Regenerative Coffee Cultivation for Sustaining & Growing India's Coffee Industry

FIREFLY LIFE SCIENCES PVT LTD.

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INTRODUCTION

The Indian coffee industry is an integral part of the country's rich agricultural landscape, steeped in history and tradition. Renowned for its aromatic and flavorful coffee beans, India has steadily climbed the ranks as one of the world's leading coffee producers. However, in recent years, the industry has faced various challenges, including changing climate patterns, fluctuating market demands, and sustainability concerns. In light of these challenges, there is a growing recognition of the need for innovative and sustainable practices within the Indian coffee sector.

This report explores the Indian coffee industry's current state, its key players, economic and environmental challenges, and most importantly the potential of regenerative cultivation to address these challenges. Regenerative agriculture, with its focus on soil health, biodiversity, and long-term sustainability, offers a unique opportunity to rejuvenate the Indian coffee sector while mitigating some of its pressing concerns.

This report delves into the various aspects of the Indian coffee industry: from its historical roots to its modern-day challenges. It then discusses regenerative agriculture, examining its principles and potential applications within the Indian coffee context.

Source: Firefly Life Sciences (Yemmegundi Estate)

It also looks at the rapidly increasing interest in Indian specialty coffee from domestic markets, and how regeneratively grown coffee can play a role in producing this high quality, value-added coffee.

Through this comprehensive exploration, we aim to shed light on the opportunities and scope for regenerative agriculture to revitalise the Indian coffee industry, thereby ensuring its continued survival and growth in the rapidly changing global economy and environment.

I. ORIGINS OF INDIA'S COFFEE CULTIVATION

The famed story of coffee's arrival to India dates back to the late seventeenth century. According to popular lore, an Indian pilgrim named 'Baba Budan' smuggled 7 coffee beans into India from Yemen in 1670. These beans were said to have been planted in the hills of present-day Chikmagalur.

Painting of Baba Budan | Source: Fix Coffee Maker

The Dutch, who occupied several regions of the Indian subcontinent, helped spread the cultivation of coffee across the country. However, it was only from the mid-19th century under British rule, that commercial coffee cultivation began to flourish in the country. This coffee was eventually exported into Europe via London. By the early 1940s, Indian Arabica coffee, or "Mysore Coffee" (as it was known then) had established itself in the European market and had a distinct branding of its own.

Initially Arabica cultivars were widespread, but infestations of coffee leaf rust led many farms to switch to Robusta or Arabica and Liberica hybrids.

In 1907, The India Coffee Board was established to help improve the quality and presence of Indian coffee through various research and education endeavours.

Indian Coffee Board Logo

II. COFFEE CULTIVATION IN PRESENT-DAY INDIA

Today, coffee production in India largely happens on small farms sized less than 10 hectares. A majority of coffee is still grown in the traditional growing regions in the southern states of Karnataka, Kerala and Tamil Nadu. Southern states account for 90% of India's coffee production.

