POLLUTION-A SERIOUS THREAT TO THE HUMAN CIVILIZATION-SERICULTURE INDUSTRY- A COUNTER FORCE.

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Abstract

Pollution has become a serious threat to human civilization. Consensus regarding creation of a pollution free world is not a new concept. Numerous measures have been adopted to control global pollution. However result is not yet mention worthy. Sericulture Industry is one of those exceptional industries which instead of resulting environmental degradation enrich the environment.

INTRODUCTION

Pollution is the introduction of contaminants into the natural environment that causes adverse changes. Environmental pollution is the degradation of environment owing to several factors resulting threat to the human civilization even extinction of human being. A recent research work concludes that if increasing global worming owing to environmental pollution results melting of just two inches of ice layers of both north and south poles the entire world will be under sea water.

Air pollution has always accompanied civilizations. Pollution started from prehistoric times when man created the first fires. It was the industrial revolution that gave birth to environmental pollution as we know it today.

CAUSES OF POLLUTION

A number of causes are responsible for pollution. Some of the types of pollution along with causes are presented herewith.

The major forms of pollution are listed below along with the particular contaminant relevant to each of them:

- Air pollution: the release of chemicals and particulates into the atmosphere by industry , motor vehicles, households, animals and means of telecommunication.

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- Light pollution: includes light trespass, over-illumination and astronomical interference.
- Littering: the criminal throwing of inappropriate man-made objects, even at the hill top of Everest.
- Noise pollution: which is caused due to roadway traffics, sound of aircraft**,** industrial noise, high volume sounds, sound of crackers etc.
- Soil contamination occurs when chemicals are released by spill or underground leakage.
- Radioactive contamination, resulting from 20th century activities in atomic physics, such as nuclear power generation and nuclear weapons research.
- Thermal pollution, is a temperature change in natural water bodies caused by human influence, such as use of water as coolant in a power plant.
- Water pollution, by the discharge of wastewater from commercial and industrial waste (intentionally or through spills) into surface waters; discharges of untreated domestic sewage, agricultural runoff, littering, human and animal body waste runoff, etc.
- Plastic pollution: involves the accumulation of plastic products in the environment that adversely affects wildlife, wildlife habitat, or humans.
- Besides deforestation over the globe has resulted air, soil as well as water pollution to a considerable extent.

Each of the types of pollution is a matter of serious concern for the state and every human being. These pollutions as a whole endangered the existence of life on the earth. A number of species of plants and animals have already extinct due to pollution.

MEASURES ADOPTED

Governments of all countries over the globe with the aid of legal authorities have adopted several measures to combat and stop pollution.

Environmental pollution has turn to be a global problem. Therefore it requires international cooperation to solve. International and regional organizations may play a key role in developing a consensus on what types of collective action should be pursued. Although the role of international organizations is extremely important, one should not forget that environmental problems require action at the national and local levels too.

Official efforts to control pollution started years back with **The Stockholm Conference** and followed by others.

It may be listed as

- Environmental Conference- Stockholm 1972
- Montreal Protocol-1987
- Earth Summit- Rio-de-Janeiro-1992
- United Nations Framework Convention on Climate Change-1994
- Kyoto Protocol on Climate Change 1997
- Buenos Aires Conference 1998
- Millennium Summit 2000
- Earth Summit 2002
- ASEAN Summit 2003
- SAARC Summit on Environment 2004
- World Summit and ASEAN Summit 2005
- Conference on Environment 2006
- Bali Action Plan 2007
- Copenhagen Accord 2009
- Cancun Agreement 2010
- Durban Platform for Enhanced Action 2011
- Rio Earth Summit 2012
- United Nations Climate Change Conference 2013
- World Climate Summit-Lima-2014
- United Nations Climate Change Conference 2015

It is evident that holding summits and conference on environmental issues has become an annual affair. Besides in India a number of laws and acts are in force to control environmental pollution[1].

1. The Water (Prevention & Control of Pollution) Act, 1974, and its amendments;

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3. The Air (Prevention & Control of Pollution) Act, 1981 and its amendments;

4. The Environment (Prevention) Act, 1986 and its amendments,

   (a) National Environmental Tribunal Act of1995 and

   (b) National Environmental Appellate Authority Act of 1997.

5. Hazardous Waste (Management and Handling) Rules, July1989 and

6. The Public Liability Insurance Act, 1991.

Above mentioned list of conferences, summits and acts portrays seriousness of the government bodies towards environmental pollution and its control.

However achievement in this regards has not yet reached the desired level. Deforestation continues. Littering even at the top of Mount Everest is a regular feature. Building up hotels at hill region and sea shore without necessary environmental protection measures become a lucrative business trend. Water and air pollution become a habitual practice of human being.

