



# "Exploring the Rich Biodiversity & culture on 118 acres of Agricultural Landscape in Satara, Maharashtra, INDIA"

"The incomparable beauty of the forest and grassland, a home to countless living organisms while integrating wilderness elements into agricultural landscapes to enhance food production and preserve biodiversity."

A report and analysis by **Arun Kashyap**



In the broader environmental assessment, the focus often centers on human expectations, but this review delves into narrower scopes, exploring human interactions with the natural world. Skepticism surrounds the notion that present rural communities and farmers in India maintain a closer connection to nature. Over the past two to three generations, urbanization has dominated over 90% of farmers' monthly earnings and hence their landscapes, leading to unexpected consequences between meeting urban ever-increasing consumption patterns and maintaining biodiversity on their agricultural landscape. In pursuit of higher income, they were forced to set their farming pattern to many commercial crops and locked into a vicious cycle of escalating input costs, growing dependence on government and corporate entities, and declining soil fertility. They resort to deforestation and disruption of wildlife on their lands for annual monocropping, contributing to ecological imbalance and biodiversity loss. The existing food system contributes to a significant extent, accounting for one-third of greenhouse gases, 80% of deforestation, and 70% of terrestrial biodiversity loss, and is associated with a notable increase in our vulnerability to zoonotic diseases like Ebola, SARS, and COVID-19. Many serious issues facing the world, such as climate change, biodiversity loss, food security, and mass migration, can be traced back to degrading landscapes. The prevailing modern approach guides farmers, prioritizing output growth at the expense of ecological considerations, instead of exposing them to an old long-persisted indigenous regenerative model, which focuses on preserving ecological services for sustainable growth and increased output of nutritious crops, and hence food security. The natural zone provides resilience against climate change, disease, and other threats. The aim is to regenerate a landscape's ecological foundation by restoring native vegetation, natural wildlife habitats, and water availability. This

helps to boost and protect biodiversity over time. Adopting such an approach is crucial as we navigate the balance between rapid population growth and demand with their consumption pattern, economic prosperity, and environmental preservation.

In the Satara district of Maharashtra, near Phaltan town (110 km from Pune, once ruled by the Nimbalkar clan of the Marathas), lies the village of Vinchurni, home to Babulal Kuberchand Gandhi (Kaka), an exceptional farmer. At 95, he resides with his brother's family on a 118-acre biodiverse agricultural land called "Samrutivan." His dedication to sustainable development stems from his involvement in land distribution during Gandhian Vinoba Bhave's Bhoodan movement (initiated in 1951). He has developed a systematic approach to understanding his interactions with nature, encompassing resource extraction, transformation, and replenishment while considering various aspects of biodiversity. Employing methods like sustainable cropping, managed grazing, limited tilling, composting, and agroforestry, he utilizes alternative crops like legumes to regenerate the soil. "Covering the land with plants, whether used as cash crops or not, gives protection to the soil, improves fertility, whereas control weeds and pests, retain water, enhances biodiversity, and safeguard wildlife," he explains. Despite residing in a region known for its arid climate, where dense canopy cover and forests are maintained, along with a balanced structural and functional diversity across the agricultural landscape, marked by temperatures 1.5 to 2 degrees Celsius lower than neighboring areas, he remains largely unrecognized and overlooked. He has endured years of isolation from authorities and supporting NGOs dedicated to environmental causes, despite his efforts in not clearing prevailing forests for agricultural land and preserving wildlife.

Several terms were frequently employed interchangeably or in close proximity to the term "regenerative agriculture." These terms encompassed "agroecological farming," "alternative agriculture," "biodynamic agriculture," "carbon farming," "nature-inclusive farming," "conservation agriculture," "green agriculture," "organic regenerative agriculture," and "sustainable agriculture."

The genesis of my visit to this farm traces back to a meeting with Geeta Tai (Geeta Suresh Deshmukh ji) from Pune in December 2017. During that time, I was actively involved in volunteering for the "Annadata" pavilion at the Bhimtadi Jatra exhibition. Unfortunately, due to prior commitments, subsequent extensive visits to various environmental projects in India and abroad, and

