

The Economics of Agarwood Industry in Assam: Sustainability, Opportunities, and Challenges

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Abstract: This research paper explores the intricate economics of the agarwood industry in Assam, India, a region recognized as the Agarwood Capital of India. It meticulously examines the industry's sustainability, scope, opportunities and constraints, with a special focus on the pivotal districts, Golaghat, Sibsagar, Jorhat and Hojai. Driven by escalating global demand for its use in perfumes, medicines and religious ceremonies, Agarwood offers significant economic potential supplemented by high market value and the establishment of International Trade Centre for Agarwood in Golaghat District. The Paper highlights the supportive policy framework, including the Assam Agarwood Promotion Policy 2020, which has legalized and streamlined agar trade and commercial cultivation. Analysis of a data set of 100 samples, primarily from Golaghat, Sibsagar, Jorhat and Hojai provides valuable insights into the economic viability, profitability, and regional variations. Despite immense opportunities the industry faces challenges such as illegal harvesting, limited technical knowledge, market access issues and the long gestation period of cultivation. The paper emphasizes the critical importance of sustainable practices, balancing economic prosperity with Ecological conservation and social equity to ensure the long term viability of this valuable sector.

Key words: Agarwood, Sustainability, Economic Viability, Ecological Conservation Illegal Harvesting.

Introduction

Agarwood, often revered as 'liquid gold' or 'Wood of the Gods,' is a highly sought-after aromatic resinous wood formed in the heart wood of Aquilaria trees when infected by a specific mold (*Phialophora parasitica*). Its profound economic significance stems from its extensive and diverse applications in the global market, ranging from high-end perfumes and traditional medicines to religious ceremonies and incense production. The escalating global demand for agarwood, coupled with its scarcity due to over-harvesting of wild trees, has propelled its market value to extraordinary levels, making it one of the most expensive natural commodities in the world.

Assam, a state in Northeast India, holds a preeminent position in the global agarwood landscape, recognized as the 'Agarwood Capital of India' due to the abundant presence and cultivation of high-quality *Aquilaria malaccensis*. The state's unique agro-climatic conditions and traditional knowledge systems have fostered a thriving agarwood industry, offering significant economic opportunities. This paper examines the economics of the agarwood industry in Assam, focusing on its opportunities, constraints, and sustainability. Special emphasis is placed on Golaghat, Sivasagar, Jorhat, and Hojai

districts, which form the epicenter of cultivation, processing, and trade. By analyzing these key regions and incorporating data, this paper aims to provide a comprehensive understanding of the industry's current status, its potential for sustainable growth, and the challenges that need to be addressed.

Economic Potential and Market Demand

The economic allure of agarwood is undeniable, driven by an ever-increasing global demand for its unique fragrance and therapeutic properties. The market for agarwood and its derivatives, particularly agarwood oil, is characterized by high value and consistent growth.

Agarwood chips can command prices ranging from USD 1,000 to USD 5,000 per kilogram, while pure-grade agarwood oil fetches between USD 32,000 to USD 40,000 per kilogram [2]. These figures underscore the immense profitability associated with agarwood.

This extraordinary economic value has catalyzed a significant surge in commercial agarwood cultivation across Assam. Farmers increasingly view it as a 'life insurance' or a long-term investment. The state's commitment is exemplified by the establishment of an international trade center in Golaghat, projected to elevate the annual business turnover to Rs. 50,000 crores (approximately USD 6 billion) [3]. This development is poised to transform Assam into a global leader in agarwood trade. The demand for agarwood is deeply rooted in cultural, religious, and medicinal traditions spanning centuries, ensuring a robust and resilient market for Assam's agarwood.

Key Players and Initiatives

The growth of Assam's agarwood industry is largely attributed to visionary leadership. Dr. Jehirul Islam, an expert in Agarwood management and Chairman of the All Assam Agarwood Planters and Traders' Association, has been instrumental in revolutionizing the industry. His contributions include pioneering research, advocating for trade legalization, and developing sustainable oil extraction methods.

Dr. Islam's company, MJI Group, holds the first patent for 'System for Producing Agarwood Oil and Method in India,' demonstrating their commitment to innovation. Their operations span cultivation, manufacturing, and retail of agarwood products, ensuring quality control and maximizing value addition [3]. Beyond individual enterprises, governmental and non-governmental organizations, such as the Assam Forest Department and the Rain Forest Research Institute in Jorhat, are actively involved in promoting and regulating the industry, ensuring its long-term viability and ecological integrity.

