

## International Journal of Agriculture Extension and Social Development

Volume 5; Issue 1; Jan-Jun 2022; Page No. 118-121

Received: 24-01-2022  
Accepted: 12-03-2022

Indexed Journal  
Peer Reviewed Journal

### Sustainable agricultural development in India: An overview

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DOI: <https://doi.org/10.33545/26180723.2022.v5.i1b.131>

#### Abstract

In the middle of the twentieth century, there was unprecedented growth in the agricultural sector around the world. Green Revolution technology-driven development has achieved the important goal of the total supply of agricultural food grains. This has ensured food security for the growing population. However, the next stage of agricultural development is facing a serious challenge in terms of sustainability. While the main problem faced by the developing countries in the south is related to the sustainability of resource use, the main challenge facing the developed economies in the north is the overuse of chemical inputs. These problems have led to growing awareness and a need to move from input-intensive agriculture used during the Green Revolution phase to sustainable farming in different parts of the world. The new agenda in Indian agriculture should set a goal that broadly and clearly focuses on improving agricultural systems and organizing rural development in an integrated manner. Although Indian agriculture has shifted from traditional farming to modern agribusiness, yet to meet the increasing demand, contribute more effectively to reduce poverty and malnutrition and to make it more ecologically sustainable, agriculture must change. This paper analyses and explores measures to tackle various issues related to sustainable agricultural development in India.

**Keywords:** Sustainable development, resources, development, agriculture, ecological sustainability, economic sustainability, social sustainability

#### Introduction

Agriculture is the lifeline for the subsistence of life on Earth. Agriculture covers every aspect of human existence through the products consumed directly or indirectly. The role of agriculture in human development is difficult to overestimate. It provides a multifaceted contribution to the global food system and many pillars of sustainable development. Agriculture faces many challenges that make it more and more difficult every year to achieve its primary objective of feeding the world. Agriculture has the most important place in the Indian economy. The role of the agricultural sector in the Indian economy can be seen as a significant contribution to GDP and employment. Despite the recent boom in manufacturing and service and a declining share of agriculture in national income, India can be safely portrayed as an agricultural country. It has been the greatest profession in India since time immemorial as 65% of the workforce in India is still engaged in agriculture and allied activities. It is only a relatively recent phenomenon that large-scale forest areas, grazing lands and barren land have been converted into croplands to support the growing population, leading to ecological imbalance and atmospheric pollution. Sustainable agricultural development of each country depends on the judicious mix of their available natural resources. The larger objective of

reforming the agricultural sector can be achieved through rapid development of agriculture, which depends on the increase in the area of cultivation, the intensity and productivity of the crop. However, for a country like India, increasing productivity is more important than the rest.

The main objective of any agricultural program is to maintain sustainable growth in agricultural production to ensure food security for the growing population and generate sufficient surplus for exports. Many believe that entering a sustainable development path for agriculture and food is a difficult challenge, but it is possible and achievable. Sustainable agricultural development not only strives to conserve and maintain natural resources but also develop them as there will be a lot of demand for agriculture and food products, quantity-wise and quality-wise, for the coming generations. It is necessary to ensure a balance of such goals with the development of livelihoods achieved by the individuals concerned. The concept of sustainable development has become a suitable basis for defining future development goals for agriculture. Although the Brundtland Commission's report mainly targeted environmental damage due to rapid industrialization, it also identified deficiencies in world agricultural systems and made clear reference to the need for a new holistic approach. Sustainable agriculture was soon recognized as the most important component of

overall sustainable development. International organizations such as the Food and Agriculture Organization, The World Bank and the International Advisory Group on Agricultural Research have made sustainability a core objective of adoption in all their future programs in agriculture.

### **Sustainable Agriculture**

“Sustainable agriculture is the successful management of resources for agriculture to meet changing human needs while maintaining or enhancing environmental quality and conserving natural resources.”- CGIAR/TAC, 1988.

“A sustainable agriculture is one that, over the long-term, enhances environmental quality and the resource base on which agriculture depends; provides for basic human food and fibre needs, is economically viable; and enhances the quality of life for farmers and society as a whole”. ASA, 1989. Sustainable agriculture thus operates within the bounds of physical and biological resources on the one hand and socio-economic viability and quality on the other.

Mac Rae *et al.* (1990) argue that sustainable agriculture is both a philosophy and a system of farming. It is rooted in a set of values that reflect an awareness of both ecological and social reality and a commitment to respond appropriately to that awareness. It emphasizes design and management processes. All of these work with natural processes to conserve resources and reduce waste and environmental damage while maintaining and improving agricultural productivity.

Rao (2002) <sup>[14]</sup> outlined the determinants of the framework of sustainable agriculture as:

1. The food demand of the growing population and economy (sustainability goals), and the supply limits set by carrying capacities of the agro-ecosystem (system capacities),
2. The trade-offs between agricultural productivity and quality of the natural resource base in different regions/agro-ecosystems as assessed by trends in suitable sustainability indicators, (Are the levels and growth of production sustainable?), and
3. Emerging technologies and improved management strategies that can shift the trade-offs towards improving both sustainability and productivity. (Can prospects for long term sustainability be improved with new technologies and management?)

