

## **SUSTAINABLE DEVELOPMENT IN INDIA – A SPECIAL REFERENCE TO AGRICULTURE**

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**Abstract**—Sustainable Development is achieving development without depleting or exploiting natural resources. It is a principle of fulfilling human need while sustaining the natural system. Sustainable Development is the way in which human needs and living conditions are met without damaging the natural resources. Now, the concept of sustainable development focus on economic development, social development and protection of environment. Sustainable agriculture is a method of cultivation which understands the inter dependence between living organisms and environment. It is “an integrated system of plant and animal production practices having a site-specific application that will last over the long term”. This paper intends to analyze the goals of sustainable development and its relevance to agriculture. Since agriculture plays a predominant role in the economic development of India, it is inevitable to study the significance of sustainable development in agriculture. This study explored that prevalence of poverty, water scarcity and wastage of water, illiteracy and ignorance of farmers, improper land management practices as the major challenges faced in agriculture to achieve sustainable development and these can be overcome through eradication of poverty, research and development in agriculture, application of traditional farming practices using modern scientific knowledge.

**Keywords**—Economic Development, Human Needs, Living Conditions, Social Development, Sustainable Development.

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### **INTRODUCTION**

The concept of Sustainable Development was first framed in the United Nations Conference on Human Development in the year 1972 at Stockholm in which ecology, environment and poverty centered the global attention. A conceptual breakthrough on Sustainable Development gained significance after the release of the book titled “Our Common Future” for the conservation of natural resource and energy, in the year 1987 at the World Conference on Environment and Development held at Rio de Janeiro. The report known as the Brundtland Report, named after the Norway’s former Prime Minister Gro Harlem Brundtland, achieved attention, in the agenda for development of all the nations. Sustainable Development is achieving economic development without depleting or exploiting natural resources. It is a principle of fulfilling human needs while sustaining the natural system. Sustainable development is the way in which human needs and living conditions are met without damaging the natural resources. Now this concept focus on social development and protection of environment. The Brundtland Report defined sustainable development as “Sustainable Development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. The sustainable development goal to “end hunger, achieve food security and improved nutrition and promote sustainable agriculture” (SDG2) provides for the integrity of sustainable agriculture, empowerment of small farmers, gender equality, eradicate rural poverty, promote health etc.

### **GOALS FOR SUSTAINABLE DEVELOPMENT**

The goals for sustainable development are listed in the document titled “The Future We Want” presented in the United Nations Conference on Sustainable Development. The goals are as follows:

- Eradication of poverty
- Zero hunger
- Good health and well being
- Quality education
- Gender equality

- Clean water and sanitation
- Affordable and clean energy
- Decent work and economic growth
- Innovation and infrastructure
- Reduced inequalities
- Sustainable cities and communities
- Responsible consumption and production
- Climate action
- Life below water
- Life on land
- Peace, justice and strong institutions
- Partnerships for achieving the goals.

## **SUSTAINABLE DEVELOPMENT AND AGRICULTURE**

The world of globalization has brought in modern technology which has led to the development of industrial sector but still agriculture plays a dominant role in the process of economic development of India. Development of agriculture forms the integral part of development other sectors to a considerable extent. Agriculture provides food to the people, employment to labours, promotes rural savings and investment, input for agro-based industries, plays major role in export sector and earns foreign exchange. With the increase in population of India, more efforts and innovations are required to meet the rising demand for food and this has enhanced the need for increasing agricultural production, reduce food wastage and loss, and also ensure the availability of food for the entire nation. Thus, the role of agriculture is inevitable for the development of an economy and nature is a significant factor for its growth. Sustainable agriculture is farming without compromising on nature, depleting or exploiting natural resources and also understanding the inter-dependency of living organisms and environment. The Food and Agriculture Organization has defined Sustainable Agriculture as “The management and conservation of resource based the orientation of technological and institutional changes in such manner that ensures attainment and continued satisfaction of human needs of present and future generations. It follows that sustainable agriculture is that path of agricultural development, which is environmentally non-degrading, technologically appropriate, economically viable and socially acceptable” (FAO 1991). Excess use of chemical fertilizers, pesticides, tilling of soil, salinization causes damage to soil and leads to depletion of soil fertility which makes soil/land unusable and reduced productivity.

## **ELEMENTS OF SUSTAINABLE AGRICULTURAL DEVELOPMENT**

- Supply of nutritious food and ensure health of people.
- Reducing wastage of food and achieving food security.
- Develop new cultivation models to help and support small and marginal farmers and women which enhance rural income and lead to rural development.
- Preserving and conserving environment through principles of efficient utilization of resources and reduce the carbon emission that damages environment and human health.
- Long term investment in agricultural resources.

