

# A SYSTEMATIC LITERATURE REVIEW ON SUSTAINABLE AGRICULTURE AND FOOD SECURITY THROUGH THE LENS OF INDIAN SOCIO-ECOLOGICAL PERSPECTIVES

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*The relationship between food security, sustainable agriculture, and socio-ecological viewpoints is examined in this comprehensive literature review. It investigates the ways in which ecological balance, social equity, and economic viability interact to impact sustainable food systems, drawing on interdisciplinary literature. In order to build resilience against climatic and socioeconomic challenges, this review emphasizes the importance of traditional knowledge, community engagement, and policy frameworks. In the framework of long-term agricultural sustainability, a holistic socio-ecological viewpoint emphasizes the inclusion of environmental justice, food equity, and sustainable development as essential agenda items.*

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## Introduction

With an estimated 8.3–10.9 billion people on the planet by 2050, food production will need to rise by 50–75%<sup>1</sup>. Food security, according to the 1996 World Food Summit, is the constant, universal availability of wholesome, favored food for a healthy lifestyle. With a focus on equitable resource distribution, policymakers have thus taken steps to align with the UN SDGs on Zero Hunger and Reduced Inequalities. Climate change, however, continues to lower yields and further deteriorate soils due to rising temperatures, unpredictable rainfall, and CO<sub>2</sub>. In essence, sustainable development embodies humanity's social responsibility for its resources, claims<sup>2</sup>. In order to maintain productivity while adapting to climate change, sustainable agriculture thus entails the integration of social, economic, and ecological characteristics<sup>3</sup>.

## Evolution of The Concept of Sustainability

From early conservationist concepts, it developed into

a contemporary ecological consensus. Early concepts of stewardship were sparked by the severe difficulties that resource scarcity presented to the survival of early civilizations, such as Egypt and Rome<sup>4</sup>. The Renaissance and Industrial Revolution led to rapid growth at the expense of degradation, whereas the Middle Ages emphasized stewardship primarily as a moral issue. Growing concerns about resource scarcity in the 19th century brought attention to the need to balance environmental preservation with economic growth<sup>4</sup>.

## Sustainable Agriculture and Food Security: Historical Perspectives

Modern agro-ecological regimes have replaced the subsistence farming of the past. Ancient India made sure this was done in a sustainable manner by using crop rotation and organic farming<sup>4</sup>. While the Green Revolution improved yield, it was detrimental to ecosystems, and the Industrial Revolution deteriorated. Innovation and conventional wisdom are combining in a renewed interest in sustainable farming. The United Nations' SDG 2<sup>1</sup> and India's PKVY are examples of international initiatives that guarantee ecological resilience.

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## **Socio-Ecological Outlook**

Subsistence farming has been supplanted by contemporary agro-ecological regimes. Crop rotation and organic farming were used in ancient India to ensure that this was accomplished in a sustainable way<sup>4</sup>. Although the Green Revolution increased productivity, ecosystems suffered, and the Industrial Revolution worsened. A renewed interest in sustainable farming is the result of a combination of innovation and conventional wisdom. International programs that ensure ecological resilience include India's PKVY and the United Nations' SDG 2<sup>1</sup>.

Socio-ecological systems, which stress the harmony between people and the natural world, view agriculture and food security as a foundation<sup>5</sup>. Food systems are negatively impacted by land degradation, biodiversity loss, and climate change, particularly in developing countries<sup>6</sup>. Food security is disrupted by rising temperatures and volatile markets, both of which are made worse by COVID-19<sup>7-8</sup>. Diversification and agroforestry improve resilience. Small farmers are still at risk, though. Although India's MGNREGA and PDS improve livelihoods, globalization makes them more vulnerable<sup>9</sup>. In food systems, socio-ecological governance promotes sustainability and equity<sup>10-11</sup>.

## **Sustainable Development Goals and Food Security**

Food security was defined by the FAO Rome World Food Summit in 1996 as a state in which everyone always has physical and financial access to enough wholesome food. Its three main pillars are utilization, accessibility, and availability. Food insecurity affects billions of people due to poverty, inequality, and environmental stress, despite the fact that food is a fundamental human right. By emphasizing ecological preservation, economic inclusivity, and social justice as some of the primary means of achieving zero hunger, SDG 2 connects food security with sustainable agriculture.

## **Sustainable Development in Goals Agriculture**

Agriculture sustainability will require a comprehensive strategy. Reducing production costs and raising marketable surplus are the two main tactics for small-scale farms<sup>3</sup>. To close the current wide yield gaps of crops like rice and wheat, technological, infrastructure, and policy limitations must be addressed. Eco-technologies, effective post-harvest management, and precision farming for resource efficiency are important interventions<sup>12</sup>. Improved management of crops, livestock, and fisheries will be

necessary to improve food safety. Local governments are the main participants in decentralized productivity planning<sup>12</sup>. Controlling desertification, preserving soil and water, and restoring degraded areas through agroforestry are all goals of environmental conservation. Long-term ecological stability can be attained by preventing excessive groundwater extraction and conserving water through community involvement<sup>12</sup>.

## **Findings**

- Together with social justice, ecological balance, and economic stability, sustainable agriculture promotes food security.
- Resilience and efficiency are increased when traditional knowledge is incorporated into contemporary methods.
- Climate change necessitates climate-smart, adaptable farming methods.
- Crop diversification, organic farming, and agroforestry techniques all contribute to ecological resilience.
- The PKVY and SDG 2 promote sustainable and equitable food systems.
- Local governance and community involvement enhance socio-ecological sustainability.
- Integrated approaches save resources and lower post-harvest losses.
- To achieve resilient systems and food justice, international cooperation is required.

## **Conclusion**

Within the socio-ecological framework of social justice, environmental balance, and economic resilience, it includes a close connection between food security and sustainable agriculture. Modern ecotechnologies combined with indigenous knowledge improve climate and market adaptation. A clear call for an inclusive, community-driven transformation in agriculture is made by policies like PKVY and SDG 2. In order to achieve global food justice and guarantee a safe, resilient, and sustainable agricultural world for our future generations, participatory, adaptive, and climate-smart food systems are essential. □

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