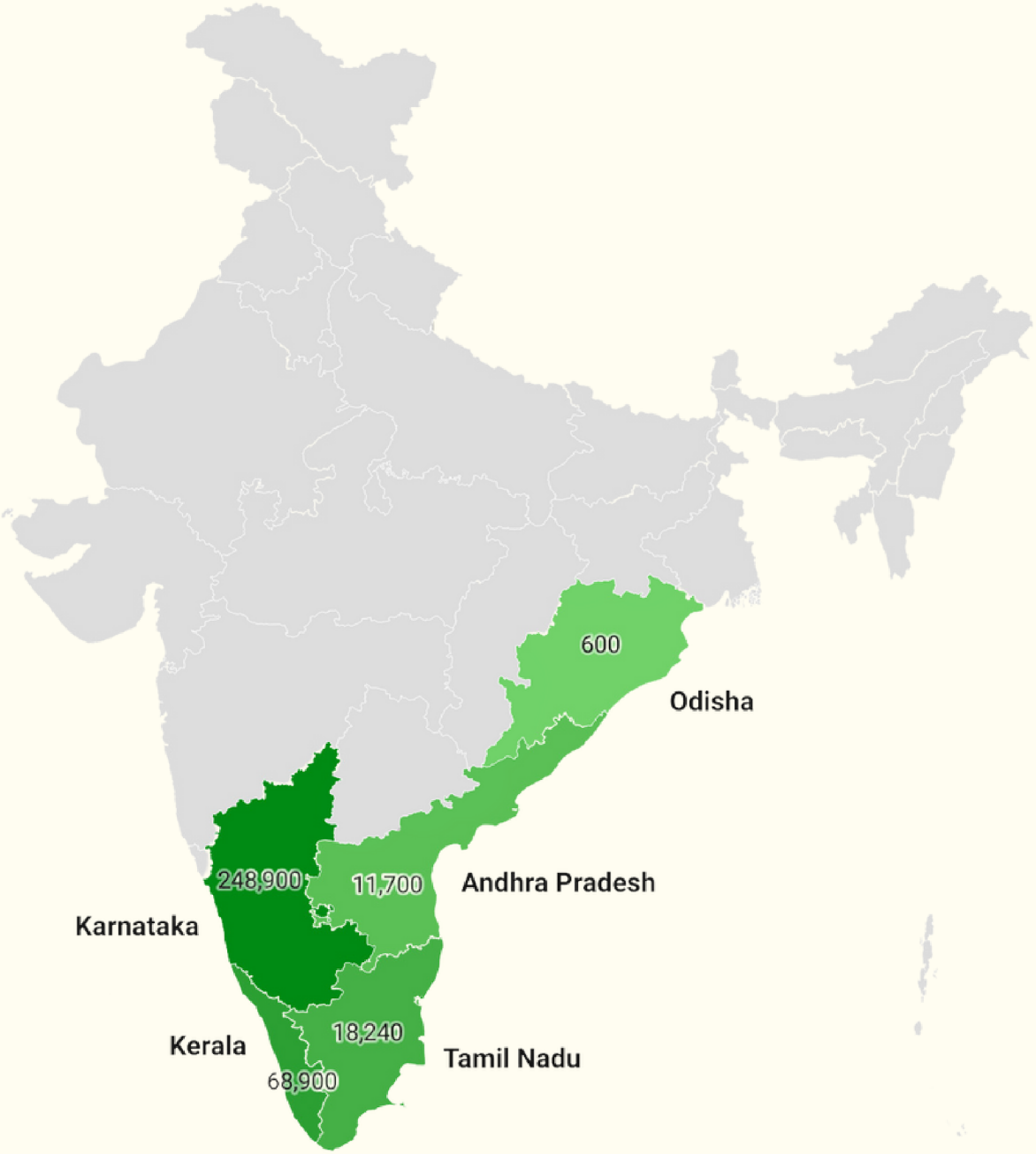
India's coffee is usually grown under a two-tier mixed shade canopy of evergreen leguminous trees, often intercropped with spices and fruit crops like pepper, cardamom, vanilla, orange and banana trees. The two main varieties of coffee cultivated are Arabica and Robusta; Robusta accounts for 72% of the total production of Indian coffee.

13 main sub-varieties of coffee are grown across various Indian regions. Some of the key coffee varieties cultivated are 'Cauvery', 'Kent', 'S795' and 'SL9'. The major Arabica producing regions are Araku valley, Anamalais, Bilgiris, Brahmaputra, Shevaroys, Pulneys and Bababudangiris. The main Robusta producing regions are Wayanad and Travancore. In Nilgiris, Manjarabad, Chikmagalur and Coorg both Robusta and Arabica are cultivated.

Beyond traditional coffee belts, coffee production is also expanding to non-traditional areas like Andhra Pradesh, Odisha on the Eastern Coast and in North-Eastern states like Manipur, Assam, Nagaland, Arunachal Pradesh. The expansion of coffee cultivation in non-traditional areas has been growing on an average of 4000 hectares annually, driven by state governments and supported by the Coffee Board. Efforts with state governments have not only increased the planted area under coffee cultivation, but also provided employment opportunities to tribal communities.

To boost coffee production in non-traditional areas, the Coffee Board has included these areas in its 'Coffee Development Plan' under the XI Five Year Plan. This development for tribal regions includes preserving existing forests by opting for shade grown coffees, providing employment, income diversification, basic amenities and support to the tribal communities living in and around these plantations.

