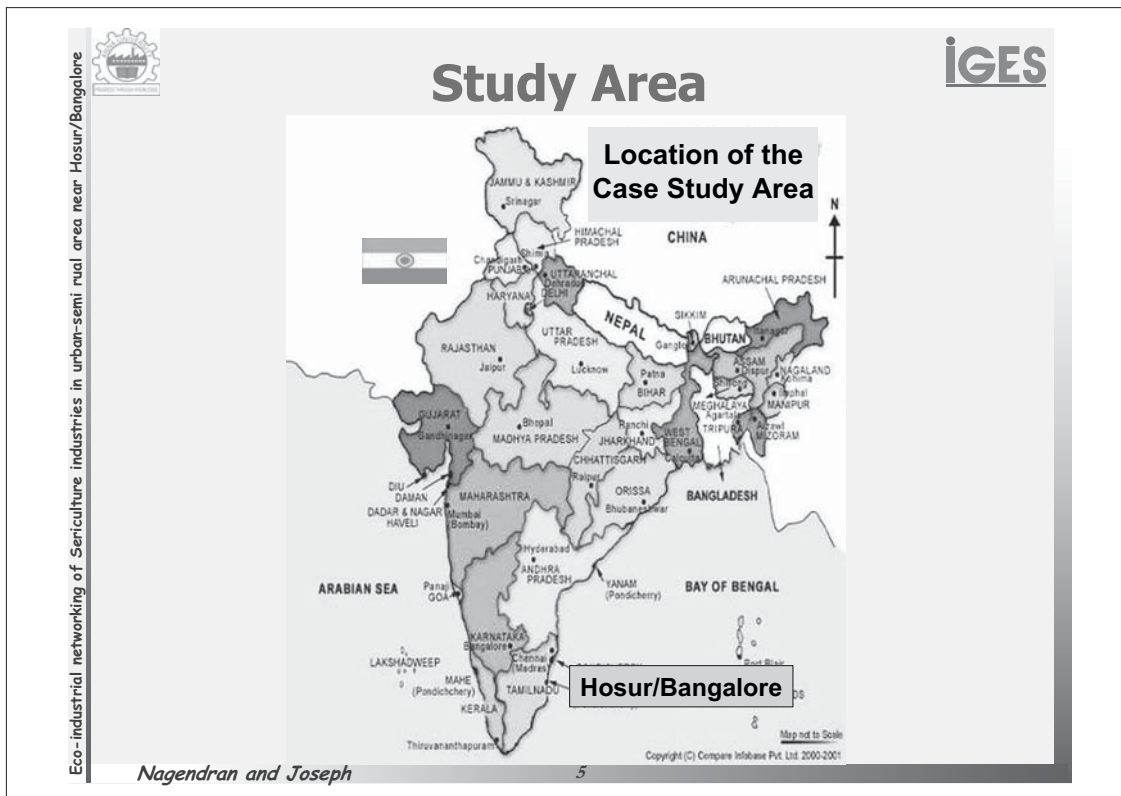
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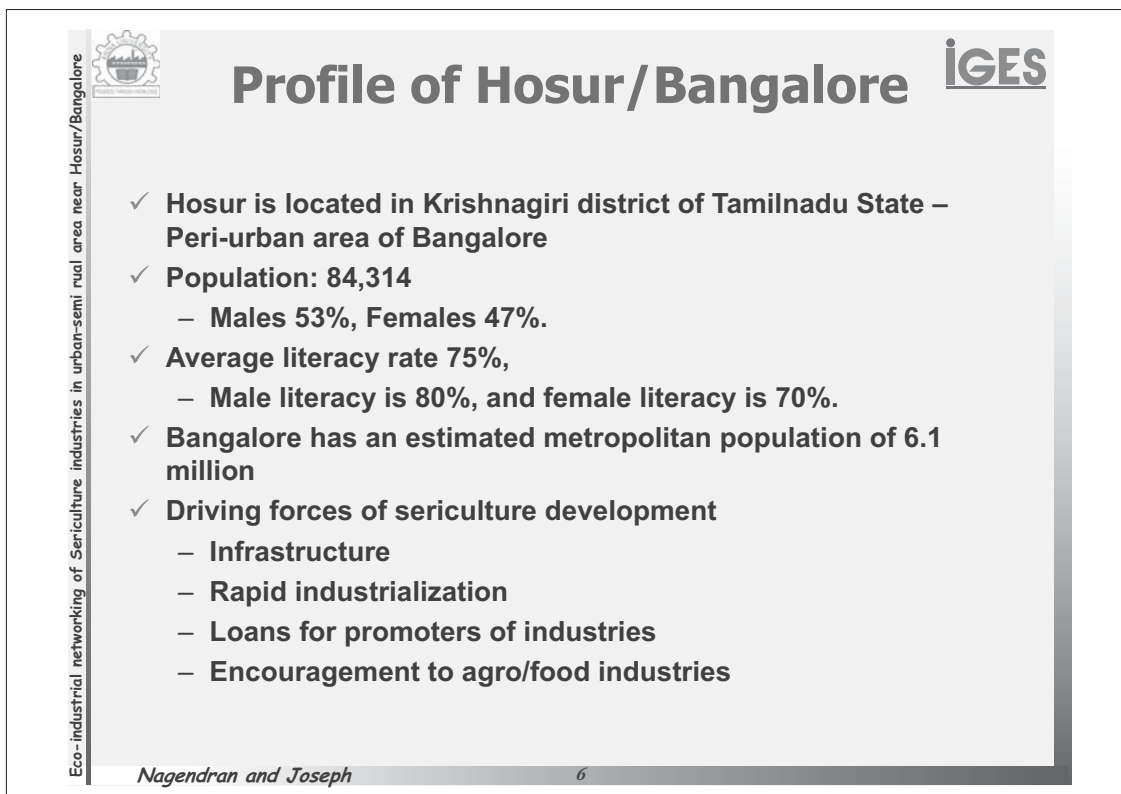
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Slide ⑤



