

# Sustainable Agriculture in Low Income Countries

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**ABSTRACT:** *The paper delineates the significant disparity between conventional farming and sustainable agriculture, emphasizing the latter's pivotal role in ensuring food security and optimizing resource utilization while minimizing environmental impact. Despite legislative reforms, the consistent adoption of sustainable practices in low-income nations remains challenging. To bolster sustainability efforts, additional policies are recommended. These include market reforms to enhance agricultural commerce and pricing dynamics, the elimination of information asymmetries through improved access to market information, ensuring easy access to financing for small-scale farmers, increased investment in agricultural research to drive innovation, and promoting integrated farming and land redistribution to mitigate food insecurity and environmental degradation.*

**KEYWORDS -** *Sustainable Agriculture, Food Security, Environmental Degradation, Resource Utilization, Sustainable Development*

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## I. INTRODUCTION

In recent decades, agricultural output has increased at an astounding rate. Worldwide food production has increased by almost 220% since the 1960s (FAO, 2013). In spite of the fact that throughout the same time period, the global population grew by almost four billion, the gain in per capita income was greater. The food output per capita varies greatly among locations, though. While most areas have seen rising food production per capita, Africa has had slower growth over the past 20 years (FAO, 2015).

Recent food and financial crises have exacerbated the food crisis in African countries (Adesina, 2010). The current state of affairs is a result of both ineffective farming practices and policy. Agriculture on this continent has been suffering due to falling soil fertility, poor chemical fertilizer usage rates, and low labor productivity. This has led to a decline in the amount of money that Africa makes from its export commodities (World Bank, 2007). Also, even with improved yield output, they still can't feed the world's fast expanding population. As a result, food insecurity is a real problem in that region, particularly in Sub-Saharan Africa. The issue of food insecurity is also affecting populations throughout the Pacific and Asia. The inability to obtain food keeps individuals from being food insecure, even when food production meets demand. An estimated sixteen percent of the population in this area was hungry in 2009, according on data from the United Nations ESCAP, which measured nutritional energy requirements. South and South-West Asians suffer from malnutrition. A lot of other nations also have a high percentage of undernourishment, albeit Afghanistan is the worst hit.

Because of globalization and climate change, low-income nations have experienced food insecurity in the last several decades. Flora (2010) found that droughts, soil degradation, and biodiversity decrease are all made worse by climate change in these nations. In order to increase yields, agriculture has been influenced by the capitalist system of production, which involves separating from nature (Heslin, 2015). Consequently, it is now feasible to sustain a growing population, but this progress has not been without its detrimental effects on the environment. Therefore, in order to ensure food security, the international organizations stress the need of sustainable agriculture. In addition to food production, sustainable agriculture considers economic profitability, equality, and environmental health. However, sustainable agriculture is getting more challenging by the day. The primary challenges to sustainable agriculture are land degradation, deforestation, and a decline in both the amount and quality of water.

This paper's primary objective is to examine sustainable agriculture in low-income nations and its potential and constraints. Woelcke (2006), Adesina (2010), and Helsin (2015) formed the basis of the study. In

these publications, we have examined the current state of agriculture in low-income nations, explored the prospects and challenges of sustainable agriculture, and made some observations on sustainable agriculture techniques.

There are several parts to this study. A brief overview of 20th-century farming practices is provided in Section 2. Sustainable agriculture is the subject of section 3. Then, in parts 3, we'll talk about the good trends in agriculture and the dangers to sustainable agriculture in low-income nations. To show the benefits and drawbacks of sustainable agriculture, an empirical study is given. Summarizing the article and its policy implications, the conclusion is reached in the end.

## **II. AGRICULTURE IN THE TWENTIETH CENTURY**

The use of machines to plough fields instead of animals marked the beginning of the agricultural revolution in the early 20th century. In traditional agriculture, farming and animal husbandry used to be inseparable. According to Jordan and Constance (2008), crops were utilized as both human and animal sustenance, with animals supplying both (human food and crop fertilizer). There was a shift from using natural manure to using artificial fertilizers and pesticides after WWII. Genetically modified seeds continued the agricultural revolution by displacing conventional strains. In order to keep up with the demands of a growing population, these revolutions established a food system that was disconnected from nature, which greatly increased production (Alison, 2015). With the success of the revolutions came the alteration and control of the ecology, which allowed for the production of more food. Consequently, there is now an ecological imbalance.