the challenges posed by the COVID-19 pandemic, I couldn't actualize the visit earlier. It was only in 2023, prompted by a reminder from my friends Sujit and Seema Agrawal (Owners of a Pune-based organization called Mera Farmer) that I revisited the idea of supporting and documenting such landscapes. Finally, in August 2023, upon entering Phaltan, we were greeted by an overall dry landscape, however, the presence of greenery on the horizon directs us to this farm called Mangal Gandhi Smriti Van. Phaltan Tahsil covering the part of the Nira river basin is one of the economically prosperous Tahsils of Satara district in southern Maharashtra. It lies between 17058' north to 1805' north latitude and 74020' east to 74040' east longitude. The region attains 576 meters in height (M.S.L.) with the northward sloping land drained mainly by the Banganga, a right-bank tributary of the Nira River. This rain shadow area of the Sahyadri range, experiences limited rainfall (approximately 521mm against a national average of 1280mm). In such a dry area, every drop of water counts. Instead, in the same biosphere of the vibrant realm teeming with life on Earth, Kaka's self-renewing phenomenon and his five decades ago plan contoured the landscape and constructed a water-harvesting pond, which overflowed on many occasions, effectively conserving the majority of the precipitation this region receives. During the initial quarter of the year, this pond also serves as a haven for several migratory bird species. The breeze gently caresses the surface of the water, creating a refreshing current, while avian & insect inhabitants perform their roles with synchronized precision. Once the lake reaches its capacity, the water sustains a year of cultivation. Even if the following year experiences drought and lacks rainfall, the groundwater is sufficiently recharged to support another year. On one occasion, Kaka introduced fish eggs (roe) into the lake, and Mother Nature rewarded him by miraculously preserving some eggs underground. Each time the lake fills up, it attracts not only fish but also hordes of migratory birds, a phenomenon considered miraculous by many birdwatchers and ornithologists. The farmer refrains from fishing; the lake is reserved for birds that accompany them from August to March.

On the farm, cultivation of the Ayurvedic plant guggul (*Commiphora mukul*, characterized by its ash-colored bark, spiny shrub or small tree with numerous branches, and native to India, Arabia, and Pakistan) involves a significant contribution to both physical and chemical weathering processes. Thriving in sandy to silt loam soils, typically deficient in organic matter but rich in other substances, guggul is known for its resilience to drought and salinity. With its wide adaptability, the plant can be found flourishing in arid regions under diverse conditions. This landscape, over a span of 30 years, this cultivation practice has led to the fragmentation of rocky land into smaller pieces, accompanied by alterations in the chemical composition of the original material through surface processes.



Picture courtesy: Seema Agarwal

The plant's robust root systems exhibit a tendency to penetrate deep below the surface and adhere to rocks in the sub-surface, facilitating their breakdown. Furthermore, selective vegetation plays a role in rock weathering, particularly when trees or bushes are uprooted by wind forces or naturally fall over. Additionally, vegetative bacteria that secrete acid solutions contribute to the acceleration of chemical weathering. Based on long observational experience, Babulal Kaka emphasizes how the selection of guggul plants in regions with wetter and warmer climates, along with enhanced water presence, promotes increased chemical weathering.

Amidst the densely mulched orchard featuring chikoos (sapodilla), mangoes, papaya, and bananas, with freely roaming peacocks gracing the surroundings, a palpable sense of lightness and freedom envelops us. Babulal Kaka is trying to grow more fruits like Guava, Papaya, and Sitaphal amidst some vegetables. He has just put to use a piece of land that was lying barren for 12 years after



Hyena Den in sugarcane field

the major fire they witnessed on their farm. He has sown Red pumpkins on the farms, expecting over 500 kgs from this farm every year. The soil quality, mulch efforts, and the water table in his land are just too good rewarding him with excellent crop growth. He will need help to set up a good farm-to-consumer channel so that his efforts on the farms do not go to waste. He wants people in Pune to enjoy the goodness, size, and sweetness of his fruits and keep coming back for more. Across his expansive agricultural domain, the landscape becomes a testament to the untouched beauty of nature, showcasing a seamless coexistence between bamboo and sugarcane cultivation and the presence of hyenas. Many farmers in the area may perceive the diverse array of bird species and canids as disruptive to traditional food production. Also, Modern agriculture methods have drastically changed global landscapes and introduced pressures on wildlife populations. Kaka's unwavering commitment to engaging local farmers in discussions underscores the vital importance of preserving the regional ecosystem. Methodically, he instituted a set of regulations for the surrounding terrain, foremost among them being the implementation of "kurad bandi" (prohibition of axes). A collective decision was made to abstain from cutting any trees, recognizing the imperative of maximizing root systems to anchor the meager four inches of fertile soil. Even indigenous vegetation remained untouched. Subsequently, the topography underwent contouring to optimize rainwater absorption with minimal runoff. Surplus water found its repository in a sprawling 22-acre water-harvesting pond. These measures proved efficacious in retaining both fertile soil and ground moisture. Furthermore, the practice of animal hunting was discouraged, and even the grazing of cattle was meticulously planned to ensure the preservation of all