INDIA TOTAL COFFEE PRODUCTION (MT) MAP 2021-22



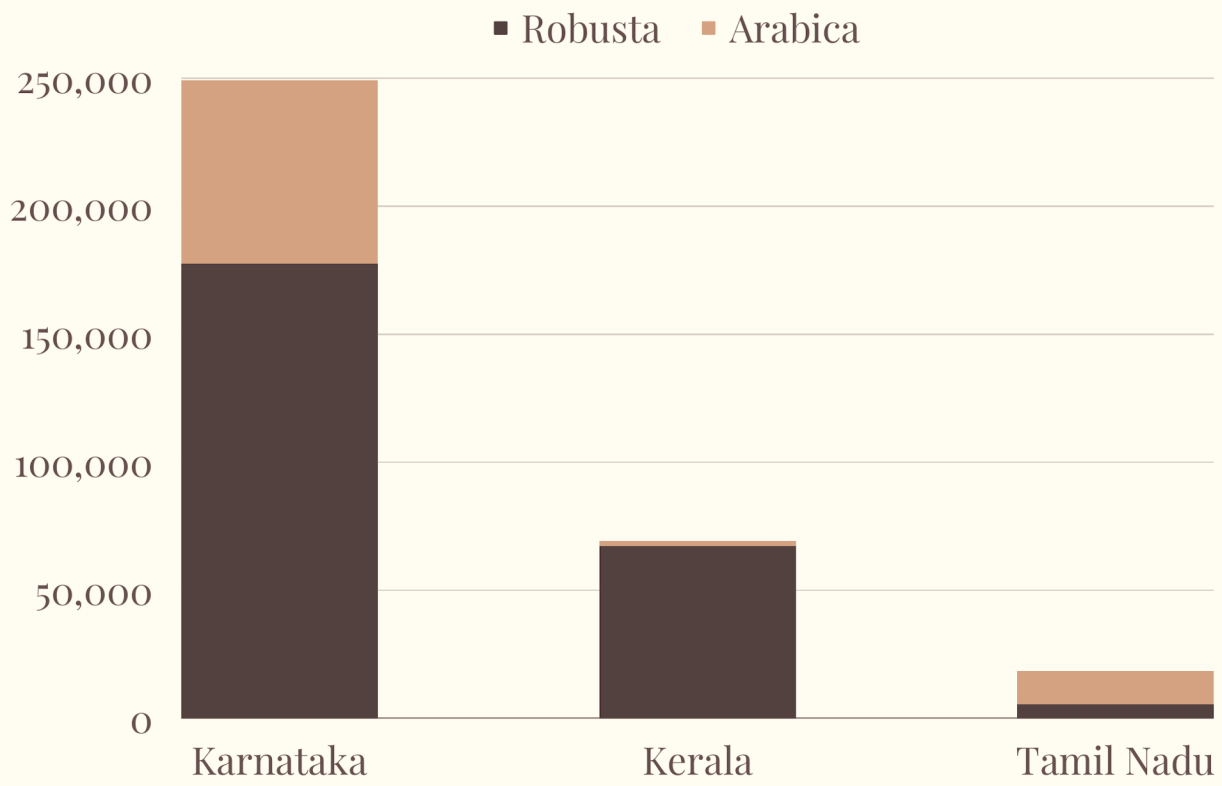
Visualised by Firefly Lifesciences Pvt. Ltd.

Source: Coffee Board of India • Map data: © OSM • Created with Datawrapper

This map reveals the total volume of coffee produced (in Metric Tonnes) by state in India for 2021-22. Karnataka is the largest producer, followed by Kerala and Tamil Nadu.

INDIA'S ARABICA & ROBUSTA PRODUCTION (2021-22)

ARABICA & ROBUSTA PRODUCTION (MT) FOR TRADITIONAL COFFEE GROWING STATES [2021-22]



ARABICA & ROBUSTA PRODUCTION (MT) FOR NON-TRADITIONAL COFFEE GROWING STATES [2021-22]

Region	Arabica Production (MT)	Robusta Production (MT)
Andhra Pradesh	11,680	20
Orissa	600	0
North Eastern States	70	90