Profile of Hosur/Bangalore

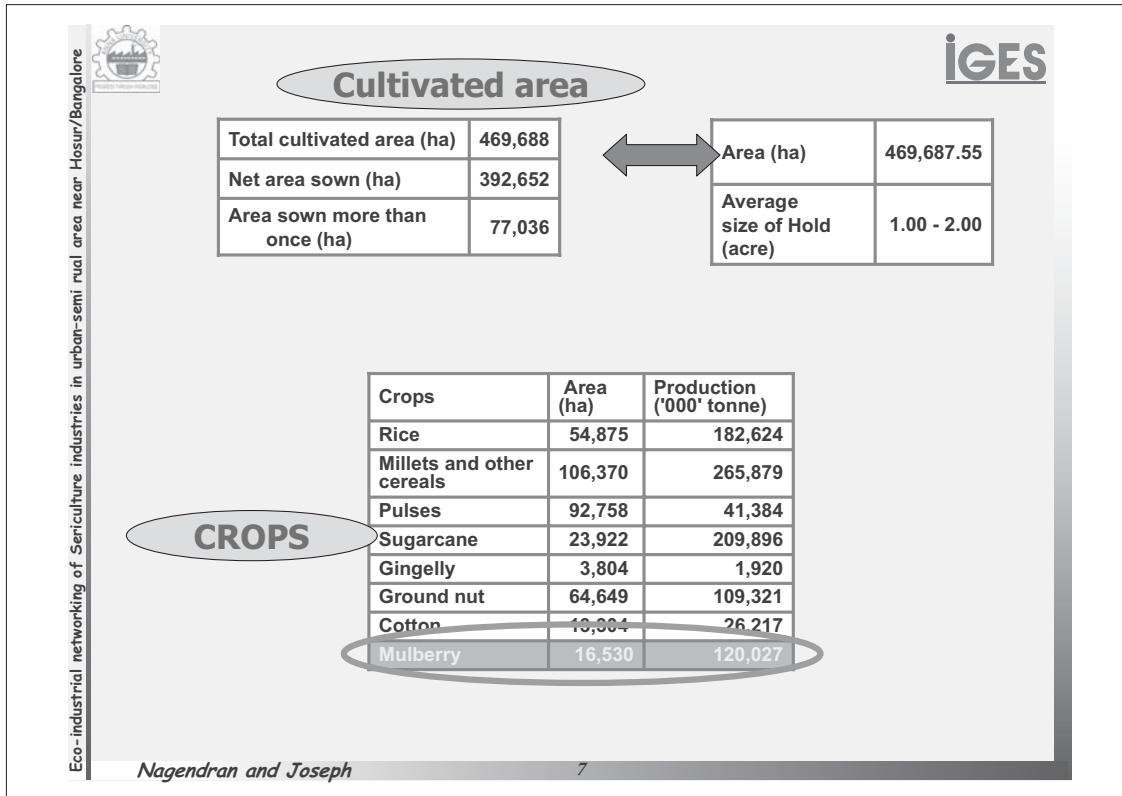
- ✓ **Hosur is located in Krishnagiri district of Tamilnadu State – Peri-urban area of Bangalore**
- ✓ **Population: 84,314**
 - Males 53%, Females 47%.
- ✓ **Average literacy rate 75%,**
 - Male literacy is 80%, and female literacy is 70%.
- ✓ **Bangalore has an estimated metropolitan population of 6.1 million**
- ✓ **Driving forces of sericulture development**
 - Infrastructure
 - Rapid industrialization
 - Loans for promoters of industries
 - Encouragement to agro/food industries