Due to the over use of arable land, modern agriculture has significantly increased emissions of greenhouse gases. The widespread use of monocropping has altered landscapes and tipped biodiversity in one direction or another. Chemical pesticides and fertilizers impair soil fertility and contaminate water sources (Kaur, 2013). As pastures expand, forests are cut down and deserts are formed. Another factor exacerbating the problem is the extensive irrigation that uses subsurface water.

Certain major agricultural firms were able to reap enormous revenues from these technology-intensive systems. Companies like these disempowered farmers, controlled the market, and shaped environmental policy (Alison, 2015). This meant that farmers' quality of life and environmental health were both taken for granted. They were in a precarious position because farmers were disempowered. The global agricultural market's integration has expanded the trade reach of agricultural products. As a result of their inability to compete, small-scale farmers in several nations have abandoned farming for other occupations. Food insecurity ensued because a huge portion of the population grew reliant on the global food market.

## **III. CONCEPT OF SUSTAINABLE AGRICULTURE**

It was in 1987 when the idea of sustainable agriculture was initially proposed (Kaur, 2013). In 1962, a book titled "Silent Spring" was released by author Rachel Carlson. This book helped bring attention to the environmental damage that chemical pesticides do, which in turn sparked a worldwide environmental movement (Alison, 2015). The United Nations report "Our Common Future" from 1987 introduced the idea of sustainability. With the rise of sustainable agriculture as a central tenet of environmental activism, the focus shifted from ending world hunger to ensuring everyone has access to nutritious food, taking into account environmental, economic, and social factors. Sustainable agriculture and traditional farming are not identical, though. These distinctions can be grouped into six groups: reliance/independence, community/competition, dominance/natural harmony, specialization/diversity, and exploitation/restraint. In these respects, the sustainable agriculture approach respects the local community (Alison, 2015).

Each stakeholder group involved in sustainable agriculture has its own unique definition of the term. Sustainable agriculture is defined by the United Nations as a way to produce food that does not jeopardize future food production. Plenty of writers have expanded upon this definition. According to Kaur (2013), reorganizing human and social capital is key to sustainable agriculture. This allows for more efficient use of current resources. In the same vein as Kaur, Pretty defines sustainability as an approach that strives to maximize the utilization of environmental products and services while minimizing harm to these resources (Pretty, 2008). Sustainable agriculture is sometimes defined as the rejection of corporate agriculture. Sustainability on three fronts—environmental, economic, and social—help to characterize this process.

When thinking about sustainable agriculture, it's important to focus on factors that affect ecosystems and the environment. The fundamental idea of sustainable agriculture is the reduction of reliance on non-renewable sources through the adoption of renewable and local energy and agricultural input sources. Reducing reliance on the current system is possible via addressing the elements of closed loop farming, which include crop rotation, the use of organic fertilizers, the combined production of crops and animals, and the gathering of solar and wind power.

Production in sustainable agriculture should shift toward smaller-scale methods that need less cash and technology. Farmers may enhance their self-sufficiency and replace human capital by taking external costs into account through the use of productive knowledge and skills. Pest, irrigation, forest, and credit management issues in agriculture and natural resource management may be effectively addressed through the collective powers of the people (Pretty, 2008).

Sustainable agriculture also takes into account the importance of social and economic fairness in the food chain. It is possible to validate this equity by decentralizing governance and placing value on local communities. The participation of additional farmers and the confirmation of direct sales from farmers are both guaranteed by decentralization in agriculture. In addition to protecting farmers from abuse, buying directly from them lowers prices by eliminating short-term costs.

#### **IV. THREATS TO SUSTAINABLE AGRICULTURE IN LOW INCOME COUNTRIES AND POSITIVE TRENDS**

##### **4.1. Threats to Sustainable Agriculture in Low Income Countries**

Particularly in nations with low per capita income, sustainable agriculture has a number of challenges. People who work in agriculture, especially those who live in rural areas, are impacted by these variables. Farmers are facing challenges in yielding because to environmental deterioration, climate change, and other issues. These threats or challenges can be categorized under (a) environmental factors, (b) structural factors and (c) policy factors.