### **Sustainable Agriculture Development**

Agriculture plays an important role in eradicating hunger, poverty and sustainable development. The challenges facing agriculture in sustainable development are working out ways to build a society that is physically adequate, socially equitable and ecologically sustainable. The challenges facing agriculture in sustainable development are working out ways to build a society that is physically adequate, socially equitable and ecologically sustainable. Sustainable agriculture must meet economic, social and ecological challenges. All these challenges are closely intertwined. These characteristics of sustainable agriculture should be considered as a package and one feature should not dominate the other. Sustainable agriculture needs to protect the natural resource base, prevent the degradation of soil and water; conserve biodiversity; contribute to the economic and social well-being of all; ensure a safe and high-quality

supply of agricultural products; and safeguard the livelihood and well-being of agricultural workers and their families. The main tools towards sustainable agriculture are policy and agricultural reforms, participation, diversification, land conservation and better management of inputs. The issues of sustainable agricultural development can be discussed under three broad types of farming systems: traditional production methods, modern farming systems and sustainable farming systems. Also, we can evaluate them in three dimensions: Ecological, Economic and Social Sustainability.

### **Ecological Sustainability**

Most traditional and conventional farming practices are not ecologically sustainable; they abuse natural resources, reduce soil fertility, cause soil erosion, and contribute to global climate change. But there are some big advantages of sustainable agriculture that outweigh traditional practices. A continuous decline in soil fertility is a major problem in many parts of India. Sustainable agriculture improves fertility and soil structure. Sustainable agriculture increases the amount of organic matter in the topsoil, which increases its ability to retain and store rainwater. Excess amounts of fertilizers and pesticides contaminate both the soil and groundwater. Irrigation is the biggest consumer of fresh water, which is very essential for crops. The Sustainable Development Goal commits the world to ensuring that everyone has safe water by 2030 and includes the goal of protecting nature. Chemicals, pesticides and fertilizers accidentally affect the local ecology as well as the population. Indiscriminate use of pesticides, improper storage etc. can cause health problems. Sustainable agriculture reduces the use of hazardous chemicals and controls pests. In the sustainable farming system, mixed crops are produced. As a result, biodiversity increases. By adopting a sustainable farming system, many problems such as the production of greenhouse gases, reducing the amount of carbon and the side effects of excessive use of artificial fertilizers, etc., can be easily overcome.

### **Social Sustainability**

Social sustainability in farming techniques is related to the data of social acceptability and justice. No development can be said to be sustainable unless it reduces poverty. The government should find such a way that poor villagers can benefit from agriculture. The development of society comes only from the opportunities of development. But having methods of social sustainability can bridge the gap between “haves” and “have-nots”. Sustainable farming practices are very useful as they are based on local customs, social traditions and norms etc. Local people are more likely to accept and adopt sustainable farming because of a person familiar with society. Because sustainable farming practices are based on traditional knowledge and local innovation, local people can gain knowledge about their environment, crops and livestock. Traditional farming is extra gender oriented where women bear most of the workload in terms of labour. Sustainable agriculture ensures that the workload and benefits are divided equally between men and women. Although traditional farming focuses on a few commodities, sustainable agriculture improves and advances food security by improving the quality and nutritional value of food and producing a better range of products over time. In traditional

farming, the rich and upper castes got additional benefits, while the lower castes and the poor were left out. Sustainable agriculture strives to ensure equal participation and duly recognizes the voice and language of all people.

### **Economic sustainability**

For agriculture to be sustainable, it needs to have economic viability over a long period of time. Traditional agriculture involves more new economic risks in the long run than sustainable agriculture. Sometimes, governments consider export-oriented production systems to be more important than domestic demand and supply. A greater focus on exports alone involves more hidden costs in transportation and in ensuring local food security. Policies must treat domestic demand and, in particular, food security as equally important to the in evidence trade balance. But market production involves certain risks because the market is volatile and highly variable. For countries such as India and China, where a large percentage of the population is dependent on agriculture and where the share of agriculture in the national economy is disproportionately large, pricing policies have to be different to balance affordability for local people, export competitiveness and import rates for deficit commodities. The welfare costs of unemployment should be taken into account when designing the National Agricultural Assistance Program. Sustainable agriculture helps address these problems with an emphasis on labour-intensive performance on a small scale.