In this situation over the globe sericulture industry with its inherent features can be an effective weapon for international, national, state and local bodies to combat environmental pollution resulting a green environment which is a need for survival of the earth. In next paragraphs along with features of the sericulture industry I have tried to depict its eco-friendly nature.

SERICULTURE AS AN ECO FRIENDLY INDUSTRY

Sericulture industry is one of the rarest industries which are eco-friendly. Before presenting the eco-friendly nature of sericulture industry we would like to elaborate the concept of silk the basic raw material of industry and the industry.

SILK

Silk is a pasty secretion from the silk glands of silk worms.

The silk glands are actually modified salivary glands, which are long and sac-like. As this pasty secretion comes in to contact of air it becomes hard and forms strong and pliable silk strands[2]. This secretion forms two courses of fibroin:

I) A tough elastic insoluble protein consisting of 75% of fibers weighted and cemented together with secretion from the middle region of the silk gland at the time of secretion.

II) A gelatinous protein, which is easily soluble in warm water.

Some quantities of wax and carotenoid pigments are also detected. The diameter of a silk fiber is 0.0045 centimeter to 0.0082 centimeter and elasticity of silk fiber is found to be 20(twenty)%.[3]

The substance from which the silken filament is produced, consists of two transparent, colorless, cellulose fluids which unite in a lightly twisted double thread. When it comes in contact with the air this lightly twisted thread rapidly hardens and congeals to form a composite thread. This thread upon hardening, acquires a faint yellow tinge, issues from the caterpillar to form a cocoon in response to its impulse for protection when the insect has nearly reached its pupal stage. As this double thread or filament exists in the cocoon before it is either reeled or spun, it is called *BAVE*, while the single filament of which it is composed is known as *BRIN*[4].

One gland is called the *aqueduct* or collector, as it dilates to form a miniature reservoir. On the other hand in spite of absence of spinning in actual state the gland is known as *spinning gland*. These two glands carry excretions of potential silk fiber through microscopic channels to the so called *spinning head* where the fluid, soon to become silk fiber, is discharged through tinny orifices placed below the jaws of the

caterpillar, which acts as spinneret uniting the produce what appear to be a single thread.

Thus it will be noted that raw silk fiber has a duplex character consisting of two distinct filaments which are joined together, side by side, prior to ejection and which, under a microscope looks not unlike a polished rod of metal[5].

The size of silk filament in every cocoon varies according to the part of the cocoon from which it is taken, the first section being fine the middle section rather coarse and the inner section is very fine.

Microscopic view of cross section of the silk filament looks like Arabic numeral eight (8). Silk threads play a pivotal role in the life of Caterpillars[6].

SILK WORM

It is already mentioned that silk is pasty secretion from the silk gland of silk worm .The silk is obtained as fine threads from the cocoons of various species of silkworms. There are mainly four types of silk-worm in India. These are:

1. **Mulberry silkworm - *Bombyxmori***: This is a completely domesticated insect. As the natural food of this worm is mulberry leaves, so it is called mulberry silk worm.

2. **Tasar Silk worm :*Antheria Myletta***

This caterpillar feeds on ber, oak, sal and fig plants. The cocoon produced by this worm is smooth and hard. It is almost of hen's egg size. The cocoon yields reel able, brown colouredTasar silk.

3. **Muga Silk worm: *Antheraea assamensis***: The native place of this species is Assam where it has now become a good source of cottage industry. The silk produced by this moth is known as **Muga silk.**

4. **Eri Silk worm :*Attacusricinii***

The caterpillar of this worm feeds on castor leaves. The cocoons of this worm have very loose texture and the silk produced is locally called as **Arandi silk** . The threads are not glossy but much durable.

SERICULTURE INDUSTRY

With this idea about the silk now the term sericulture has been clarified. In the strict sense 'Sericulture' would refer to the processes involved in production of natural silk. 'Serio' is a Latin word meaning silk. Silk is a natural filament created by the silkworm. The art and process of silk production is called sericulture. It comprises of cultivation of host plants, silkworm rearing and collection of cocoons from food plants followed by reeling of silk yarns from cocoon, dyeing of silk yarn, spinning of the same,

weaving of silk products, printing & stitching for product development and the terminates with marketing of silk products. Activities involved in cultivation of food plants, rearing of silk worms and gaining commercial cocoons are basically farm level activities. In our study it can be termed as agricultural stage popularly known as pre-cocoon stage. The remaining stages which are mainly involved in reeling, weaving and marketing of silk products are termed as manufacturing and trading stage popularly known as post-cocoon stage. Therefore, sericulture means the raising or rearing of silkworms for production of silk. The activities get commercialized and develop on a large scale along with specialized activities. They are also considered as parts of Sericulture. Therefore sericulture would refer to the activity of raising the food plants for the silkworms, production of silkworm eggs or Disease Free Laying [D.F.Ls], silk worm rearing, production of cocoon, collection of the same, reeling of silk fiber, manufacturing of silk products, marketing and overall maintenance.