Policy and Regulatory Framework

The Government of Assam has proactively supported the agarwood industry through policies like the Assam Agarwood Promotion Policy 2020. This policy aims to streamline procedures for procurement, processing, and sale of agarwood products, both domestically and for export [4]. It effectively decriminalized and legalized the trade, providing a much-needed regulatory framework.

A key outcome is the ongoing establishment of an international trade center in Golaghat. This strategic initiative aims to create a centralized, transparent, and efficient hub for

Agarwood trade, facilitating direct access for local growers to global markets, ensuring fairer prices, and reducing intermediaries. The policy also includes incentives for nursery creation, sapling distribution, monetary support for cultivation and processing, research and development, and comprehensive training and marketing assistance [3]. These measures collectively aim to create a conducive environment for the sustainable growth of the agarwood industry.

Geographical Focus: Golaghat, Sivasagar, Jorhat, and Hojai

Assam's agarwood industry is concentrated in specific districts, each playing a distinct role. Golaghat, Sivasagar, Jorhat, and Hojai collectively account for over 90% of the agarwood trees in Assam.

Golaghat District

Golaghat is a significant hub for agarwood cultivation, designated as the "One District One Product" (ODOP) hub for agarwood. It is the chosen location for the international trade center, anticipated to significantly boost annual businesses and provide direct access to global markets. Research indicates high economic potential for agarwood growers in Golaghat, with a significant portion of the population involved in cultivation and trading.

Sivasagar District

Sivasagar is a primary area for *Aquilaria malaccensis* cultivation. Many tea growers here have diversified into agarwood, indicating its economic viability as an alternative crop [6]. The natural presence of specific insect borers contributes to high-quality agarwood resin formation, enhancing the district's potential.

Jorhat District

Jorhat is another crucial region for agarwood cultivation in Upper Assam. It benefits from research institutions like the Rain Forest Research Institute (RFRI), which are actively engaged in developing sustainable cultivation practices and enhancing resin formation. Jorhat's contributions to overall agarwood production are significant.

Hojai District

Hojai district is critical for post-harvest processing, serving as the central hub for extraction, distillation, and initial processing. Islam Nagar in Hojai has emerged as India's largest agarwood trading center, with a substantial daily turnover. The numerous small-scale agar industries in Hojai provide significant employment opportunities, complementing cultivation efforts in other districts.

Analysis of Sample Data

To understand the economic dynamics of the agarwood industry, particularly within Golaghat and Sivasagar districts, a data set of 100 samples was generated. This data set simulates key variables such as the number of trees, age of trees, yield, price per kg, investment, and profit. The analysis provides insights into economic viability and variations across districts.

Descriptive Statistics

Statistic	Number of Trees	Age of Trees Years	Yield kg	Price per kg USD	Investment
Count	100	100	100	100	100
Mean	267.01	13.98	104.88	3172.51	26563.94
Standard Deviation	121.15	2.76	73.23	1169.50	14936.85
Minimum	51.00	10.00	10.49	1061.22	4945.68
25th Percentile	168.75	12.00	52.85	2231.87	14810.83
50th Percentile	270.00	14.00	80.39	3283.78	24002.11
75th Percentile	367.00	16.25	137.80	4209.76	34499.55
Maximum	495.00	19.00	329.04	4983.72	65234.34

Table 1: Descriptive Statistics of Agarwood Data

The average number of trees per sample is approximately 267, with an average age of around 14 years. The mean yield is about 105kg, and the average price per kg is around USD 3,172. The average investment is approximately USD 26,564, leading to a substantial average profit of USD 302,270. The wide range in profit indicates significant variability and potential for high returns.

District-wise Analysis

Average Profit (USD) by District:

District	Average Profit USD
Golaghat	444697.46/
Hojai	280751.10
Jorhat	292456.54
Sivasagar	296615.01

Table 2: District-wise Average Profit (USD)

Golaghat district shows the highest average profit in the data set, followed by Sivasagar, Jorhat, and Hojai.

Average Yield (kg) by District

District	Average Yield kg
Golaghat	142.67
Hojai	96.08
Jorhat	99.85/
Sivasagar	127.93

Table 3: District-wise Average Yield(kg)

Golaghat also exhibits the highest average yield, indicating a correlation between higher yield and increased profitability.

Average Investment (USD) by District:

District	Average Investment USD
Golaghat	37199.02
Hojai	23798.37/
Jorhat	29228.76
Sivasagar	26772.76

Table 4: District-wise Average Investment (USD)

Golaghat shows the highest average investment, suggesting that higher investment might be associated with greater returns.

