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Climate-Smart Agriculture (CSA)

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Why is in news? Need for climate-smart agriculture in India

The two most important issues facing humanity in the 21st century are **climate change and food insecurity**.

Some of the ongoing effects of climate change, such as heat waves, flash floods, droughts, and cyclones, are negatively influencing lives and livelihoods.

The world's southern continents are reportedly experiencing severe drought due to climate change, which negatively impacts agricultural production and farmers' livelihoods. Both population expansion and dietary changes are contributing to an increase in the demand for food.

The **effects of the environment on farm output** only add to the difficulty. As a result of climate change, traditional farming practices are becoming less productive. Climate change is increasing the dangers faced by farmers, prompting them to re-evaluate their practices.

Farmers are taking a variety of adaptation measures to reduce the negative effects of climate change.

The need for a holistic strategy is driven by climate change's dual challenges of adaptation and mitigation, and the pressing need for agricultural production to rise by 60% by 2050 in order to fulfill food demand.

As a viable option, **climate-smart agriculture** (CSA) provides a **holistic framework**.

About CSA:

The **Food and Agriculture Organization** said in 2019: "Climate-smart agriculture is an approach for transforming food and agriculture systems to support sustainable development and safeguard food security under climate change.

According to the **World bank**: "Climate-smart agriculture (CSA) is an integrated approach to managing landscapes – cropland, livestock, forests and fisheries – that address the interlinked challenges of food security and climate change".

Climate Smart Agriculture also known as **Climate Resilient Agriculture**. It is the development of agriculture under new realities of climate change.

Objectives:

CSA comprises **three pillars or objectives**:

sustainably increase agricultural productivity and incomes;

adapt and build resilience to climate change; and

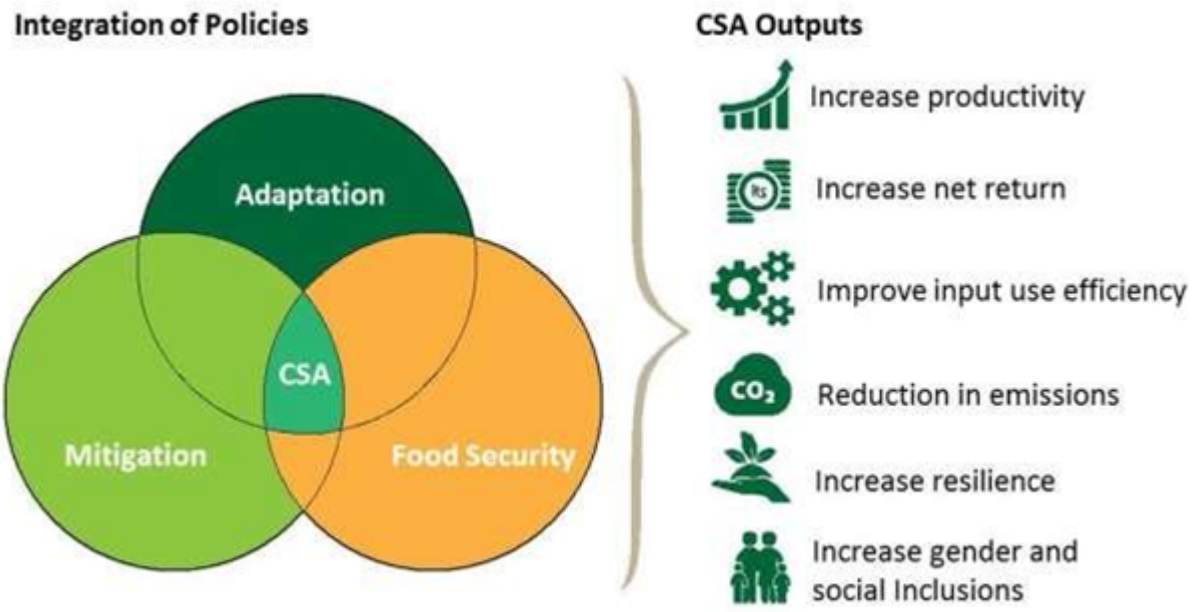
reduce/remove GHG (greenhouse gases) emissions, where possible.

Dimensions of climate-smart practices include water-smart, weather-smart, energy-smart, and carbon-smart practices. They improve productivity, deal with land degradation, and improve soil health.

CSA promotes **crop diversification, increases water efficiency, and integrates drought-resistant crop types**, all of which help lessen the disruptive effects of climate change.

The importance of CSA lies in its ability to increase agricultural output while maintaining ecological stability.

This correlation is not only a desired consequence but rather essential for long-term food security and sustainable resource usage in a warming planet.



Climate Smart Agricultural Practices:

Crop Management: Practices include intercropping, crop rotations with legumes, using drought, wind, and flood-tolerant crop varieties, composting, mulching, and adopting organic fertilizers.

Livestock Management: Improved feeding strategies, rotational grazing, using suitable crops to feed animals, and better livestock health and husbandry.