Eco-industrial networking of Sericulture: industries in urban-semi rural area near Hosur/Bangalore

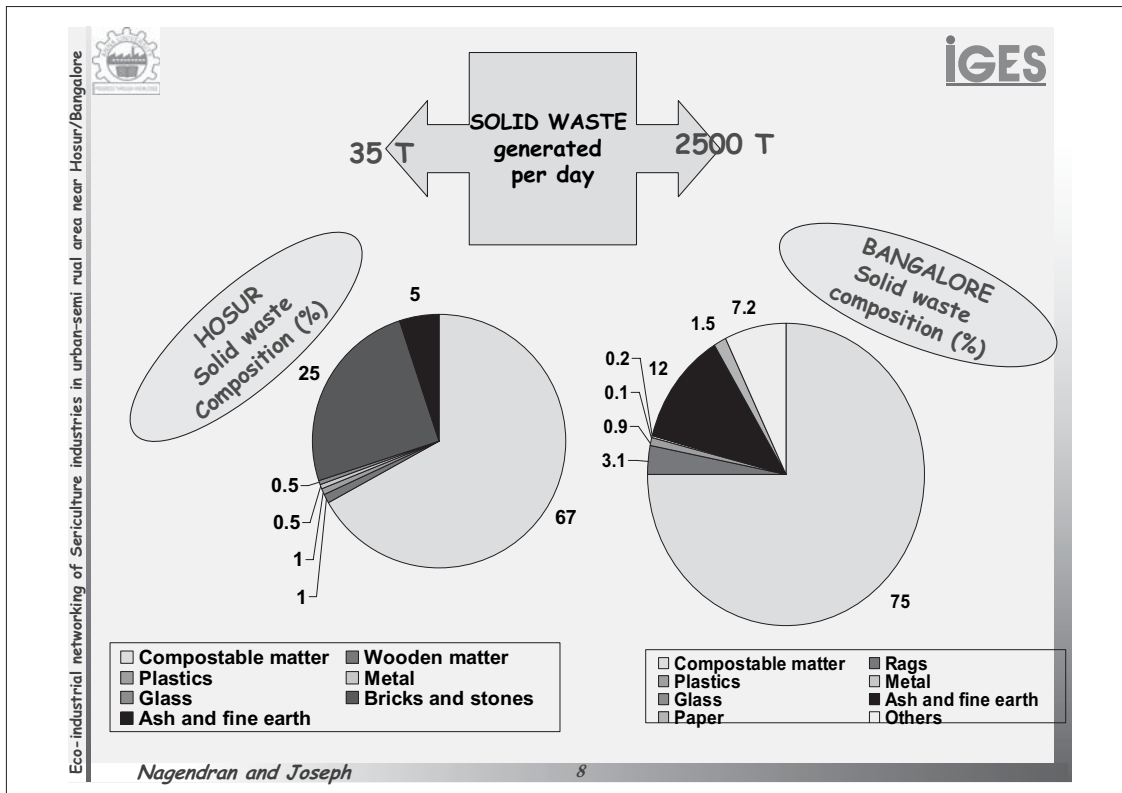
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Eco-industrial networking of Sericulture industries in urban-semi rural area near Hosur/Bangalore