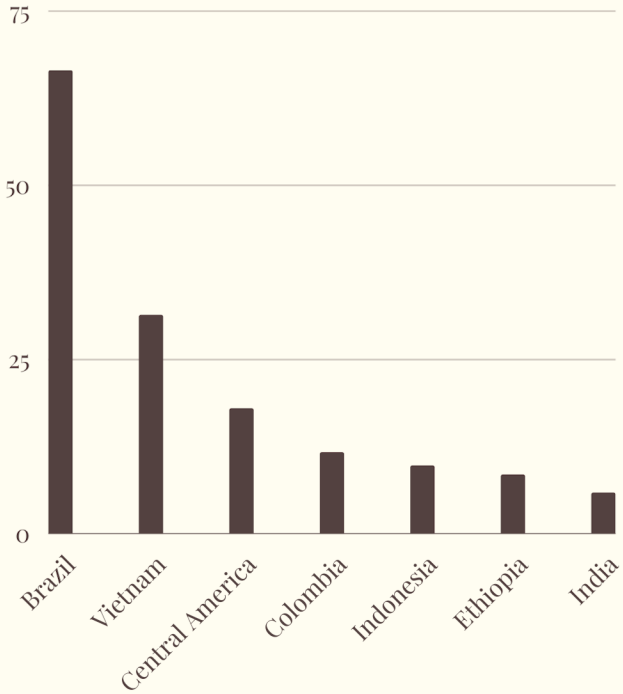
III. INDIAN COFFEE CONSUMPTION

A. International Consumption - Exports

About 70% of the country's coffee production is exported; in 2022 exports came close to a record 4 lakh tonnes. Top export destinations are Italy, Germany, Belgium and the Russian Federation, with an average total share of about 45%.

On average, India is the 7th largest coffee exporting nation in the world (by volume). The export of Indian coffee in FY22 was valued at US $1.05 billion. Apart from green coffee beans, preparations of coffee (31% of which is instant coffee) have a sizeable share in India's export basket. Between 2010 and 2020, instant coffee experienced a Compound Annual Growth Rate of 4%.

Estimated coffee exports by country for 2023/24 (per unit = 1 million 60-kg bags)



B. Domestic Consumption

India has seen an unprecedented increase in the number of coffee consumers in the past two decades. Between 1998 to 2011, domestic coffee consumption increased from 50,000 MT to 115,000 MT. This can largely be attributed to an increase in disposable income, global exposure, digital and media penetration, urbanization, lifestyle changes.

The entry of national and international coffee chain-house brands have been a key factor is the rising awareness and demand for coffee in domestic markets. Key brands include Cafe Coffee Day, Starbucks, Costa and Barista alongside newer artisanal brands like Blue Tokai, Third Wave Coffee Roasters and Araku coffee.

Most of these chains have also diversified their coffee offerings - they offer many different types of coffee beverages to appeal to a wide range of tastes. Moreover, these cafes have also been established as a popular 'hangout spot' for the country's youth, fostering a culture of reading, casual meet-ups, working etc.

C. Forms of Coffee Consumption in India

Coffee consumption in India occurs in diverse forms. One of the most popular is 'filter coffee', especially popular in the South Indian states like Tamil Nadu, Karnataka, Kerala and Andhra Pradesh. Instant coffee, known for its convenience, is more popular in urban areas. Urban cafes and coffee shops sell a range of espresso-based drinks.

Cold coffees and coffee-based desserts are more famous among younger generations. Other less popular forms of consumption include traditional preparations (e.g.: those in tribal communities), instant coffee pre-mixes, coffee pods and capsules and desserts.

Despite the presence of coffee cultivation having preceded the arrival of tea to the Indian subcontinent, for much of its modern history the country has been a predominantly tea-drinking nation. Besides South Indian states, coffee's geographical penetration is largely confined to urban populations in Tier I and Tier II cities.

D. Growing Demand for Indian Specialty Coffee

India's coffee culture is undergoing a revolution at the moment - there is genuine domestic market interest and curiosity in understanding, brewing and learning more about Indian coffee. Rising awareness about coffee and its types among students, working professionals and the youth of the country is generating demand for independent coffee brands. Before the pandemic there was an active culture of youngsters visiting cafes for **specialty coffee**. During the lockdown, the demand for 'cafe-like' coffee spurred awareness and demand for home brewing, brewing equipment and exploration of various coffee types.

Indian coffee is one of the world's finest shade-grown coffees, and monsoon environments contribute significantly to its complex flavour profile. Therefore it is in high demand among coffee enthusiasts across the globe. Typically, Indian coffee farmers have largely exported their coffee (70% of the produce is exported). However, new-age coffee entrepreneurs are partnering with Indian coffee growers to pitch their produce at premium values even in the domestic market. Therefore, farmers are beginning to cater to the domestic market as opposed to largely exporting their produce.

Innovative coffees being served by homegrown Indian brands | Source: India Food Network

IV. KEY PLAYERS IN INDIA'S COFFEE RETAIL CHAIN

The coffee retail chain in India is highly concentrated at the top and fragmented at the bottom. The retail market is a duopoly, with the two main competitors being Hindustan Unilever Limited and Nestlé, owing 51% and 49% of the market share respectively.

In recent years, the Indian coffee industry has witnessed a rising demand for disruptive and premium products. This has ushered in a wave of over a dozen independent coffee start-ups Many of these brands are deploying technology to streamline operations through automation, app-based transactions and savvy social media marketing. Big data has a crucial role to play in enhancing the speed of service, consistency and efficiency of these coffee brands, to ultimately support scalability. Felipe Cabrera, Founder and CEO of Ad Astra Coffee Consulting noted that "this big data is a key differentiating factor that gives investors numbers and intel to create forecasts''.