## **METHODOLOGY**

### **Scope of the study**

As agriculture is the primary occupation of India, which provides huge employment opportunities and supplier of necessary products, any deterioration in agriculture will severely affect the development of our nation. The application of chemical fertilizers and pesticides affects the crop, health of the people and also depletes the fertility of the soil, causing damage to the nature. Use of non-renewable resources, organic fertilizers, vermicomposting will protect and conserve land and also increase productivity. Hence, at this juncture, it is inevitable to study about sustainable development in agriculture and analyze natural resources. This study provides an insight on sustainable agricultural development, elements of sustainable development, various challenges faced in sustainable agricultural development.

### **Objectives of the study**

- To explore the challenges of sustainable development in agriculture.
- To suggest long term measure to achieve sustainable development in agriculture.

### **Collection of data**

This is a descriptive analysis and the information are collected from articles published in journals, books, newspapers and related websites.

### **Limitation of the study**

Primary data were not collected for the analysis due to non-availability of time and cost constraint.

### **REVIEW OF LITERATURE**

**Acharya (2006)** study the significance of agriculture on rural livelihoods and identified that majority of population depend on farm and non-farm sector for their livelihood in developing countries. The issues in sustainable agriculture identified by this analysis were need for prioritization of sections of the society, excess use of water on agriculture, consumption pattern of the people, increasing energy needs, migration of rural people. The study concluded that proper water management system, change in the plantation of crops, reduce, reuse and recycling of natural and water resource, nationalization of rivers would lead to sustainable agricultural development and better rural livelihood.

**Ashok Sen Gupta and Devika Sonwani (2012)** had made a comparative analysis about sustainable development in agriculture with the traditional system and modern system adopted for cultivation. Sustainable agricultural development had been studied under three dimensions such as ecological sustainability, economic sustainability and social sustainability. In depth analysis had been made on agricultural productivity, impact of economic reforms on Indian agriculture, identified challenges in Indian agriculture and also suggested measures to achieve sustainable development in agriculture. The study concluded that farming should be profit oriented because new opportunities in agriculture and agriculture related activities had been developed and adoption of these measures would improve agriculture, their livelihood and also ecological sustainability.

The case study done by **Jency Samuel (2015)** in Nagapattanam, a coastal district of Tamil Nadu which was adversely ruined after 2004 Tsunami and the worst was the “*intense period of salt inundation*”. The natural disaster affected the livelihood of 10000 small and marginal farmers. The Tamil Nadu Organic Farmers Movement (TOFarM) adopted this village and took various measures for soil rejuvenation and used age old practice of digging trenches and filling with green fronds of palms, using bio-solutions such as “ghee, milk, cow dung, tender coconut, fish waste, jiggery and buttermilk” for controlling pests. All these organic methods were eco-friendly, cost effective and also yield better results than chemical farming. Thus, the study concluded that sustainable agriculture leads to the development of farm, farmer and also withstand all challenges of the nature.

**Kesavan and Swaminathan (2008)** analyzed the strategies and models of sustainable agriculture in Asian Countries. Agricultural sustainability is increasing its production without affecting the natural resources. The various revolutions in agriculture and related activities had increased the productivity in the past but the adoption of age old methods of cultivation, overuse of water resource led to change in agriculture production and it is difficult to feed the growing population. This paper had identified that adoption of modern ICT knowledge, non-farm eco-friendly enterprises, sustainable management of water and natural resources would enhance agricultural production. Thus, the analysis concluded that application of modern science combined with traditional knowledge, co-operation and co-ordination of farmers, policy makers, and agricultural scientists would pave way for sustainable agriculture, thereby developing agricultural sector without depleting natural resources.

**Krishan and Dwivedi (2015)** examined the significance of sustainable development in agriculture for development of India. The descriptive paper had used secondary data to examine the role of sustainable development in agriculture. The study had identified issues of agriculture – traditional production system, modern agricultural system and sustainable agricultural system and examined sustainable development in agriculture from various dimensions such as ecological sustainability, economic sustainability and social sustainability. The paper concluded that sustainability in agriculture enhanced the agricultural production, employment opportunities, restores soil fertility, efficient water management practices and also protects the environment.

**Liu et al (2010)** investigated the problems of soil degradation in North East China. This paper used secondary data to show the importance of grain production sown acreage in North East China. The problem of soil erosion was investigated based on water erosion, gully density, soil layer, and organic content of soil, water holding capacity, of field and soil micro-organisms. The investigation had identified that strategies for soil and water erosion control, tillage management, terrace and strip cultivation and soil amendments would control erosion and restore productivity in agriculture. The study

concluded that the co-ordination of scientific, social economic and political entities and policy for soil conservation would lead to sustainable development in agriculture.