Soil and Water Management: Conservation agriculture, contour planting, check dams, water storage, improved irrigation, and efficient water use.

Agroforestry: Planting trees as windbreaks, using nitrogen-fixing trees, and incorporating fruit orchards.

Integrated Food Energy Systems: Implementing biogas, improved stoves, solar power, and gravity-fed irrigation.

Benefits of Climate Smart Agriculture:

Climate-smart agriculture practices build resilience in farming systems, enabling farmers to cope with the impacts of climate change, such as droughts, floods, and extreme temperatures.

Efficient use of resources and adoption of climate-resilient crop varieties can lead to higher crop yields, **contributing to improved livelihoods** for farmers and increased income.

Climate-smart practices **focus on sustainable management** of natural resources, including water, soil, and biodiversity. This leads to reduced environmental degradation and conservation of ecosystem services.

By optimizing resource use and enhancing agricultural productivity, climate-smart agriculture **contributes to improved food security**, ensuring a stable supply of food even under changing climatic conditions.

Certain climate-smart agricultural practices, such as agroforestry and reduced tillage, can contribute to **reducing greenhouse gas emissions** from the agricultural sector, supporting climate change mitigation efforts.

Climate-smart agriculture promotes inclusivity and gender equity by empowering women farmers and vulnerable communities. It also enhances rural livelihoods by **creating new income-generating opportunities** and promoting sustainable rural development.

Climate-smart agriculture **drives innovation and the adoption of advanced technologies** in farming, facilitating increased efficiency and productivity.

Government Initiatives:

The **United Nations' Sustainable Development Goals** aim to end hunger and enhance environmental management; CSA's foundation is in achieving these goals through sustainable agriculture and rural development.

National Innovation on Climate Resilient Agriculture (NICRA):

Launched in 2011 by the Indian Council of Agricultural Research (ICAR).

Aims: To increase the resilience of Indian agriculture, including crops, animals, and fisheries, to climate variability and change.

National Action Plan on Climate Change (NAPCC):

It launched in 2008 to mitigate and adapt to the adverse impact of climate change.

It includes various "National Missions" focusing on climate change awareness, adaptation and mitigation, energy efficiency, and natural resource conservation.

National Mission on Sustainable Agriculture (NMSA):

It is one of the eight Missions under the NAPCC seeks to address issues regarding 'Sustainable Agriculture' in the context of risks associated with climate change by devising appropriate adaptation and mitigation measures.

National Adaptation Fund for Climate Change (NAFCC):

It was established in 2015 to meet the cost of adaptation to climate change for the State and Union Territories of India that are particularly vulnerable to the adverse effects of climate change.

Climate-Smart Villages (CSV):

CSV is an institutional strategy to implement and promote CSA at the local level, enhancing farmers' ability to adapt to climate change.

CSVs undertake a portfolio of actions to address climate challenges, covering various farm activities.

Neem Coated Urea:

This is a type of urea fertiliser that has been coated with neem-derived material.

It serves as a gradual releaser of nitrogen, reducing insect and disease infestation and ultimately lowering the need for chemicals in farming by increasing crop production.

Pradhan Mantri Krishi Sinchayee Yojna (PMSKY):

Launched to prioritize water conservation and management in agriculture, PMSKY aims to expand irrigated areas.

It focuses on “More crop per drop” by offering end-to-end water solutions, from source generation to delivery networks.

Zero Budget Natural Farming (ZBNF) and Organic Agriculture:

The government has made a concerted effort to promote ZBNF and other types of organic farming throughout India.

Challenges in climate smart agriculture:

The agricultural sector also **produces a large amount of GHGs**. The sector’s share in GHG’s emissions in 2018 was 17%. Therefore, CSA implementation is crucial for lowering GHG emissions and protecting biodiversity.

Many farmers, particularly small-scale and resource-poor farmers, **lack access to current information**, **technical skills, and climate-smart practises training**.

The adoption and application of CSA approaches are hampered by a **lack of awareness and comprehension**.

Many farmers, particularly those in poor countries, **suffer financial constraints** and **find it difficult to obtain finance and funding** to implement climate-smart practices.

Inadequate policy frameworks and weak institutional support might stymie climate-smart agriculture uptake.

Lack of cooperation among government agencies, insufficient enforcement of regulations, and ambiguous land tenure systems can all stymie the expansion of CSA practices.

Climate change projections and regional climatic variability might be uncertain. Farmers require **accurate and reliable climatic information** to make informed decisions and modify their agricultural practices.

Farmers may **face difficulties in obtaining critical resources** such as land, water, seeds, and fertilisers.

Climate change has the potential to **worsen resource scarcity**, making it more difficult for farmers to apply climate-smart practices that necessitate appropriate access to these resources.

Conclusion:

CSA has the potential to assure food security, empower farmers, and protect our delicate ecosystems by merging innovation, resilience, and sustainability.

In the face of a changing climate, the path of CSA stands out as a source of inspiration and transformation for a world working to ensure a sustainable future.