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Blue-green gold: Why seaweed is Indiaâ??s next big bioeconomic bet

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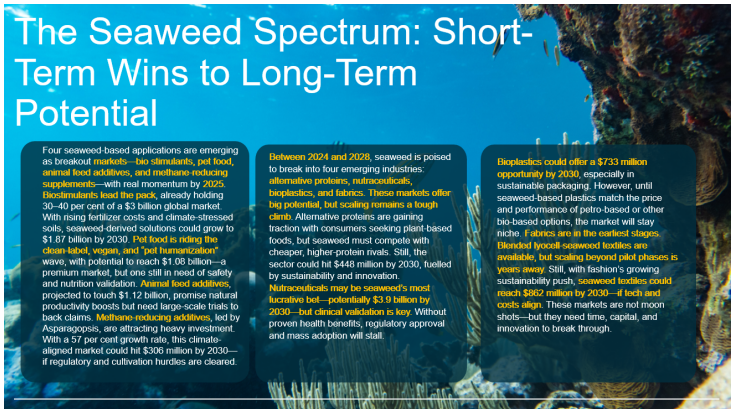

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The Indian government is setting its sights on the country's vast maritime assets â?? an 8,118 km coastline and a sprawling Exclusive Economic Zone (EEZ) of over two million square kilometres â?? to build a thriving, sustainable seaweed mariculture industry. As part of a strategic national framework, the initiative aims to unlock the untapped potential of seaweed farming to drive economic growth, boost food security, and support the achievement of several Sustainable Development Goals (SDGs). Once a humble coastal resource, seaweed is fast becoming a star ingredient across Indiaâ??s industrial playbook.

Seaweed isnâ??t just sushiâ??s best friendâ??itâ??s quietly shaping industries all around us. Take alginate, for instance. Extracted from brown seaweeds plucked from the wild, this $ 213 million market plays a behind-the-scenes role in everything from creamy cosmetics to life-saving medical dressings and your favourite sauces. Then thereâ??s agar, a $132 million powerhouse derived from red seaweeds. Not to forget carrageenanâ??a $ 240 million ingredient hiding in plain sight in ice cream, toothpaste, and dairy products. Sourced from red seaweeds like Irish Moss, it gives your food that smooth, satisfying texture. From your kitchen shelf to lab benches and beauty cabinets, seaweed is the oceanâ??s quiet achieverâ??thickening, stabilizing, and shaping the future of sustainable industry.

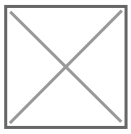
â??By 2030, Indiaâ??s seaweed sector could easily be a Rs 10,000 crore industryâ??if we do it right. From food, pharma, cosmetics to bio-packaging and organic fertilizers, the applications are vast. We must develop our own MRV (Monitoring, Reporting, Verification) frameworks, and set up a Seaweed Carbon Credit Authority, maybe within the Blue Economy Cell. Let fishers get income not just from biomass, but also from â??green value,â stated Vikas Motiram Koli, Voice for fisherfolk & blue economy entrepreneur.

Household names like NestlÃ©, Britannia, Amul, Cipla, Zydus Cadila, Hindustan Unilever, The Body Shop, and Tata Chemicals are leveraging seaweed for everything from thickening agents to bioactives. Agri giants like Godrej Agrovet, UPL, and BASF India are tapping into its bio-stimulant potential, while a new wave of startups in packaging, biofuels, and regenerative farming are betting on seaweed as the next frontier. With health, sustainability, and innovation aligning, seaweed is no longer a niche input. Itâ??s a movement.

Vast Shores, Limited Yield, and a Market That Canâ??t Wait

In a move that could redefine Indiaâ??s coastal economy, the central government has rolled out guidelines to regulate the import of live seaweed varieties with an agenda of sparking seaweed revolution by scaling up domestic cultivation and feeding a growing demand across industries. Despite having a coastline capable of producing a staggering 9.7 million tonnes of seaweed annually, India currently harvests just 34,000 tonnesâ??a fraction of its potential. By contrast, global seaweed production is cruising at over 35 million tonnes, valued at an estimated $16.5 billion each year.

â??Despite Indiaâ??s vast coastline and growing interest in seaweed cultivation, domestic buyers continue to lean heavily on imports. Whether for food-grade applications, pharmaceuticals, or industrial uses, quality assurance is non-negotiable. Currently, Indian seaweed just isnâ??t making the cutâ??â??, remarked Dr Johnson B, Sr. Scientist, ICAR-CMFRI.



â??Barriers? No standard pricing. No buy-back system. Limited processing infrastructure. Also too much red tape in permissions-we need clear, decentralized policies and seaweed â??zonesâ similar to agri-export zonesâ??â??, added Koli. Unreliable gelling properties, especially in locally sourced agar derived from Gracilaria dura. While some Indian seaweed producers do price their product based on gel strength, variability in growing conditions, harvesting practices, and post-harvest handling leads to uneven quality. In contrast, imports from countries like the Philippines and Indonesia offer stability in both volume and performance.

â??Fixing the gaps isnâ??t just a supply chain challengeâ??itâ??s an opportunity to unlock the full value of Indiaâ??s "blue-green" gold. While India possesses an extraordinary potential to emerge as a global leader in seaweed cultivationâ??with an estimated capacity exceeding one million tonnesâ??the sector languishes at a meagre 34,000 tonnes annually. This glaring underachievement stems from a set of challenges: the absence of reliable seed infrastructure, tenuous market linkages, insufficient technical literacyâ??particularly among coastal womenâ??and the looming spectre of climate volatility. Addressing these systemic deficiencies requires more than perfunctory policy interventions; it necessitates a paradigm shift towards inclusive, community-driven models and sustained, holistic ecosystem developmentâ??â??, said Neelkanth Mishra, CEO,

Jaljeevika.