**Mukesh Chalal (2015)** studied the issues of sustainable development in agriculture in India. Agriculture is the main occupation in India and the productivity in agriculture is also increased due to green revolution, white and yellow revolution and blue revolution. The various economic reforms also had positive impact on Indian agriculture. The major issue in Indian agriculture was lack of modern technology and unscientific method of cultivation. The study concluded that agriculture should be made profit oriented and this would enable the farmers to utilize new opportunities available in cultivation and farming.

**Shivay and Teekam Singh (2017)** had explored sustainable agriculture with reference to cropping pattern and availability of water. “Sustainable agriculture is the way of farming according to the location – specific ecosystem and study of relationships between organisms and their environment”. This paper opined that sustainable agriculture should be “resource conserving, socially supportive, commercially competitive and environmentally sound” and farmers should depend on crop rotation, crop residuals, animal manures, off-farm organic wastes, legumes, green manures, appropriate mechanical cultivation, etc. for sustainable agriculture. The paper concluded that sustainable water management, selection of crop and cropping pattern would enhanced the productivity of crops and lead to sustainable development in agriculture.

### **CHALLENGES FOR SUSTAINABLE DEVELOPMENT IN AGRICULTURE**

- Prevalence of rural poverty.
- Rising internal food demand crisis.
- Water scarcity, pollution of waterways, depletion of fresh water resources, lack of irrigation facilities.
- Land degradation and soil erosion.
- Inappropriate land management practices.
- Loss of soil fertility.
- Inappropriate use of fertilizers.
- Negligence of traditional methods of farming and natural resource management.
- Lack of rural credit.
- Lack of research and development in agriculture and dearth of agricultural scientists.
- Poor human resource in agricultural sector.
- Illiteracy and ignorance of farmers prevent them from gaining knowledge about bio-fertilizers, new varieties of crops, credit etc.
- No adoption of land reform measures particularly co-operative farming.
- Small size of land holdings obstructs farmers from making huge investment in land and utilizing agricultural opportunities.
- Lack of accessibility to farm credit from organized sector and institutional sources. Hence, small and marginal farmers depend on informal source which has huge drawbacks.

### **LONG TERM MEASURES FOR SUSTAINABLE AGRICULTURAL DEVELOPMENT**

- Eradication of poverty will enhance food production and rural income because poverty and hunger are the general scenario of a small and marginal farmer and struggles between family and cultivation expenses which hinders the further development.
- Utilizing the existing agricultural land restoration of degraded and barren lands testing the fertility and healthy of soil and application of sustainable agriculture practices would increase agricultural productivity.
- Management of excess rain water through dams, reservoirs and other water storage facilities will help utilize the dry lands for cultivation. Development of new drought resistant crop varieties will also enable to use dry lands for cultivation.
- The traditional ideas of farmers combined with modern and scientific knowledge of agricultural scientists will enrich and support food production through soil management, pest control, effective use of water and land and also the extensive use of organic fertilizers.
- Crop intensification, integrated use of land and marginal lands.
- Control of population, development of pollution free energy, preservation and conservation of energy, biodiversity, recycling of farm wastes.

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- Awareness on environment at school level and reframing of environment laws. Government and NGOs should combine together and create awareness among the public even at school level. The planners and policy makers should frame objectives and strategies for public awareness and ensure the target has reached the entire nation.
- Adoption of improved technology which uses water efficiently, plantation of crop which requires low water use, nutrient management and agronomic practices.
- Nationalization of rivers would solve the problem of flood and drought and help achieve sustainable agricultural development.
- Optimum utilization of rural human resource through delivering education, proper manpower planning, training on application of traditional knowledge in modern agricultural practices.
- Proper supply of rural credit through banks and financial institutions to ensure the availability of funds to the farmers for investing in agriculture. This also enables them to come out of debt traps.
- Development of Public-Private Partnership to ensure accessibility and availability of land management systems, water and natural resources for organic farming to the poor and marginal farmers.
- More emphasis should be given for the integrated rural development plans such as human resource development and capacity building, financial resources, development of entrepreneurial skill with special reference to women, and investment in infrastructure development.
- Conservation of environment should be included in the academics at all levels of education. All the disciplines should emphasis on environmental studies, discuss the pros and cons and impact of damage caused to environment and also its effect on human life.
- Conservation and management of soil through nutrient management for sustaining soil fertility, on-farm residue management.
- Water resource management through scheduling of irrigation and method of irrigation. This includes when and how to apply water of land, how much water to be applied on land.

### **CONCLUSION**

Agricultural sector should be more profit oriented and this can be achieved by enhancing the role of agricultural scientists and research and development in agriculture. The combination of traditional farm practices with modern technology in the usage of land, application of organic and bio-degradable fertilizers, vermicomposting, land reform measures, and improved irrigation facilities will lead to sustainable development in agriculture. Agriculture depends on nature and is the supplier of necessary commodities and hence it needs to be preserved, conserved and passed on to our next generation.

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