One significant example of this is the brand Blue Tokai, which began as a small-scale operation in 2013, focusing on direct-trade relationships with Indian coffee farmers. Today it has 68 stores and 4 coffee roasteries.

Recently, it secured a total of $40 million B funding round to open 200 new stores across India and internationally. This is the largest investment in the Indian speciality coffee industry and highlights growing opportunities for branded coffee chains.

Two popular instant coffee products offered by Nescafe and Hindustan Unilever Ltd. respectively

Retail outlet of popular home-grown Indian coffee brand 'Blue Tokai' | Source: Blue Tokai

V. CHALLENGES FACED BY INDIA'S COFFEE INDUSTRY

A. Environmental Concerns

Despite the various changes in the coffee market that hold promise for Indian growers, a barrage of environmental and economic issues threaten the industry. Both Robusta and Arabica varieties of coffee suffer if there are prolonged periods of inadequate rainfall, temperature rise, drought and heavy flooding - all of which have become increasingly common in recent years. Many coffee growers fear that the frequently occurring pattern of droughts and floods could eventually wipe out plantations.

Drastic changes in climate patterns have adversely affected India's coffee production and crop quality. Dry spells between 2015-2017 and unseasonal heavy rains, floods and landslides between 2018-2022 have dealt successive blows to Indian coffee growers. In 2022, the torrential rains between July and September in the coffee belts of Kodagu, Chikmagalur and Hassan districts destroyed coffee plantations and damaged estate infrastructure. Plantations in Wayanad (Kerala) and Palani (Tamil Nadu) also suffered similar losses. These extreme climatic conditions in 2022 lowered the anticipated yield by an estimated 30-35%
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Climate change causes leaf shedding, reduced coffee plant productivity and increased vulnerability to pests. Extreme cold delays plant flowering and lowers the berry quality. Heavy and irregular rains cause premature bursting and dropping of cherries. Continuous heavy rains before harvests can prevent drying and lead to crop spoilage. While excess water and rain can damage the crops, on the other side of the spectrum is water scarcity. Coorg has been facing water scarcity over the past few years. Delayed monsoons have been reducing usable berry production and causing declines in yields.

Coffee estate in Karnataka's Kodagu district submerged after unseasonal, heavy rainfall | Source: India Climate Dialogue

B. Economic Concerns

Market volatility is the other factor threatening India's coffee producers. The prices of coffee can fluctuate violently since they are connected to global markets. The cost of financing is one of the biggest challenges for the Indian coffee industry. Most private banks would insist on collaterals to provide financing - however, most small and medium-sized growers are not in the position to provide one. Therefore, interest rates are high (at about 12%) compared to international interest rates that are often negligible (mostly in single digits). This provides an advantage to competing coffee-producing regions.

In India, production of coffee is low (worsened further due to climate change) while cost of production is on the rise compared to other coffee producing nations like Brazil and Vietnam. While labour charges account for 25% of the entire production cost in a country like Brazil, in India they constitute a whopping 65%. Dire shortages of labour have only led to a further hike in these costs.

In the face of increasing climate volatility compounding economic concerns of coffee growers, inculcating regenerative and climate-resilient practices is increasingly becoming a necessity.

Several studies have indicated that the climate crisis is likely to deliver ongoing systemic shocks to production. By 2050, rising temperatures could halve the land suitable for coffee cultivation globally.

This is likely to crush the livelihoods of coffee farmers, especially in countries like India, Mexico, El Salvador, Brazil etc. where 70% of coffee farmers run small-scale operations. Therefore, a systematic incorporation of regenerative practices into coffee cultivation is imperative to mitigate the effects of increasingly volatile climatic conditions.

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VI. TRANSITIONING TO REGENERATIVE CULTIVATION

'Regenerative Agriculture' is a term gaining increasing popularity within coffee cultivation circuits. The term was coined by the Rodale Institute in the 1980s; it has a holistic definition that considers factors like nutrient cycles and soil health.

This type of agriculture aims to create harmony between the three pillars of sustainability - economic, environmental and social. Ultimately, the aim is to balance conservation and environmental sustainability alongside the commercial production of crops like coffee. Regenerative cultivation places emphasis on concepts like agroforestry, reviving natural ecosystems and managing and replenishing soil health on coffee farms. It extends beyond merely sustaining soil and natural resources, to actively *restoring* and *reviving* agricultural land.