Sericulture Industry in India




- ✓ Employment to approximately 580,000 people in the country
- ✓ Silk goods export: US \$ 640 million
- ✓ Second (to China) in world silk exports
- ✓ Mulberry plantations area: 165,000 ha
- ✓ Cocoon production: 120,000 tons
- ✓ Means of livelihood to over 51,000 families in Hosur / Bangalore

Country	Production (tons)
China	102,560
India	16,500
Japan	287
Brazil	1,512
Korea Republic	150
Uzbekistan	950
Thailand	1,420
Vietnam	750
Others	1,500


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Eco-industrial networking of Sericulture industries in urban-semi rural area near Hosur/Bangalore



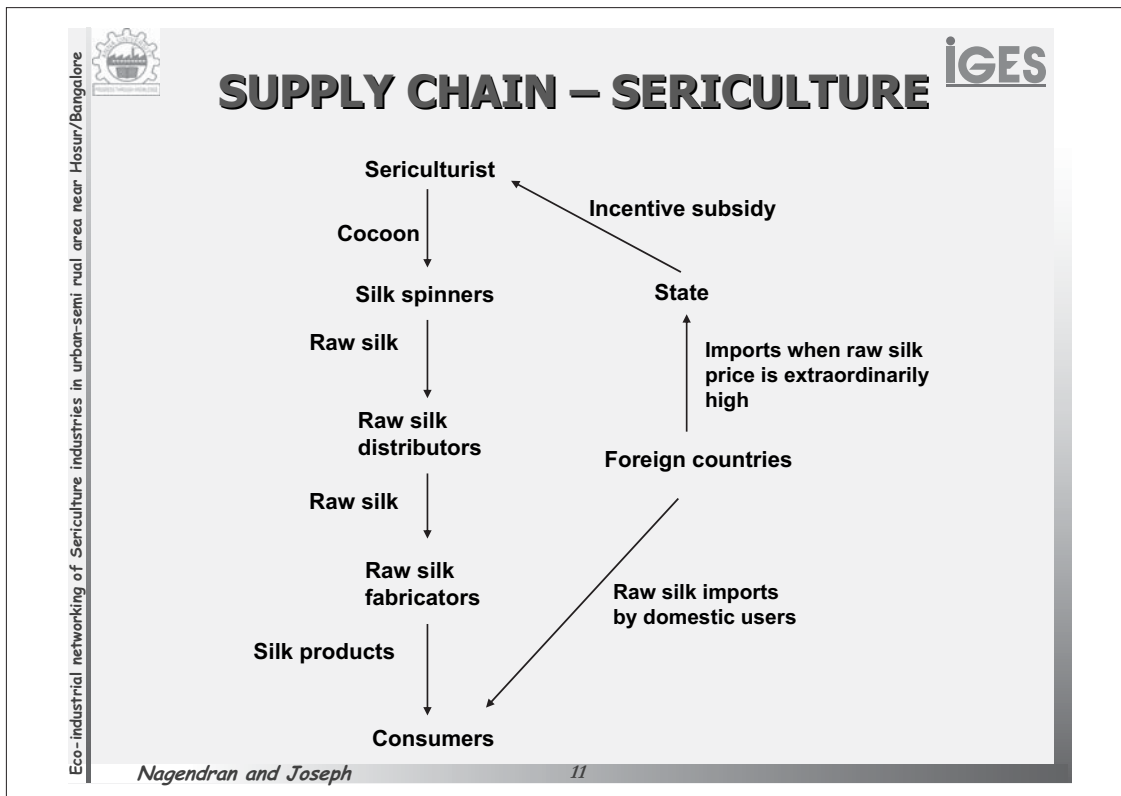
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 - Increase in the number of sub-schemes in the area, which are low-cost and can be set up with micro-credit facilities that government departments and schemes offer.

