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Manuscript ID:  
IJWGAFES-2025-021205

DOI: 10.5281/zenodo.18253035

DOI Link:  
<https://doi.org/10.5281/zenodo.18253035>

Volume: 2

Issue: 12

December

Year: 2025

E-ISSN: 3066-1552

Submitted: 06 Nov.2025

Revised: 11 Nov.2025

Accepted: 04 Dec 2025

Published: 31 Dec. 2025

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**How to cite this article:**  
Gaikwad, S. C. (2025). Sikkim's Organic Revolution: A Sustainable Agricultural Model for Rural and Urban Resilience. *International Journal of World Geology, Geography, Agriculture, Forestry and Environment Sciences*, 2(12), 26–29.  
<https://doi.org/10.5281/zenodo.18253035>

# Sikkim's Organic Revolution: A Sustainable Agricultural Model for Rural and Urban Resilience

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## Abstract

Sikkim, India's first 100% organic state, offers a transformative model for sustainable agriculture in both rural and urban settings. This paper synthesizes six studies to critically examine the socio-economic, policy, ecological, and urban dimensions of Sikkim's organic farming journey. It evaluates farmer perceptions, productivity outcomes, policy implementation gaps, urban innovations like rooftop farming, and marketing limitations. Results indicate that although organic farming in Sikkim boosted yields, lowered input expenses, and improved environmental conditions, marketing and scalability continue to be significant obstacles. Rooftop agriculture in Gangtok stands out as a valuable addition to addressing food security issues through urban farming. The results indicate that organic farming in Sikkim has contributed to improved crop yields over time, reduced dependence on external chemical inputs, enhanced soil health, and generated positive environmental outcomes. Farmers also reported long-term economic benefits, although short-term transition costs and limited market infrastructure remain constraints. Urban initiatives, especially rooftop agriculture in Gangtok, emerge as complementary strategies for enhancing food security, promoting local food systems, and increasing community engagement in sustainable practices. The paper concludes by advocating for a holistic, context-sensitive replication of Sikkim's model in other Indian states, emphasizing the need for broader market linkages, inclusive policy design, and community-based innovations.

**Keywords:** Organic farming, Sikkim, sustainable agriculture, rooftop farming, policy, marketing, rural-urban resilience

## Introduction

Sikkim is a tiny state in India's northeast, recognized for its natural beauty. The region is located in the Himalayan ranges, bordered by Bhutan to the east, Nepal to the west, and the Tibet autonomous area of China to the north. Sikkim is the second smallest state in India by area, following Goa. Modern agriculture faces growing scrutiny over its environmental, health, and socio-economic repercussions, especially in post-Green Revolution India. Amid this backdrop, Sikkim's declaration as a 100% organic state in 2016 marks a pioneering shift toward sustainable agriculture. The move aligned with global sustainability goals and national priorities under initiatives like Paramparagat Krishi Vikas Yojana (PKVY). With a combination of top-down policy and bottom-up farmer adaptation, Sikkim transformed its entire cultivable land into organically

certified territory. This transition not only redefined agro ecological strategies but also became a global case study acknowledged by international organizations including the FAO.



Source: [https://www.freepik.com/premium-vector/sikkim-district-map-with-neighbour-state-country\\_154935614.htm](https://www.freepik.com/premium-vector/sikkim-district-map-with-neighbour-state-country_154935614.htm)

This paper examines the state's organic transition through the lenses of rural farmer experience, productivity trends, urban farming innovations, and persistent structural bottlenecks, particularly in marketing and policy outreach. Integrating evidence from six diverse studies, the paper highlights both the achievements and limitations of Sikkim's organic revolution while reflecting on its adaptability across India's heterogeneous agricultural landscapes.

## Objectives

1. To analyze the socio-economic and ecological outcomes of organic farming in Sikkim.
2. To assess farmer perspectives on cost, productivity, and policy engagement.
3. To explore rooftop farming as a model for urban food security in Sikkim.
4. To identify challenges in marketing and scalability of organic produce.
5. To propose context-sensitive recommendations for replicating Sikkim's model elsewhere in India.