In the context of coffee, it entails a holistic land management approach that closes the nutrient cycle, promotes system diversity and builds better soil health. This benefits the entire coffee farming system - soil, coffee and associated plants, communities involved in cultivation and the surrounding environment.

Brands and consumers are realising the importance of growing, buying and drinking coffee that is socially and environmentally sustainable. Producers are also increasingly adopting sustainable methods to mitigate the ever-growing threat of climate change.

Coffee is a crop that is highly vulnerable to weather fluctuations, therefore, sustaining coffee plantations will require an integration of climate-smart practices into cultivation. In countries like India where a majority of production is from small-holdings, adopting these practices are an urgent requirement to safeguard and augment farmer livelihoods.

Practices like cover cropping, composting, minimal tillage etc. can improve soil structure and fertility, leading to healthier coffee plants and higher yields. With a well-rounded approach that prioritises the long-term health of soil and plantations, a phased transition to regenerative agriculture will ensure the sustenance and growth of coffee production in India and other coffee producing nations. Ultimately, it can offer a holistic solution that simultaneously addresses the environmental and economic challenges threatening the coffee industry.

The strong links between regenerative agriculture and farmer profitability have become increasingly clear in recent years. A report released by the International Union for Conservation of Nature (IUCN) in 2021 estimated that regenerative agriculture practices in Africa could add more than $15 billion in gross value to farmers per year by 2030, and $70 billion by 2040.

A comparative study conducted on conventional sun-grown and regenerative shade-grown coffee plantations in Vietnam found that the soil of regenerative farms was comparable to or healthier than soil enriched with chemical fertilisers in conventional farms. Moreover, regenerative practices promoted biodiversity and decreased a reliance on external inputs through a system of crop diversification and livestock production. This improved productivity and economic performance while preserving environmental integrity.

Beyond coffee growers, big players in the supply-chain like Nescafé are also placing emphasis on regenerative methods. In its 'Nescafé Plan 2030', it unveiled its goal of investing over $1 billion in scaling up regenerative agriculture methods and environmentally sustainable farming worldwide. By 2025, it aims to source 20% of its coffee from regenerative agricultural methods.

Beyond boosting the yields and resilience of coffee farming, this plan seeks to contribute towards lowering carbon emissions by implementing practices that increase the soil's ability to sequester carbon dioxide.

Moving towards regenerative cultivation is not only good for the environment, but also makes sense for farmers from an economic standpoint. It can lower dependency on external inputs (such as synthetic fertilizers and pesticides) that are becoming increasingly expensive. Maintaining the integrity of the system and actively allowing the soil to improve would strengthen the land each year as opposed to stripping it of its fertility due to the imbalance that could arise from improper usage of synthetic inputs. This can ensure the longevity of plantations, even in the face of increasing climate fluctuations.

Shade grown polycropped coffee plantation | Source: The Scientific American

VII. REGENERATIVE AGRICULTURE FOR SPECIALTY COFFEE

Beyond benefitting growers by making their plantations healthier and climate-resistant, regenerative cultivation is also important to consumers of 'specialty coffee'. **Speciality coffee** is excellent grade coffee, grown and processed with meticulous care and attention to quality at each stage of its life cycle. It is grown at select altitudes and climates and typically nursed for years before the first harvest. Quality is the key consideration, not quantity. Only coffees free of defects and picked at their peak of ripeness are chosen for further processing.

Cultivation and plant management practices are known to influence the phytochemical compositions of agricultural produce. Several studies on the impact of organic and regenerative cultivation have shown significantly higher levels of antioxidants and flavonoids in the produce compared to conventionally grown crops.

Plant flavonoids are metabolites that are very abundant in plants, fruits and seeds and are responsible for the plant's colour, fragrance and flavour characteristics. They perform many functions such as regulating cell growth, attracting pollinators and protecting against biotic and abiotic stresses. They also play several functional roles in drought, heat and freezing tolerance.

Therefore a higher content of flavonoids can make plants healthier and resistant to various stresses. Organically grown crops have also been shown to have higher antioxidant levels, which contribute to making a crop healthier and nutrient rich.

Therefore it is clear that regenerative practices hold great promise in improving the overall health, quality and flavour profile of coffee berries and beans. This kind of coffee is an ideal candidate for specialty coffee production, processing and brewing. Several consumers are willing to pay high premiums for this kind of high quality, well-rounded, flavourful coffee. Regeneratively grown coffee can be a significant value addition through which farmers can realise higher prices for their beans.