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Eco-industrial networking of Sericulture industries in urban-semi rural area near Hosur/Bangalore

TECHNOLOGY/PROCESSES IN SERICULTURE INDUSTRY IGES

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Cocoon markets facilitate the securing of good prices for cocoons produced in the district.

Video of process


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Eco-industrial networking of Sericulture industries in urban-semi rural area near Hosur/Bangalore



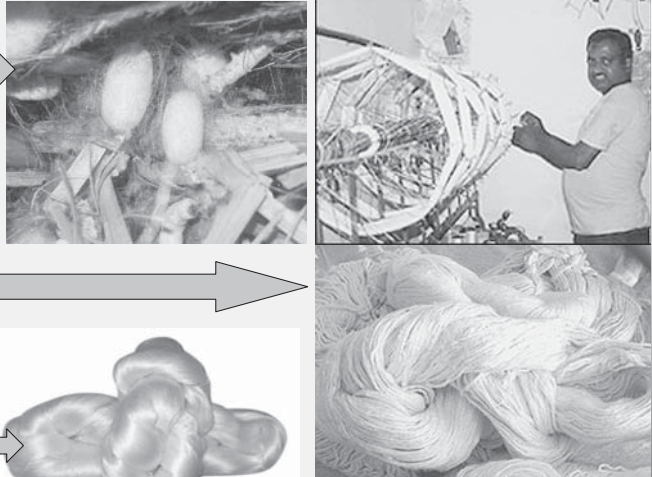
TECHNOLOGY/PROCESSES IN SERICULTURE INDUSTRY (Contd.)




Reeling of Cocoons:
Reeling of cocoons to produce the raw silk is the ultimate industrial destiny for the products.

Winding and Doubling:
The next stage of processing the silk yarn is winding of yarn from the cocoons and doubling it for strength.

Twisting:
This is the process whereby individual silk threads obtained after doubling are twisted into a strong multi-ply thread.






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Eco-industrial networking of Sericulture industries in urban-semi rural area near Hosur/Bangalore




TECHNOLOGY/PROCESSES IN SERICULTURE INDUSTRY (Contd.)



- ✓ **Silk Farms:**
These farms perform several functions such as maintenance and propagation of breeder stock of silk worm races, propagation of high yielding variety of mulberry, maintaining the mulberry garden, preservation of mulberry leaves, rearing of silk worms, mounting and harvesting of cocoons, control of diseases and imparting training to the farmers.
- ✓ **Co-operative Societies:**
Several silk co-operative societies have been working for promoting the silk industry in the state.