###### *(a) Environmental factors*

The agriculture sector and its workers are directly affected by environmental conditions. Our declining biodiversity is just one of many pressing environmental issues; others include land degradation, deforestation, water scarcity, and climate change.

Sustainable agriculture has several challenges, one of the most significant being land degradation. A lot of grassland and farmland has already been cut down. The danger it posed made a lot of area vulnerable. By 2050, it is projected to have recovered half of the topsoil from the mid-1990s, resulting in food production twice that of that time (Ruttan, 1999). As a result of land degradation, deserts are spreading throughout numerous nations, China included. In order to improve output, current agricultural practices include considerable cultivation, which degrades the land. Excessive cultivation in environmentally sensitive soil regions, together with inadequate management of the interplay between crops, soil, and water, leads to land degradation. Additional factors contributing to soil degradation include the improper use of mineral fertilizers and an overabundance of cattle (United Nations ESCAP, 2009).

Watersheds are naturally shielded by forests. Additionally, fisheries benefit greatly from it. Many people, particularly those with less financial resources and smaller businesses, rely on forests as a source of food, fiber, and other things. However, as a result of deforestation, it is becoming increasingly difficult to locate these minerals. The annual loss of natural forest cover is over thirteen mega hectares (Hazell & Wood, 2008). The timber industry relies on the harvesting of trees for its raw materials. Another cause of deforestation is the cutting down of trees for their wood instead of using them as fuel. The Asia-Pacific region's mangrove forests are under jeopardy due to the region's focus on lumber extraction and shrimp farming for export, which has taken precedence over the forest's value. Ranching on a grand scale leads to deforestation in Latin America. According to Hazell and Wood (2008), low-income nations lose one-fifth of their total forest cover due to deforestation.

A growing problem for agricultural expansion is water shortage. Crop cultivation uses about half of the world's water (Hazell & Wood, 2008). According to the United Nations ESCAP (2009), rice production accounts for about 70% of total water withdrawals in Asia and the Pacific. The reduced prices in many nations

due to subsidised irrigation system building have enticed farmers to over-pump groundwater and drain water from rivers. Fresh water is wasted as a result of this. Industrial wastes exacerbate the problem by polluting the water supply. The increasing demand for water in many countries' households, businesses, and farms has outpaced the natural system's ability to replenish itself, causing water shortages in many nations. Consequently, conflicts over water pose a threat to societal stability.

The effects of climate change on farming are multifaceted. While some nations reap the benefits of climate change, others feel its negative effects. Achieving food security is jeopardized by this aspect. The release of greenhouse gases is a result of traditional farming methods. On the one hand, clearing land of trees to make way for more farmland and grazing diminishes its ability to absorb carbon dioxide. Conversely, increased emissions of carbon dioxide gas are caused by practices such as tillage, burning, and the excessive use of chemical fertilizers and pesticides. In addition, the production of methane gas is caused by the raising of cattle and paddy rice. The greenhouse effect and shifts in precipitation patterns are both attributed to the greenhouse gasses carbon dioxide and methane. Climate change and unpredictable precipitation are making the weather more unpredictable. The increased frequency of natural disasters including floods, droughts, and storms is having a negative impact on ecosystem health. In nations with low per capita wealth, natural disasters pose a particularly serious threat to environmental health. The majority of low-income nations have very low ratings in environmental health, as stated in the EPI's 2014 study (EPI, 2014). Climate change poses a significant threat to these nations' agro-ecosystems and, by extension, their food security.

There are a number of ways in which traditional farming methods impact biodiversity. Because of how agricultural landscapes are managed, there is less natural biodiversity. The loss of natural biodiversity is accelerated by deforestation and the use of pesticides and other chemicals in food cultivation, which kill out beneficial insects and animals. There is a danger of biodiversity loss even for the conventional crop species. Instead of planting wide kinds of conventional crops, certain novel species are being used to increase yields. Disease and insect outbreaks are possible outcomes of this technique.