Other Forms of Coffee Value Addition

Beyond specialty coffee cultivation, the integration of organic, fair-trade, ethical and sustainable practices into coffee growing can allow Indian growers to market their coffee at higher prices. Many micro-roasteries also focus on 'single-origin' coffees, sourced from select regions or estates to bring out flavour profiles unique to the coffee grown in that area.

Another innovation that is slowly gaining traction is that of *coffee fermentation*. Fermentation in coffee production involves allowing the coffee cherries to undergo controlled microbial activity before they are processed. This process occurs after the cherries are harvested but before the beans are dried and roasted. The goal is to develop new and exciting flavours by leveraging the natural microorganisms found on the cherries.

Fermentation of coffee cherries in vats | Source: Firefly Life Sciences

These exciting new innovations are ushering in what is believed to be the 'fourth wave' coffee movement in India. Fourth wave coffee is often characterised by its emphasis on artisanal craftsmanship, direct relationships with growers, and a focus on the unique flavours and characteristics of coffee beans.

There is also an emphasis on awareness building on various coffees, roasting methods, blends etc. among consumers through platforms such as independent cafes, coffee workshops, competitions and festivals.

This movement is likely to lead to a further maturation of India's domestic coffee market, causing a surge in demand for premium coffees. This would safeguard Indian coffee producers from fluctuations in the global coffee markets and give their coffee long overdue recognition within the country.

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CONCLUSION

The Indian coffee industry, with its time-honored tradition and global reputation, stands at a critical juncture. While it faces formidable challenges, it also holds immense potential for growth and sustainability. Our exploration of regenerative agriculture within the Indian coffee sector reveals a promising path forward that could simultaneously address environmental and economic concerns threatening the industry.

However, it is crucial to acknowledge some of the caveats that come with the transition to regenerative coffee cultivation. Several challenges must be navigated to ensure its successful implementation, namely initial investment costs, comprehensive education and training among coffee growers, and the potential for temporary yield reductions during the transition phase.

Despite these challenges, the adoption of regenerative agriculture in the Indian coffee industry offers a multitude of benefits. It is becoming increasingly evident that without an urgent reconfiguration of conventional cultivation practices, coffee plantations could become increasingly unviable from an environmental and economic standpoint.

Given the challenges of climate change and global market volatility, moving towards regenerative practices can safeguard livelihoods by making coffee plantations resilient and less reliant on external, expensive synthetic inputs. It can improve soil health, enhance coffee quality, and contribute to a more resilient and sustainable coffee ecosystem. By fostering biodiversity, reducing chemical inputs, and sequestering carbon, regenerative agriculture aligns with global sustainability goals and positions India as a responsible coffee producer on the world stage.

Various practices and green solutions are already being incorporated in coffee plantations across the world. More common examples include and vermicomposting, mulching and using biological agri-inputs for integrated pest and nutrition management for plantations.

Biochar is another potent soil amendment that could benefit coffee plantations. It is produced by combusting organic matter in an oxygen-limited, controlled process known as ‘pyrolysis’. Certain biochar production technologies, like the ‘Adam’s Retort’ produce zero to minimal fumes or emissions. The product is a charcoal-like substance that is rich in carbon and improves soil structure.

It also sequesters atmospheric carbon dioxide which makes it a promising solution to simultaneously address soil fertility and mitigate greenhouse gas emissions.

An Adam's Retort structure for producing biochar | Source: Firefly Life Sciences

Another innovative green solution is that of **'Constructed Wetland Treatment Systems' (CWTS)** that harness the power of phytoremediation (using plants to remove toxins) to treat effluents. Coffee pulping water from plantations is highly acidic and can significantly disrupt aquatic ecosystems if let into waterbodies without treatment. CWTS technology uses wetland plants to treat water that is sent through an engineered subsurface. Various plants are used to address specific toxins. This makes the pH of the effluent more neutral along with improving other water quality parameters. These systems use minimal energy, are easy to maintain and enhance biodiversity.

Constructed Wetland Treatment System to treat coffee pulping effluent | Source: Firefly Life Sciences

In the face of climate change, evolving consumer preferences, and the urgent need for sustainable and innovative agricultural practices, regenerative coffee cultivation is a promising path to safeguard the future for the Indian coffee industry. It is a vision of an industry that not only thrives economically but also preserves the environment for future generations.

By embracing innovation and sustainability, India's coffee growers can continue to produce some of the world's finest coffee beans while contributing to a healthier planet. The journey toward regenerative coffee cultivation may be challenging, but the rewards are boundless, and the future of Indian coffee shines brightly with promise and hope.