In simple Sericulture industry is a vertical combination of two major stages viz. Production of cocoon stage and Post-cocoon. Each of the stages involves a number of activities. The stages of the industry are mentioned in the Table no-1 given below.

TABLE-NO-1

TABLE SHOWING STAGES OF SERICULTURE INDUSTRY[7]

STAGES OF SERICULTURE INDUSTRY	ACTIVITIES
PRE-COCOON STAGE	PLANTATION OF FOOD PLANTS
	UPKEEP OF FOOD PLANTS
	REARING OF SILK WORMS
	COLLECTION OF COCOON
POST COCOON STAGE	BOILING OF COCOON
	REELING
	SPINNING
	WEAVING
	STICHING, DYEING, PRINTING ETC.
	MARKETING

While table no.-1 shows that only boiling of cocoon causes emission of carbon-di-oxide (CO2) due to burning of coal for the same. However the harmful effect of above mentioned stage is surpassed by benefit from plantation of saplings as food plants. Cocoons are produced in matured trees. Following table shows comparative picture of harmful effect of the industry and environment friendly nature of the industry in the units surveyed in two blocks of the districts

Table No-2

TABLE SHOWING ECO-FRIENDLY NATURE OF SERICULTURE INDUSTRY IN 2012-13:

STAGES	KASHIPUR			RAGHUNATHPUR-I		
	CO_2 EMISSION	CO_2 ABSOBPTION	O_2 PRODUCTION	CO_2 EMISSION	CO_2 ABSOBPTION	O_2 PRODUCTION
Unit::	lbs/acre	lbs/acre	lbs/acre	lbs/acre	lbs/acre	lbs/acre
Plantation and upkeep of food plants(Arjun trees)		43200	2,34,000		43200	2,34,000
BOILING OF COCOON	1822.79			1520.60		

The table shows that in spite of CO_2 emission in one of the stages of the industry absorption of CO_2 and production of O_2 surpass the same by miles.

Actually barren rocky soil with high slope will be converted into green with the food plants of Sericulture.

This change of course has its environmental benefits. Besides it has a scenic beauty of greenness instead of dark rocky soil.

Basic reasons behind selection of these two blocks as sample are:

- Kashipur and Raghunathpur-I consists of about 30% of total plantation area of food plants of the district.
- Engagement of Raghunathpur-I in post cocoon stage is more than 50% of the districts engagement.

CONCLUSION

Against above mentioned discussion it may be concluded that development of sericulture industry will be an effective means for environmental up gradation and protection. Sericulture can be practiced in any texture of soil from hill top to sea shore, any climate from rainy to dry with very low capital investment and a huge employment generation. Therefore proper nurturing of industry by the stakeholders will result a green world with utmost environmental security.

However any measure, law or act fails to bring benefits to human being unless and until conciseness of self protection and protection of the society for the future is generated within.

REFERENCES

1. Pollution control Acts and Regulations of India-Harish C. Sharma.
2. Ganguly,Sinha, Adhikari : Biology of Animals, Volume-I(2008), New Central Book Agency. Pp-411.
3. Ibid. pp-412.
4. Ibid pp-413.
5. Ibid pp-414.
6. Ibid pp-414
7. Tasar Chash: Directorate of Sericulture, Government of West Bengal, 2001, Page-7.
8. Hints for calculation:
   a) A single mature tree absorbs 48 lbs CO_2 per annum.(source-McAliney, Mike. Arguments for Land Conservation: Documentation and Information Sources for Land Resources Protection, Trust for Public Land, Sacramento, CA, December, 1993)
   b) No of mature trees per acre-900.
   c) A single mature tree produces 260 lbs O_2 per annum. (McAliney, Mike. Arguments for Land Conservation: Documentation and Information Sources for Land Resources Protection, Trust for Public Land, Sacramento, CA, December, 1993)
   d) CO_2 Emission from burning of Coal= 3.214lbs/k.g.(source: statistics of Renewable Energy System of Netherland)
   e) Production of Cocoon in 2012-13: Kashipur->567 kahan/acre, Raghunathpur-I->473 kahan/ac0re.
   f) Requirement of coal for boiling of cocoon: 1 k.g./kahan.
9. Field survey
10. Field survey.