**Sustainable Agriculture and Nutrition in the Context of Sustainable Development Goals**

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**Introduction**

Sustainable agriculture and nutrition are pivotal in achieving the United Nations' Sustainable Development Goals (SDGs). The SDGs, adopted in 2015 are providing a framework for addressing global challenges for the future such as poverty, hunger, inequality and environmental degradation. Among the 17 SDGs, several are directly or indirectly connected to agriculture and nutrition, including Goal 2 -Zero Hunger, Goal 12 -Responsible Consumption and Production and Goal 13 -Climate Action. This chapter explores the intersection of sustainable agriculture and nutrition, emphasizing their role in advancing sustainable development and addressing key challenges in the existing issues.

**The Nexus between Sustainable Agriculture and Nutrition**

Sustainable agriculture focuses on producing food in ways that are environmentally sound (most probably using natural farming and adopting organic cultivation practices), economically viable and socially equitable. Nutrition, on the other hand, ensures that food systems provide sufficient and diverse nutrients to meet the dietary needs of populations considering at the global level advance. The integration of sustainable agriculture and nutrition is crucial to achieving SDG 2, which aims to end hunger, achieve food security and improve nutrition while promoting sustainable agriculture.

**Key Components of Sustainable Agriculture**

* **Soil Health:** Sustainable farming practices, such as crop rotation, agroforestry, biofertlizers and organic farming, enhance soil fertility and reduce dependence on chemical fertilizers meanwhile enhances the life of living organisms under the soil.
* **Water Management:** Efficient irrigation systems and water harvesting techniques minimize water wastage, so that reduces the over dependency on soil moisture conditional stress for the crops growth, further more ensuring availability water for future generations. Many such water management techniques are drip irrigation, sprinkler irrigation, mist spray system in controlled production techniques and hydroponics many more.
* **Biodiversity Conservation:** Preserving genetic diversity in crops and livestock supports ecosystem resilience and food security. In India we have very well established research centres for conservation of genomes is National Bureau of Plant Genetic Resources (NBPGR) New Delhi. It conservers all the genetic resources in plant originated and cultivated in our country in order to avoid future controversy. Despite of all these things many of the research intuitions are also actively involved in conservation, research and innovations in bio resources.
* **Climate-Smart Practices:** Strategies such as reduced tillage, agroforestry, application artificial intelligence and machine learning techniques, use of drones for many agricultural activities, updated accurate weather forecasted information and use of renewable energy mitigate the impact of climate change on agriculture.

**Nutrition-Sensitive Agriculture**

Nutrition-sensitive agriculture aims to align agricultural practices with nutritional outcomes by promoting the production and consumption of diverse, nutrient-rich foods. This approach emphasizes:

* Increasing the availability of fruits, vegetables, legumes and whole grains.
* Reducing reliance on monoculture and staple crops.
* Addressing micronutrient deficiencies through biofortification and education.
* Diversifying food consumption practices among the communities by training them good food practises.

**Challenges to Sustainable Agriculture and Nutrition**

**Climate Change:** Climate change poses significant threats to agricultural productivity and nutritional security. Rising temperatures, erratic rainfall and extreme weather events disrupt food systems, reducing crop yields and quality. Vulnerable populations, particularly in developing countries are disproportionately affected.

**Resource Degradation:** Land degradation, deforestation and water scarcity undermine the sustainability of agricultural practices. Unsustainable farming methods exacerbate these issues, leading to a decline in productivity and biodiversity.

**Inequality and Access:** Inequalities in access to land, resources and markets hinder smallholder farmers, particularly women from adopting sustainable practices. Moreover, economic barriers prevent marginalized populations from accessing nutritious food.

**Policy and Governance:** Weak governance, inadequate policies for agricultural production and marketing technologies, more active role of traders/middlemen while marketing of agricultural produced and lack of investment in sustainable agriculture and nutrition programs limit progress. Effective policies must address land tenure, subsidies and research funding.

**Strategies for Integrating Sustainable Agriculture and Nutrition**

**Policy Frameworks:** Governments and international organizations must establish policies that promote sustainable agriculture and nutrition. Some of the key measures include:

* Subsidizing environmentally friendly farming inputs (Promotion for natural and organic farming practices).
* Investing in research and extension services to disseminate best practices.
* Developing nutrition-sensitive agricultural policies that prioritize diverse and nutrient-rich crops, so that no one suffers from malnutrition.

**Technology and Innovation:** Technological advancements play a crucial role in enhancing sustainability and nutrition. Precision agriculture, digital tools like drones, soil moisture test based irrigation techniques, and biotechnology enable efficient resource use and improved crop yields. For example, drought-resistant crop varieties can mitigate the impact of climate change.

**Community Engagement:** Empowering local communities through education and participation ensures the successful implementation of sustainable practices. Farmer cooperatives, Farmers producer’s organizations (FPOs), Farmer producer companies (FPCs),women’s groups and youth organizations can drive change by fostering collective action and knowledge sharing.

**Public-Private Partnerships:** Collaboration between governments, private sector actors and civil society is essential to scale sustainable agriculture and nutrition initiatives. For example, partnerships can facilitate investment in infrastructure, value chains and market access.

**Education and Awareness:** Raising awareness about the benefits of sustainable agriculture and nutrition is critical. Educational programs and awareness training programmes should target farmers, consumers and policymakers to build capacity and drive behavioural change in the community.

**India’s National Food Security Mission**

India’s National Food Security Mission aims to enhance food security and nutrition through increased agricultural productivity. The program promotes sustainable practices, such as organic farming and integrated pest management, alongside measures to improve dietary diversity.

**Measuring Progress:** Effective monitoring and evaluation are crucial for assessing progress toward sustainable agriculture and nutrition goals. Indicators such as crop diversity, soil health and prevalence of malnutrition provide valuable insights. Data collection and analysis should be inclusive and participatory, involving local communities and stakeholders.

**Conclusion:** Sustainable agriculture and nutrition are fundamental to achieving the SDGs and building resilient food systems. By addressing environmental, economic and social challenges, integrated approaches can ensure food security, improve health outcomes and promote sustainable development. Collaborative efforts among governments, communities, and the private sector are essential to transforming global food systems and achieving a sustainable future.

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