A sleeping giant, poised for growth, India contributes less than 1 per cent to global seaweed production. Today, over 40,000 coastal farming families are engaged in seaweed cultivation, spread across states such as Tamil Nadu, Gujarat, Maharashtra, Odisha, Goa, and the island territories of Lakshadweep and the Andaman & Nicobar Islands.*â??There are central schemes like PMMSY, and CSIR, ICAR are pushing pilot projects. However, thereâ??s no dedicated National Seaweed Mission yet with strong financial and technical incentives. We need state-specific seaweed policiesâ??Maharashtra, Tamil Nadu, Gujarat must all localize support ensuring that these reach the actual harvesters, not just paper cooperativesâ??â??,*advocated Koli.

Lakshadweep is beginning to emerge as a standout performer. With its calm lagoons and pristine coastal conditions, the islands offer ideal seasonal windowsâ??up to seven months annuallyâ??for high-yield seaweed farming. While average dry yield across the country hovers around a 5X return on seed, certain pilot projects in Lakshadweep have recorded an impressive 15X output, attributed to optimal temperatures and low pollution levels. The industry has seen particular promise in the cultivation of Kappaphycus alvarezii, a commercially valuable red seaweed used extensively in food, pharmaceuticals, and cosmetics.

Farmers report earnings of Rs16 per kg for fresh seaweed, rising to Rs 70 per kg for dried, turning this once-overlooked marine crop into a source of livelihood security. Beyond economics, seaweed offers a triple winâ??absorbing carbon, restoring marine biodiversity, and supporting rural livelihoods. Globally, the seaweed market is projected to exceed $ 30 billion by 2030, and India stands at the edge of this wave. The question is no longer if India can lead in seaweedâ??but how fast it can catch up ! What lies ahead is a rare convergence of economic promise and ecological responsibility and it starts with the tide turning in places like Lakshadweep.

Cultivate, Connect, Capitalize

â??We are demanding the creation of a Coastal Autonomous Bodyâ??a council acting as a bridge between the government and the grassroots, ensuring policies are practical, inclusive, and grounded in local realities. Additionally, clarity is urgently needed on insurance coverage, safety liabilities, and property rights farm plots in the sea. Without these protections, sustainable seaweed entrepreneurship cannot flourishâ??â??, recommended Koli.

To turn India into a seaweed powerhouse, the government needs to move fast, think big, and bring the right players to the table. Aligning cultivation with market demand makes the entire value chain more resilient and profitable. Next, capital must flow. Fiscal incentivesâ??like tax breaks, subsidies, and low-interest loansâ??can unlock private investment in processing units and logistics infrastructure. These facilities should be close to farming hotspots to cut post-harvest losses and preserve product quality. A smart, data-led approach is crucial. An interactive portal with geotagged maps of potential and active seaweed sites can guide decision-making, track progress, and drive efficient resource allocation. Seed is the industryâ??s lifelineâ??and right now, it's unreliable.

â??As sea cage farming grows, so does the strain on marine ecosystems. Thatâ??s where Integrated Multi-Trophic Aquaculture comes inâ??by co-cultivating seaweed with finfish and shellfishâ??â??, mentioned Dr Johnson.â• We not only reduce environmental impact but also boost biomass and income. Our trials in Tamil Nadu, Gujarat, and Andhra Pradesh have shown that seaweed isnâ??t just a bufferâ??itâ??s a game-changer for sustainable aquaculture and blue carbon gains,â• he added, while discussing innovations in seaweed cultivation. India also needs to fix the policy grey zone around seaweed farming. Legal clarity on land use, pricing, and delivery terms will reduce disputes and build long-term trust.

â??Based on ground insights, five key pillars can scale seaweed as a women-led coastal enterprise: year-round seed access through decentralized nurseries; women-centric cooperatives for collective farming and value addition; fast-tracked permissions in climate-vulnerable areas; climate-resilient tools like floating dryers, mobile vans, and crop insurance; and strong market linkages with ethical buyers and traceable brandingâ??â??, added Mishra. *â•With the right support, seaweed can become a lighthouse livelihoodâ??women-led, community-driven, and aligned with both climate resilience and market*

potential ,â??â?? he concluded.

India must establish rigorous product standards and certification systems across food, pharma, and cosmetics to boost global competitiveness. With the right moves, India can lead the next blue economy boomâ??anchored in seaweed, powered by policy, and driven by demand. In the words of *Dr Megha Shinge, Advisor, Bhoomiputra Foundation,â??By 2045, India will stand tall as a beacon of innovation and sustainabilityâ??a seaweed powerhouse powered by cutting-edge AI farms, coastal biorefineries across key states, and blue carbon markets that reward those who protect our planet. Women-led enterprises will drive new green industries, while export hubs will showcase Indiaâ??s leadership in nutraceuticals, bioplastics, and clean fuels. This is not just progressâ??itâ??s a promise of a high-tech, inclusive, and climate-resilient future for all.â*

------ **Suchetana Choudhury (suchetana.choudhuri@agrospectrumindia.com**)