## History of Organic Farming in Sikkim

The majority of farmers in Sikkim, located in the Himalayan region, were practicing natural farming. The application of chemical fertilizers amounted to just 5.5 kg for each hectare. As a result, Sikkim was positioned third among states that utilize fertilizers. Furthermore, chemical fertilizers were not utilized in the cultivation of cardamom grown on 3,000 hectares. The productivity of agricultural farming was poor. Consequently, there existed a supportive setting for organic agriculture. Subsequently, on May 1, a concept document and action strategy were developed. The intent was to establish the goals. An organic farming policy was developed. The Sikkim State Organic Agriculture Board was established on September 7.

Meanwhile, the support for chemical fertilizers was discontinued. Transport and handling grants as well as commissions for fertilizer sellers were closed from 1 to 3. A period of seven years was set to completely phase out chemical fertilizers and slowly shift to organic fertilizers.

The entire area of Sikkim is approximately seven lakh 19 thousand 19 hectares; however, merely 1.5 percent of this, equating to just 5 thousand 5 hectares, is used for agriculture. Since the remainder of the region is filled with forests, natural grains, and so forth. Despite the geographical area being low, there are five agricultural departments based on the climate. The majority of these regions are found in tropical, semi-arid, and cold climates. Thus, maize, rice, wheat, barley (cereal plants), beans, mustard, mustard (oil plants) orange, pears, banana, lichi, peru, apple, apple (fruits), ginger, veloc, turmeric (spice plants), tubers, peas, potatoes, potatoes, potatoes Various orchid types, roses, anthuriums, gerbera, lilies (butterflies) are cultivated in Sikkim.

The Sikkim government initiated activities such as village adoption for bio-villa development, grants for earthworm and compost fertilizer production, access to organic fertilizers, and the provision of standard organic fertilizers. To grow as 'Bio-Dialogue', the government took on over 90 villages and helped more than 3,000 farmers. The government farms in Nazitam and Melidara have been converted into the 'Organic Farming Center of Excellence'. Numerous experiments in organic agriculture started taking place there, and its demonstrations were also presented to the farmers.

On August 7, Chief Minister Chamling introduced the organic farming initiative and stated that the objective was to turn the whole state organic. The primary concept of organic farming is that it aims to remain independent from external inputs beyond our fields. In other words, when it is the season to create compost or earthworm casts from the cows and cattle, the moment to apply pesticides, to prepare it from the arboreal plants on the farm, to ready the seeds for the farm, and so forth. Understanding this, the Sikkim government highlighted the training initiatives to empower the farmers' self-sufficiency. Furthermore, the items requiring additional support were provided by the government in a dependable manner. Emphasis was placed on using green and organic fertilizers to enhance soil health

## Main Content

### 1. The Transition to Organic Farming

Sikkim initiated its organic mission in 2003, culminating in a state-wide certification by 2016. The phased and participatory approach included removal of subsidies for chemical inputs, intensive training, and institutional support through the Sikkim Organic Mission. Farmers, especially in the southern and central regions, adapted with composting techniques, green manuring, intercropping, and crop rotation methods. Awareness campaigns and NGO involvement further encouraged organic transition. Post-transition, crop yields for rice and maize rose by 29% and 14% respectively (Parikh, 2023). The state government's role was instrumental in creating a conducive environment. Policy implementation involved coordination with certification agencies, the promotion of bio-inputs, and development of demonstration farms. Importantly, farmers received cattle for manure production and government-supported compost pits, facilitating a smoother transition.

### 2. Farmer Experiences and Perceptions

Based on a survey of 35 farmers (Bhujel & Joshi, 2021), the majority reported organic farming to be cost-effective and productive. About 91.4% received training and 85.7% financial support. Despite the positive financial implications, 71.4% identified lack of market access as a major constraint. Farmers with smaller holdings, primarily under 2 acres, found the transition easier due to low input needs and greater flexibility in crop planning.