*(b) Structural factors*

The main challenges to sustainability in low-income nations stem from the need for economic structural transformation and from the inadequate structure of their agricultural sectors. In order to attain the greater growth rates, this structural adjustment was required by the World Bank and the IMF. Through this modification, the level of government interference with the agriculture sector and the agricultural market is diminished. While farmers have reaped benefits from adjustment policy measures related to cash crop trading, small-holder farmers have seen the detrimental effects of these reforms (Adesina, 2010). The production cost of staple foods has risen due to the removal of input subsidies under the policy reforms. Conditions for the inhabitants have deteriorated because to competition from imported and low-cost commodities, limited access to loans, and the loss of subsidies.

Countries with low per capita income tend to have less developed markets and infrastructure. As a result of underdeveloped infrastructure, transportation expenses are considerable. High transaction costs for farmers to get inputs are a result of a poorly formed market system. Trade within regions is hindered by high tariff and non-tariff barriers. Consequently, the cost of basic necessities is kept low. Opportunities to achieve economies of scale, especially in marketing, might arise through intra-regional commerce. The precipitous drop in the value of food crops is another issue it can help alleviate.

The expansion of agriculture is hindered by insufficient human capacity as well as farmers' inadequate education and training in the field. The outcome is that resources are not utilized efficiently. There is a lack of access to market price information for the farmers as well.

*(c) Policy factors*

Agriculture cannot be sustainable due to ineffective policies and a lack of political will. Less emphasis is being placed on the agricultural sectors in nations with low incomes. Foreign investment is not attracted to agribusiness that has a poor structure. Governments also aren't likely to actively court international investment in the agriculture industry. Inadequate investment in agricultural research is made possible by a tight domestic budget. In particular, African nations have seen a reduction in their proportion of aid going toward agriculture as a result of donors' focus shifting to the social sector (Adesina, 2010).

The production of biofuels is made more affordable by subsidies. It makes land use a competing factor in food production. A threat to food security might result from diverting arable land from food crops to biofuel production, which would lead to food shortages and price increases. In addition, biofuels have the ability to raise carbon dioxide emissions, which is bad for the environment because fossil fuels are being replaced by them.

Ensuring food security is an essential part of farming in a sustainable way. Most nations with low per capita income prioritize increasing output without thinking about their citizens' access to nutritious food. So, even if a nation produces enough food to satisfy demand, its citizens still won't be able to eat it. Many countries adopt genetically modified (GM) crops in order to attain food sufficiency. The lack of proof of increased output, however, has sparked significant objections against the use of GM crops. At the same time, it facilitates the management of agriculture by major businesses, which in turn widens socioeconomic gaps.

The production of food was also impacted by trade rules. In response to the worldwide scarcity of food, some nations have instituted export restrictions, such as quotas or tariffs, on their goods. Conversely, the tariff is lowered by the nations that import. Producers in both nations would suffer as a result.

#### **4.2. Positive Trends**

There are some encouraging tendencies in the agriculture industry right now, despite the difficulties. These shifts help to lessen the blow that the transition to sustainable agriculture takes. There is a clear dedication to agricultural and rural development in the policies that have been implemented to help agricultural producers.

##### *(a) Renewed support by implying good governance*

A big roadblock to sustainable growth is corruption. Corruption may be lessened and democracy can be strengthened via effective government. There is more political will for agricultural growth when effective administration is implemented. For instance, as a result of better governance, funders and policymakers are shifting their focus to agricultural development in African nations (Adesina, 2010).

As efforts to improve agriculture and rural areas intensify, public-private partnerships are taking shape. A change has been made to the subsidy scheme compared to the old system, and its effects are being studied. Many African governments have abandoned the practice of providing subsidies in favor of more modern methods. As a form of smart subsidy, the farmers are receiving vouchers. This subsidy scheme has also been fortified by the backing of the World Bank and AGRA. Consequently, that area has witnessed a surge in agricultural output. Since food price inflation has decreased due to increased output, food security and economic development are guaranteed.