### **Sustainable Agriculture in India**

The development of agriculture should not be at the cost of the environment. The Green Revolution in India achieved self-sufficiency in food production, although in the state of Haryana, there has been continuous environmental degradation, especially in the soil, vegetation and water resources. Sustainable agriculture may be defined as any set of agronomic practices that are economically viable, environmentally safe, and socially acceptable. If a cropping system requires large inputs of fertilizer that leak from the system to pollute groundwater, drinking supplies and distant coastal fisheries, the system may be sustainable economically as the long-term supply of fertilizer is stable and the economic cost of fertilizer is easily borne by larger grain production, but it is not sustainable environmentally or socially, since it does not cover the cost of environmental damage or social costs. The level of organic matter in the land is continuously declining and the use of chemical inputs is increasing rapidly. New varieties of crops have been responsible for more input use and, due to this, there has been a huge increase in the use of chemical fertilizers and irrigation. As a result, water is getting contaminated by nitrates and phosphates and changes in the groundwater table. The total cultivable land of the country is about 144 million hectares, of which 56% (80.6 million hectares) is degraded due to faulty agricultural practices and the dense forest cover has been reduced to 11% (36.2 million hectares) of the total geographical area. Watershed areas, river corridors and rangelands have been extensively disturbed. The situation is frequently so bad that even cessation of abuse may no longer lead to self-restoration of biological diversity, stability and productivity of the ecosystems. There has been growing criticism of

conventional agriculture for its side effects, the “external costs” that impact communities, the environment, and human health. As for indicators of sustainability, there is no single prescription. Sustainable practices will vary by cropping system, local environment and socio-economic system. Still, experience tells us that locally sustainable systems tend to be more resource-conservative than less sustainable systems and tend to rely less on external inputs and more on internal ecosystem services.

Since the 1980s, the water level has risen and salinity spots are visible at the farm level. The situation is worse in areas of high rainfall where water logging occurs immediately after the rains. Groundwater overtook surface water as the primary source of irrigation in the early 1980s. It now serves more than 60% of India's net irrigated area, compared to 30% for surface water. Besides affecting agricultural crops, a high water table also causes flooding after minor rains by reducing the storage capacity of the soil. Such an ecological impact is prompting farmers to reduce the use of chemical fertilizers and pesticides. This has led to increased investment in products including alternative technology and interest in integrated pest management.

### **Policies for sustainable agriculture**

The policies of the Government of India have always emphasized self-sufficiency in food grains, which does not necessarily coincide with any stability. What should be the policy framework for sustainable agriculture? The challenges facing agriculture require coordinated responses based on the strengths of all stakeholders. They should be addressed within coherent national strategies for agriculture in partnership with provincial departments of agriculture, other government departments, farmers, the private sector and civil society. This requires setting up appropriate policies, laws, programs and resources, as well as mobilizing resources at the national, provincial and local levels. Sustainable development requires change and harmony. It involves balancing the economic, social and environmental objectives of society. The growth of agricultural production and productivity, which had risen significantly during the 1970s and 1980s, declined during the 1990s. These slowdowns have worsened since 2000. Both overall agricultural production and food grains production have shown negative growth rates in the 2000-01 to 2002-03 period. Thus, a critical examination of the approach to sustainable agricultural development is necessary. This examination must be drawn from the consequences of not only India's continued need to ensure food self-sufficiency but also access to international markets. Possible actions related to sustainable agriculture in India can be as follows:

1. Improvements in existing production systems include changed crop rotation, introduction of green manure, better use of plant species adapted to specific locations, etc.
2. The efficiency of existing resources should be increased through irrigation, the use of technology, and basic and advanced training.
3. Better protection of natural resources
4. Introduction of regenerative branches of business (e.g. horticulture or aquaculture).
5. Introduction of new production element into existing

enterprises

6. Covering the risk by supporting the producer group through land laws etc.
7. Optimizing post-harvest systems like storage etc.
8. Increase in the value of agricultural products through the production of dairy products like curd from milk, butter etc.
9. Ensuring farmers' market access, transportation facilities as well as access to credit and other financial services.
10. Promote participation of previously disadvantaged groups, including women, youth and the disabled, in facets of plant production sector thus ensuring sustainability and food security for all.

## Conclusion

There is a great need for change in agricultural technologies from production-oriented to profit-oriented sustainable farming under the changing agricultural scenario. The pace of adoption of resource conservation technologies by Indian farmers in this direction is satisfactory to a great extent, but in the present scenario, we are only halfway through conservation agriculture. The agricultural conservation systems will lead to sustainable farming and will be the most thrust of future farming. The conditions for the development of sustainable agriculture are becoming more and more favourable. New opportunities in this direction are opening the eyes of farmers, development activists, researchers and policymakers to see the potential and importance of these practices not only for their direct economic interest but also as a basis for further intensification and ecological sustainability. This does not mean that agrochemicals can be abandoned because research plays an important role. Bankers and funders that enable investment in dry land farming should think that there is an incentive and credit for poor farmers and women. As conditions for farming will continue to change, the key to sustainable agriculture is the capacity of farmers and all other actors in agricultural development, as well as the wider society, to learn, experiment, adapt and cooperate in an effective way. Security Agriculture plays an important role in sustainable development and eradication of hunger and poverty. An increase in agricultural productivity can lead to a rapid and permanent reduction in hunger and poverty. Increasing agricultural productivity is one of the most effective ways of tackling hunger and poverty. Strategies for policy development Ensure that agricultural, food security and nutrition objectives are integrated into broader national development policies and plans. Agriculture is the main source of overall economic development and poverty reduction in rural areas. It should develop programs to focus on improving the well-being of rural people and creating employment opportunities. In conclusion, it can be said that in order to improve the productivity, profitability and sustainability of the farming system, small farm management will necessarily go a long way in ensuring all-round sustainability.

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