Notably, none were consulted during policy formulation, revealing a disconnect between grassroots stakeholders and state planning. Although 91.4% were conscious of sustainable practices, 42.9% did not know the specific organic policies in place. Farmers expressed willingness to continue organic farming but requested better access to cold storage, local markets, and value-added processing facilities.

### 3. Rooftop Farming in Gangtok

Urban areas like Gangtok are exploring rooftop farming as a solution to limited arable land and high food imports. Goswami and Pariyar (2023) demonstrated that 100 sq. ft. rooftop gardens can meet up to 77% of a four-member family's

vegetable needs. If implemented across Gangtok's 11,806 residential and commercial buildings, this could contribute 20% of the city's vegetable supply, saving Rs. 14.9 crore annually.

Beyond food security, rooftop farming enhances urban biodiversity, improves air quality, and engages communities in sustainable practices. Challenges include technical knowledge gaps, structural reinforcements for buildings, and water management. However, pilot programs in schools and municipal buildings suggest scalability with appropriate public-private partnerships.

#### 4. Marketing Challenges

Despite state-wide organic certification, farmers struggle to access premium markets. Darjee (2023) notes that poor branding, lack of geographical indications, and inadequate cold storage undermine profitability. Most farmers sell produce at conventional prices, nullifying the economic advantage of organic practices. Cooperatives such as SIMFED and agencies like MEVEDIR attempted to streamline logistics and aggregation, but uneven demand and market saturation posed obstacles.

Retail chains and online platforms showed limited integration with Sikkim's organic produce, primarily due to inconsistent supply and lack of uniform packaging standards. Recommendations include GI-tagging high-value crops like cardamom, creating dedicated organic hubs, and linking producers to institutional buyers such as schools and hospitals.

#### 5. Lessons and Scalability

Sikkim's success stems from political unity, strong policy backing, and a culturally receptive population. However, replicability is limited without addressing market access, institutional participation, and regional adaptability. In larger states with fragmented landholdings, transitioning to 100% organic may disrupt short-term food security and incomes.

Nonetheless, phased adoption with district-level pilots, community-based models, and integration with national schemes like Rashtriya Krishi Vikas Yojana can offer scalable alternatives. Farmer Producer Organizations (FPOs) and digital traceability systems could support certification and supply chain transparency.

### Conclusion

Sikkim's organic transition presents a compelling case for sustainable agriculture, blending policy innovation, farmer resilience, and ecological stewardship. While productivity gains and environmental benefits are evident, marketing and scalability issues persist. Rooftop farming in Gangtok offers a viable urban extension of the organic model, showcasing how food security and sustainability can be locally driven.

To replicate Sikkim's success, future efforts should integrate farmer voices in policymaking, develop robust market linkages, and tailor organic models to regional contexts. Policymakers must also invest in branding, cold chains, and cooperative marketing. This case emphasizes the importance of holistic approaches in sustainable agriculture that include rural and urban strategies, ecological restoration, and inclusive governance.

In addition to this, biodynamic farming, sage agriculture, Panchagavya agriculture, and natural farming were also incorporated. The Sikkim government has launched initiatives like building soil testing facilities, integrated pest management labs, packaging units, research centers, along with training and capacity-building programs. To achieve this, the phase's objectives were established, and a consistent effort was exerted to attain them. The government supported, supported, supported the farmers in organic farming and strongly backed them. Due to all these initiatives, Sikkim achieved organic status on December 5.

Organic farming expenses range from four to six times greater than conventional methods. Consequently, farmers' earnings will rise; the absence of chemicals will keep agriculture sustainable; tourism will grow to observe organic farming; agriculture will thrive due to reduced pollution; with the conclusion of nature and a reduction in external dependencies, numerous self-sufficient outcomes will be realized in Sikkim because of organic farming.

### Acknowledgment

The author wishes to express sincere gratitude to SNDT Women's University, Churchgate, for providing the academic environment and institutional support necessary for the completion of this research.

I am deeply thankful to my respected supervisors and faculty members for their continuous guidance, valuable suggestions, and encouragement throughout the course of this study.

### Financial support and sponsorship

Nil.

### Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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