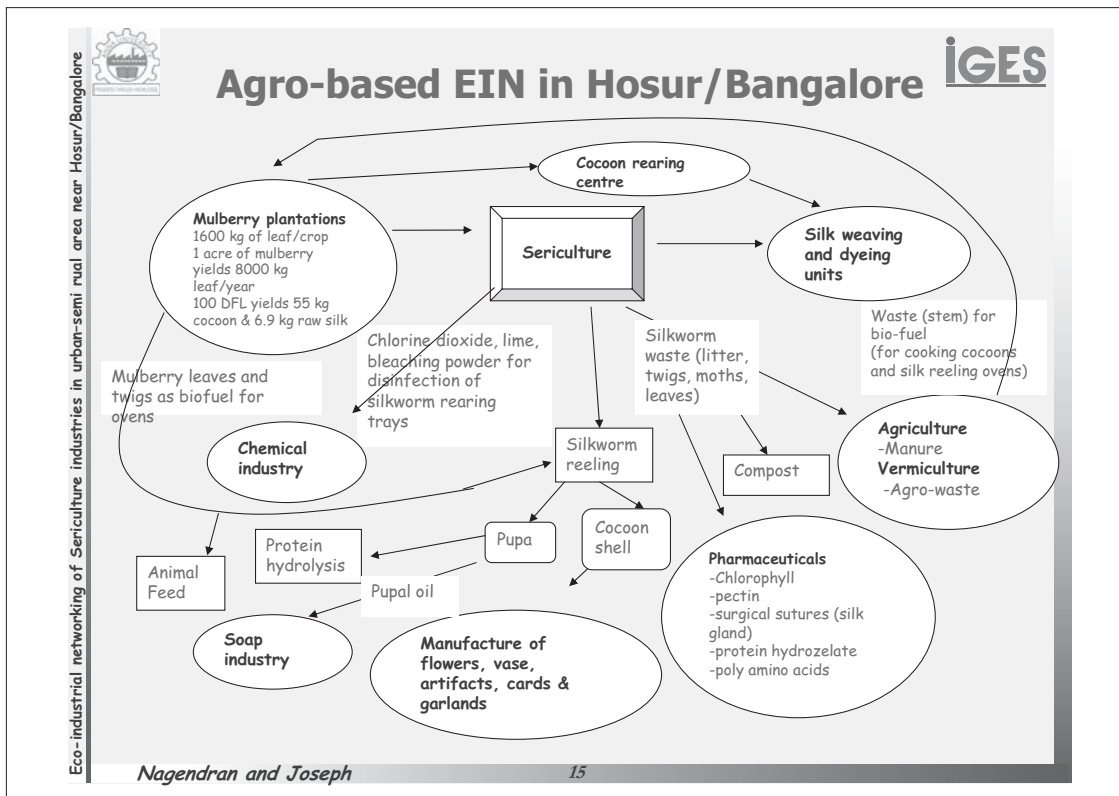




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Eco-industrial networking of Sericulture industries in urban-semi rural area near Hosur/Bangalore




SWOP



Weaknesses

- ✓ Present
 - Low farmer education / awareness / knowledge
 - Intermediate technology
 - Limited fund
 - Low expertise in marketing
- ✓ Ideal
 - More industries in cluster may exert increased pressure for raw material requirements
 - Increased farmer / people awareness – insight into gains
 - Expansion of urban ‘tentacles’ into rural
 - Improved quality of industry through broad-based and revitalized research – need for more expansion




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Eco-industrial networking of Sericulture industries in urban-semi rural area near Hosur/Bangalore




SWOP



Opportunities

- ✓ Present
 - Conservative and hence judicious use of resources
 - Self sufficient and self-dependent rural economies
 - Can have better quality of cocoon / eggs
- ✓ Ideal
 - Creation of more businesses
 - Attraction of new investments
 - Prevention of population migration to urban areas
 - Socialization of silk and its products




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Eco-industrial networking of Sericulture industries in urban-semi rural area near Hosur/Bangalore




Potential SWOP



- ✓ **Present**
 - Increased number of industries / businesses
 - Mulberry improvement
 - Silkworm care

- ✓ **Ideal**
 - Increased silk production and quality to take on competition in the WTO regime
 - Add fillip to handloom sector of India
 - Sericulture-based agro-forestry
 - Agro waste as manure for agriculture
 - Biofuel from organic waste




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Eco-industrial networking of Sericulture industries in urban-semi rural area near Hosur/Bangalore



SWOP – Findings



Strengths

- Family labour available
- Foreign investment capital
- Program training to develop employee skills
- Decreased production cost
- Expanded market compartment