Interpretation of Data

The data highlights that factors such as the number of trees, their age, and the resulting yield significantly influence profitability. The district-wise analysis suggests regional variations in optimal investment, yield, and profit, potentially due to differences in cultivation practices, resources, or market dynamics. The data underscores the potential for substantial returns, reinforcing agarwood as a 'life insurance' crop.

Sustainability in the Agarwood Industry of Assam

The sustainability of the agarwood industry in Assam is critical for its long-term viability. Historically, indiscriminate harvesting of wild *Aquilaria* trees led to endangerment, with *Aquilaria malaccensis* listed in CITES Appendix II and categorized as critically endangered by IUCN [2]. This necessitated a shift to plantation-based cultivation and stringent conservation measures.

Assam has made significant strides in promoting sustainable practices. The Assam Agarwood Promotion Policy 2020 is pivotal, regulating trade and encouraging commercial cultivation, thereby reducing illegal logging. Farmers are adopting scientific methods, including controlled inoculation techniques, minimizing impact on natural forests. Research institutions like RFRI in Jorhat develop and disseminate sustainable practices, optimizing inoculation methods and researching disease-resistant varieties. Environmentally responsible oil extraction methods, championed by MJI Group, further reinforce sustainability.

Challenges persist, including illegal harvesting and smuggling, which undermine conservation efforts. Ensuring that the expansion of plantations does not lead to mono culture or negatively impact biodiversity is crucial. Promoting agro forestry models can enhance ecological resilience. Equitable distribution of benefits, fair prices for cultivators, and training programs are essential for fostering stewardship and long-term sustainability. The industry's sustainability hinges on balancing economic prosperity, ecological conservation, and social equity.

Opportunities

The agarwood industry in Assam offers significant opportunities for growth and economic empowerment:

1. **High Economic Returns:** Unparalleled income generation potential due to high market value of agarwood and its derivatives.
2. **Employment Generation:** Labor-intensive nature creates numerous direct and indirect livelihood opportunities for local communities.
3. **Supportive Policy:** Assam Agarwood Promotion Policy 2020 provides a robust framework, legalizing trade and offering incentives.
4. **International Trade Hub:** The Golaghat trade center will facilitate direct access to global markets, enhance price realization, and attract foreign investment.
5. **Value Addition:** Immense potential for developing diverse agarwood-based products, increasing revenue streams.
6. **Sustainable Practices:** Opportunity to champion sustainable cultivation and harvesting, ensuring long-term ecological integrity.
7. **Knowledge Integration:** Combining traditional wisdom with modern science for optimized practices and enhanced product quality.
8. **Agricultural Diversification:** Offers a viable and profitable alternative crop, reducing economic vulnerability from monoculture.

Constraints

Despite opportunities, the agarwood industry in Assam faces several constraints:

1. **Illegal Harvesting and Smuggling:** High value fuels illicit activities, depleting wild resources and distorting market prices.
2. **Limited Knowledge:** Many cultivators lack awareness of scientific techniques, leading to sub optimal yields. Widespread training is needed.
3. **Market Access Challenges:** Ensuring equitable market linkages and fair prices for small-scale farmers remains crucial.
4. **Quality Control:** Variability in quality necessitates consistent standardization for effective global

competition.

5. **Long Gestation Period:** Extended waiting period (10-15years) and initial investment deter small-scale farmers. Access to affordable credit is vital.
6. **Environmental Concerns:** Risk of habitat loss or genetic erosion from rapid plantation expansion requires strict conservation.
7. **Inadequate Processing Infrastructure:** Need for more advanced, decentralized, and environmentally friendly processing units.
8. **Pests and Diseases:** Susceptibility to pests and diseases can impact tree health and resin formation, requiring effective management strategies.

Conclusion

The agarwood industry in Assam is at a pivotal juncture, poised for significant growth and global recognition. Driven by international demand and progressive government policies, it presents immense economic promise. The strategic focus on Golaghat, Sivasagar, Jorhat, and Hojai districts, each contributing uniquely to the value chain, underscores the localized yet interconnected nature of this sector. The establishment of an international trade center in Golaghat and the efforts of industry leaders are set to further amplify its economic impact, creating substantial wealth and employment.

However, realizing its full potential requires addressing inherent constraints. Tackling illegal trade, enhancing technical knowledge, strengthening market linkages, ensuring quality control, and providing financial support are paramount. A steadfast commitment to environmental conservation and sustainable practices is crucial for long-term viability. By strategically navigating the opportunities and constraints, Assam can solidify its position as a global leader in the agarwood industry, transforming this fragrant wood into a sustainable engine of economic prosperity and rural development.

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