available grass. This orchestrated approach triggered a cascading effect, fostering an increase in the populations of insects, birds, snakes, rabbits, and foxes. Additionally, this should present an opportunity for the local government and related NGOs to increase financial investments in alternative conservation strategies, such as demonstrated here with the establishment of Conservation Reserves, Community Reserves, and Village Reserve. Hyenas currently inhabit only 49% of their potential habitats in India, making them one of the significant carnivores in forest and grassland ecosystems across Africa and Asia. Given the ongoing risk of carnivore population decline, it remains essential to conduct further studies exploring the positive impacts of these animals on human existence to promote harmonious cohabitation between humans and carnivores. However, we need farmers like Babulal Gandhi who regard these creatures as integral members of his extended ecological family.



This farm incorporates diverse breeds of cows, a biogas facility for cooking, and pits for producing Jeevamrut (indigenous fertilizer - a mixture of cow dung, cow urine, jaggery, gram flour, and curd) meeting soil deficiency from Electrical conductivity(EC)



The presence of a peacock on the farm enhances the diversity of the farm's inhabitants.

organic carbon (OC), and nitrogen (N) values, and soil is enriched with phosphorus (P) and Potassium (K) values. The amalgamation transforms into a solution, subsequently being introduced to the farm via a solar-powered drip irrigation system. The surplus cow dung is repurposed as feed into the vermicompost beds. Mulching is done with unfailing regularity by using dry leaves, grass, and even uprooted weeds. For a dry grassland like this, mulching proves to be a crucial step that helps retain moisture in the soil for the driest quarter of the year.

Kaka envisioned this location as a dedicated educational space catering to children of diverse ages. He has established a campsite on the farm, welcoming school children and other groups to explore and stay for a few days. Several schools from Pune have adopted this farm, making it an annual destination for their students to immerse themselves in the natural surroundings, combining enjoyment with learning. A structured educational program has also been

crafted to involve children in the environment actively. In a heartwarming tradition, Kaka extends a warm invitation to children from all the nearby schools to partake in a delightful watermelon feast. As the harvest season reaches its peak in May, he orchestrates a lively watermelon-eating contest, inviting all the kids to indulge in as many juicy watermelons as they desire. Accompanied by the rhythmic slicing of melons by diligent workers, the children relish the sweet pulp without biting into the seeds and enthusiastically spit out seeds into buckets strategically placed at every meter. Following a few weeks of this festive celebration, numerous sacks filled with watermelon seeds are carefully stored for the upcoming crop, while the excess is sent out to generate impressive income. This sustains the system to encourage constructive rural revolution based on principles of ecological sustainability and social equity. Babu Kaka advanced this mission with the assistance of his nephew and nieces. Madhavi among his nieces, enthusiastically embraced the role of an apprentice and is presently taking on the responsibility of overseeing the daily operations of the farm. She received home tutoring, and while she never particularly enjoyed studying, her passion for reading flourished. The pivotal moment in her life occurred during her two-month stay at a kibbutz in Israel. She was astonished by the social and practical organization of the community. The dedication of each member of the kibbutz to communal tasks left a profound impression on her. Her sisters, Nadani, Madhuri, and Midori, along with their brother Yogesh, also actively engage in various responsibilities aimed at the farm's development. In an era where farmers often discourage even their sons from



"Enveloped by a diverse array of native bamboo species, the forest contributes to a vibrant and ecologically rich environment within the Samrutivan landscape."