Opportunities

- Create additional jobs through EIC especially at the household level
- Reduce production cost through waste exchanges and increase competitiveness
- Attract external investments

Weaknesses

- Lack of policies encouraging exchange of resource and materials
- Unstable financial conditions prevent new investments
- Low expertise in marketing

Potentials

- Add fillip to handloom sector of India
- Enhance living standards by increasing income levels
- A model eco-industrial cluster

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Eco-industrial networking of Sericulture: industries in urban-semi rural area near Hosur/Bangalore

POLICY ANALYSIS

National Environment Policy

- Revenue enhancing fiscal instruments
- Setting environmental standards
- Climate change
- Eco-labeling and certification
- Environmental management
- Awareness
- Education and information

National Agriculture Policy

- Private sector investments
- Sustainable agriculture
- Food and nutritional security
- Broad-based and revitalized research
- Strengthen database for the agriculture sector

State Industrial Policies

- Maximum value addition to 'local' resources
- Promotion of R&D
- Employment of local population in SSIs
- Automatic conversion of land use when the Government approves creation of industrial cluster / estate
- development of agro/food industries

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Eco-industrial networking of Sericulture: industries in urban-semi rural area near Hosur/Bangalore

Institutions for Sericulture

Main Research Institutes

Central Sericultural Research and Training Institute
Mysore, Karnataka
Berhampore, West Bengal
Pampore, Jammu & Kashmir

Central Sericultural Germplasm Resource Centre, Hosur, Tamil Nadu

Silkworm Seed Technology Laboratory, Bangalore, Karnataka

Seri-biotech Research Laboratory, Bangalore, Karnataka

Central Muga Eri Research and Training Institute, Lahdoigarh, Assam

Central Tasar Research and Training Institute, Ranchi, Jharkhand

Regional Research Stations
10 for Mulberry
8 for Tasar
1 each for Eri and Muga

Research Extension Centres (RECs)
38 for Mulberry
12 for Tasar
3 each for Eri and Muga

One Satellite Silkworm Breeding Station
19 Sub-RECs for Mulberry
1 Sub-REC for Muga.

Basic and Commercial Silkworm Seed Support

- National Silkworm Seed Organisation, Bangalore
- 19 Silkworm Seed Production Centres,
- 22 Basic Seed Farms
- Basic Tasar Silkworm Seed Organization
- Muga Silkworm Seed Organisation
- Eri Silkworm Seed Organisation

Post-Cocoon Support and Eco-testing

- Central Silk Technological Research Institute
- Silk Conditioning and Testing House
- Textile Testing Laboratories
- 15 Demonstration cum Technical Service Centres
- 2 Raw Silk Testing Centers
- 2 Cocoon Testing Centers

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Sericulture Policy - Karnataka

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Sericulture Policy - Tamil Nadu

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POLICY MEASURES




- ✓ Integrate cleaner production and industrial ecology in a broader system
- ✓ Support resource optimization
- ✓ Site-based opportunities for testing new policy approaches in areas like Cleaner Production
- ✓ Environmental performance better than simple compliance to regulations
- ✓ Opportunities for testing and disseminating policy initiatives regionally


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Eco-industrial networking of Sericulture industries in urban-semi rural area near Hosur/Bangalore