BIBLIOGRAPHY

- About us. Blue Tokai Coffee Roasters. (n.d.). https://bluetokaicoffee.com/pages/about-us

- Adopting regenerative coffee agriculture to boost smallholder incomes and resilience in Kenya and Uganda. CGIAR. (2023, August 10). https://www.cgiar.org/news-events/news/adopting-regenerative-coffee-agriculture-to-boost-smallholder-incomes-and-resilience-in-kenya-and-uganda/

- Arun, S. (2021, September 5). Coffee Consumption Pattern & Trends in India - coffeebi: Coffee Business Intelligence. CoffeeBI. https://coffeebi.com/2020/04/15/coffee-consumption-pattern-trends-in-india/

- Bhargava, E. (2022, December 1). Financialexpress. The Financial Express. https://www.financialexpress.com/lifestyle/from-farm-to-cup-how-the-coffee-brewing-culture-in-india-is-evolving/2897860/

- Bunn, C., Läderach, P., Ovalle Rivera, O., & Kirschke, D. (2015). A bitter cup: climate change profile of global production of Arabica and Robusta coffee. Climatic change, 129(1), 89-101.

- Chowdary, A. (2019, August 17). All perked up: How third wave coffee roasters created a micro-community of Coffee Lovers in Bengaluru. YourStory.com. https://yourstory.com/weekender/startup-third-wave-coffee-roasters-bengaluru

- Coffee cultivation in non-traditional areas rises 8%. Business Standard. (2013, January 29). https://www.business-standard.com/article/markets/coffee-cultivation-in-non-traditional-areas-rises-8-108112601094_1.html

- Exports of Coffee from India by Countries – FY 2020/2021*. Coffee Board of India. (2022). https://coffeeboard.gov.in/

- Ghosh, A. (2019, May 20). Coffee in India: A complex history and a promising future. Daily Coffee News by Roast Magazine. https://dailycoffeenews.com/2018/10/02/coffee-in-india-a-complex-history-and-a-promising-future/

- United States Department of Agriculture. (2023). (rep.). Coffee: World Markets and Trade.

- Good Citizen Coffee Co. (2023, January 4). The benefits of regenerative agriculture for the Coffee Industry. Good Citizen Coffee Co. https://goodcitizencoffee.com/blogs/beyond-the-brew/the-benefits-of-regenerative-agriculture-for-the-coffee-industry

- Grant, T. (2022, August 24). Exploring regenerative agriculture in coffee production. Perfect Daily Grind. https://perfectdailygrind.com/2022/08/exploring-regenerative-agriculture-in-coffee-production/

- Holder, M. (2022, October 11). Nescafé unveils $1 billion Regenerative Coffee Farming Plan. GreenBiz. https://www.greenbiz.com/article/nescafe-unveils-1-billion-regenerative-coffee-farming-plan

- Kareem, R. A. (2016, May 2). The story behind your coffee and its beans. The Hindu. https://www.thehindu.com/features/metroplus/growing-good-coffee-beans/article8547424.ece

- Le, Q., Cowal, S., Jovanovic, G., & Le, D.-T. (2021). A study of regenerative farming practices and sustainable coffee of ethnic minorities farmers in the Central Highlands of Vietnam. Frontiers in Sustainable Food Systems, 5. https://doi.org/10.3389/fsufs.2021.712733

- Our Story. Third Wave Coffee Roasters. (n.d.). https://www.thirdwavecoffeeroasters.com/pages/our-story

- Shri Rajan, D. (2023, June 26). How climate change is brewing trouble for India's Coffee Industry. Outlook Traveller. https://www.outlooktraveller.com/editors-picks/how-climate-change-is-brewing-trouble-for-indias-coffee-industry

- The large subcontinent of India has a unique coffee story far different from any other origin. Mercanta. (2022, December 5). https://coffeehunter.com/our-origins/india/#:~:text=Coffee%20was%20introduced%20to%20India,the%20Chandragiri%20hills%20of%20Karnataka

- Mani, I. (2023, August 10). Growing up fast: The New Generation of Tech-led coffee chains. World Coffee Portal. https://www.worldcoffeeportal.com/Latest/InsightAnalysis/2023/August/Digital-first-coffee-start-ups-young-and-growing-u

- Tejaswi, M. (2022, October 22). *A crisis is brewing in the Indian Coffee Industry*. The Hindu. https://www.thehindu.com/business/Industry/a-crisis-is-brewing-in-the-indian-coffee-industry/article66040410.ece

ABOUT

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