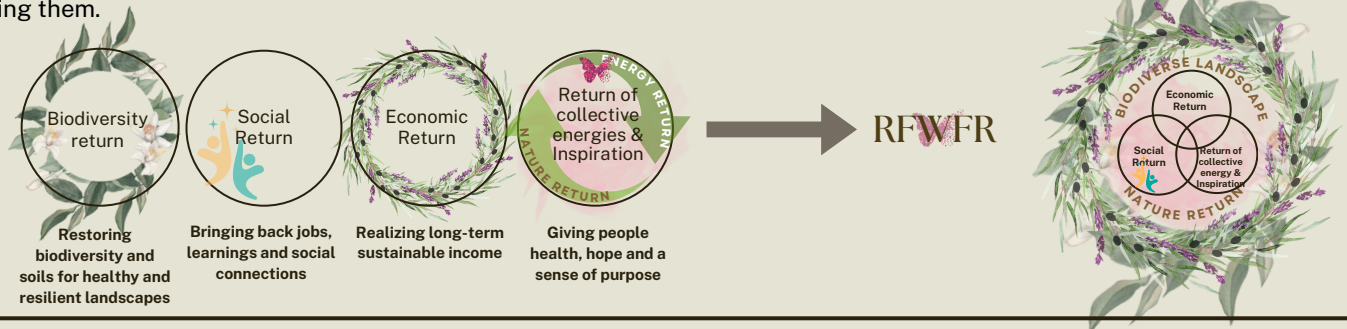
pursuing this vocation, the three sisters serve as a source of inspiration for both boys and girls who visit the farm. Their dedication offers hope and encouragement for a renewed interest in farming as a noble and viable profession.

Today, we have the opportunity to seek valuable insights from farmers like Babulal Kaka regarding various aspects such as reforestation, biodiversity, carbon sequestration, and food security. Despite potentially being overlooked in the modern world, farmers like him offer strong models for nature-based farming, which holds significant potential to practical and positive environmental impact and saving the planet Earth and all lives on it.

As a philosophy and approach to land management, such agriculture models with forest restoration and conservation ask us to think about how all aspects of agriculture are connected through a web—a network of species that grow, enhance, exchange, distribute, and consume goods and services—instead of a linear supply chain. It’s about farming and ranching in a style that nourishes people and the earth, with specific practices varying from grower to grower and from region to region. There’s no strict rule book, but the holistic principles behind the dynamic system of regenerative agriculture are meant to restore soil and ecosystem health, address inequity, and leave our land, waters, and climate in better shape for future generations. Regenerative agriculture has at its core the intention to improve soil health (restore highly degraded soil) which symbiotically enhances the quality of water, vegetation, diversity, and land-productivity.”

## Regenerative Biodiverse Farming with Forest Restoration

The regenerative biodiverse agriculture model aims to revitalize and enrich a farm’s ecosystem, prioritizing soil health, water management, energy management, and fertilizer use, among other aspects. It represents a sustainable farming approach that enhances the resources it employs, rather than degrading or depleting them.



Regenerative agriculture relies on natural processes and living things to create food, but often changes the environment around it. While farms can be managed in ways that minimize their damage to the environment around them, industrial agriculture’s focus on productivity means that too many farms are disruptive to wild species both near and far. When environments are too altered or polluted by industrialized agriculture, vulnerable species may lose their habitats and even go extinct, harming biodiversity. In anticipation of the formidable task of feeding a global population approaching 11 billion by 2050, farms and ranches face the imperative to redouble efforts in sustainably enhancing productivity.



The farmland is surrounded by forest and houses a hyena den within the sugarcane crop.

**Achieving successful holistic landscape restoration is a prolonged effort that yields results when it is embraced and owned by the individuals within that landscape. Transitioning from authoritative top-down approaches to democratic and inclusive bottom-up strategies is a crucial element for success in ecosystem restoration.**

The impact of population growth on farmland manifests diversely across regions, with some areas susceptible to conversion into suburban and urban developments, evident in the traces surrounding Babulal Gandhi’s farmland. Recognizing the pivotal role of agriculture in habitat loss, the prevention of wildland conversion into farmland emerges as crucial for biodiversity preservation.

To minimize overall environmental costs while meeting food needs, a detailed analysis of carbon and biodiversity losses per ton of crop (not per hectare) becomes essential. In the quest for sustainable agriculture, the integration of traditional wisdom and state-of-the-art research has led farmers and scientists to adopt agroecology, a cornerstone strategy in regenerative agriculture. This approach directs attention toward enhancing natural resources such as healthy soil and water rather than depleting them.

The fact that approximately 80 percent of the world’s biodiversity thrives on a mere 15% of lands managed by indigenous communities underscores the potential of agroecology. While the adoption of agroecology marks a revolutionary departure from industrial farming, it draws inspiration from practices deeply rooted in the age-old wisdom of Indigenous peoples globally. These practices, ingrained in intricate

agroecological systems that harmonize with nature, present a sustainable model. Preserving and revitalizing these Indigenous traditions holds promise for contributing to global agricultural sustainability and biodiversity conservation. For the world to enjoy the benefits of enhanced productivity while safeguarding natural ecosystems, efforts must link both objectives.