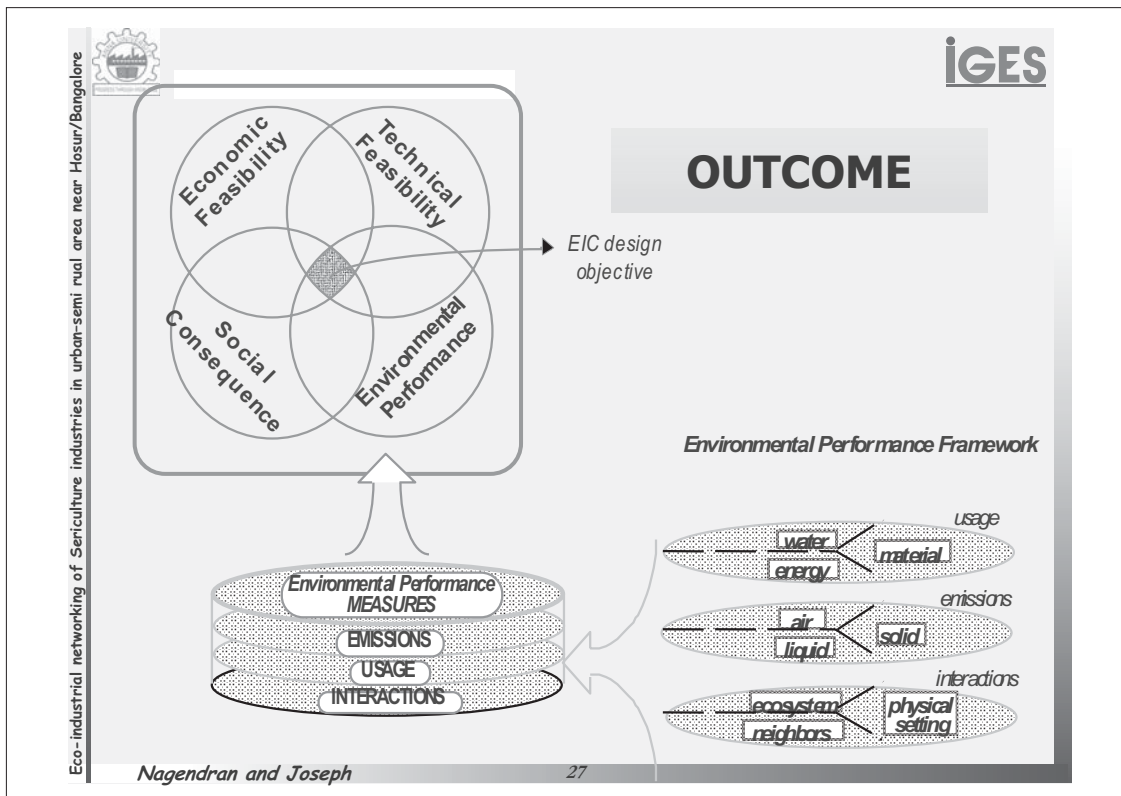
POLICY MEASURES



- ✓ Foster social capital through Government support for voluntary initiatives and community organizations
- ✓ Policy environment that provides the right signals to innovators and users of technology processes
- ✓ Participation of industrial facility managers required for testing of voluntary programs in environmental protection and industrial development
- ✓ Fund basic research and support private initiatives in an appropriate manner

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CONCLUSIONS

IGES

- ✓ Upswing in industrial development in the region resulting in economic gains
- ✓ Families are keeping up the traditional sericulture and are reaping the benefits of initiatives of Governmental Private silk entrepreneurs
- ✓ Findings of the study encourage networking
- ✓ Sufficient scope to involve women cutting across age distribution to develop the network


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Eco-industrial networking of Sericulture industries in urban-semi rural area near Hosur/Bangalore



CONCLUSIONS




- ✓ **Networking would provide a platform for assessing and evaluating the role of participatory approach for social development**
- ✓ **Policy modifications and their integration with the growth of other industries would help retain and enhance the quality of environment**
- ✓ **Resource conservation and its equitable sharing is an added advantage**
- ✓ **Right mixture of local and external technologies are needed to keep the links of the chain intact**


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Eco-industrial networking of Sericulture industries in urban-semi rural area near Hosur/Bangalore



Recommendations



- ✓ **Technology for EIC**
 - **Creation of micro level interactions between existing units**
 - **A broader view of the entire value chain is essential to establish EIC**
- ✓ **Social Capital**
 - **Sericulture to be made more participatory to ensure gender justice and build social capital**
 - **Use Eco-industrial clusters to strengthen social capital**

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