##### *(b) Macroeconomic policy improvement & Debt reduction*

The rates of agricultural growth are being propelled higher by better macroeconomic policies (Binswanger-Mkhize et al., 2009). Both inflation and government spending can be lowered with these better approaches. This prevents the government from taking on further debt as a result of smaller budget deficits. Debt problems in low-income nations, especially in Africa, have improved as a result of sound fiscal and macroeconomic policies and budgetary reforms. By 2007, Africa's overall debt has dropped from \$279 billion in 2000 to \$260 billion (Adesina, 2010). Binswanger-Mkhize et al. (2009) also noted that the region's agricultural sector has recovered thanks to better agricultural policy.

##### *(c) Increase in per capita income growth*

The enhancement of policies also has a role in the rise of per capita income. Some African countries managed to achieve a faster rate of per capita income growth than emerging nations between 1994 and 2004, according to Binswanger-Mkhize et al. (2009). Because the effective demand for food rose as a result of this rapid expansion, food production rose as well. This led to these nations' agricultural sectors experiencing the most rapid expansion (Adesina, 2010).

##### *(d) Improved agricultural & trade policies and reformation of agricultural system*

Conventional agricultural techniques in most low-income nations prioritized increasing food output. Current policy discussions are focusing on sustainable agriculture. Changes and reforms to agricultural policy have been observed in these nations. Some measures of better agricultural policies include lowering taxes on farmers, promoting integrated farming, ensuring the effective use of common properties, and eliminating anti-farm and anti-trade prejudices. According to Adesina (2010), African countries modified their policies by

eliminating anti-farm and anti-trade measures that had exacerbated the situation in the late 1960s and 1970s. Agricultural products were subject to lower tax rates. The use of integrated agricultural practices is on the rise throughout Asia, which helps to lower the probability of output failure. The production of crops and cattle is done in tandem. So, practically all trash ends up becoming a resource. Farmers no longer have to worry about running out of food since grain or seed banks have been set up. People living in poverty in remote regions sometimes lack access to sophisticated storage solutions. People in a given area can rely on this bank type as a mutual assistance system.

*(e) Land distribution and sustainable use of land*

The equitable distribution of land is a key component of sustainable agriculture. The smallholders have reaped the rewards. People in low-income nations, including those without land, have the opportunity to grow their own food. Consequently, there is less food insecurity. Additionally, forest pressure has been reduced. One of the biggest issues in low-income nations is the clearing of forest area to make way for agricultural land. The pace of deforestation is reducing, which adds to a reduction in carbon dioxide emissions, since impoverished people and residents are receiving land. Also, the carbon trading market is worth several billion dollars, thus it's a great chance for low-income nations to get help (Adesina, 2010).

## V. CONCLUSION AND POLICY IMPLICATION

There is a world of difference between conventional farming and sustainable agriculture. Sustainable agriculture confirms food security, makes better use of current resources and technology, and increases food production while considering the environmental impact, in contrast to traditional approaches that prioritize increased food output. Consistently practicing sustainable agriculture in low-income nations is quite challenging. Many nations have shown their commitment to sustainability by legislative reforms and structural improvements in agriculture, but they still have a long way to go before they reach their objective. It would be effective to implement some extra policies in addition to the ones already in place to achieve sustainability.

First, for sustainability, it is strongly advised to complete market reforms. In order to facilitate agricultural commerce, it is critical to establish a conducive business climate and boost marketing efficiency. More than that, it has the potential to alter farmers' pricing relations for the better. The second point is that market information asymmetries must be eliminated. Information asymmetries disproportionately affect smallholders. The imbalances might be effectively reduced by utilizing social networks in addition to radio and television programming. Third, farmers must have easy access to financing. Due to easy access to loans, small-scale farmers in many low-income nations face this challenge. Farmers will be able to alleviate capital constraints with the support of easy access to financing. The operational capability of microfinance institutions should be enhanced as a matter of priority. The fourth point is that the agriculture industry needs further research. In low-income nations, governmental funding for agricultural research is inadequate. Spending in R&D will pave the way for improved technology adoption and the enhancement of current systems. Additionally, farmers' ability to innovate in the field will be enhanced through agricultural training. Finally, it's important to highlight integrated farming and land redistribution. Land redistribution alleviates food insecurity by encouraging self-employment among the poor. Conversely, via integrated farming, farmers are able to enhance food output while utilizing less resources. The danger of deforestation is lessened by these characteristics.

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