



## Understanding Climate Smart Agriculture to meet the Challenges of Climate Change and National Food Security

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### ABSTRACT

Climate change is affecting the nations of the world in unprecedented ways and jeopardizing the livelihood security, food security of the people of the world. Since weather and climate are all pervasive and knew no national boundaries and affecting people in all possible ways through hydro-meteorological disasters of floods, droughts, hot winds, cold winds, lightning, hail storms and resulting in heavy destruction of crops, plantations and livelihoods. Global actions are called for and many international organisations including FAO and World Bank and many other organisations are taking initiatives and actions to understand the challenges of climate change and devised new ways of farming, - climate smart agriculture. Nations need to understand what constitutes climate smart agriculture for their survival and sustainable development.

### Introduction:

Primarily agriculture has always been considered as gambling with Nature, as witnessed by Indian farmers. Every sowing season, farmers wait for onset of rains and usually get worried with delays in onset or frequent dry spells during crop season. With adverse changes in the way the climate is behaving recently, farmers need to re-invent new ways of handling the vagaries of monsoons and develop new smarter ways of farming that evade, mitigate and adjust to changing climate. Agricultural scientists and environment specialists are now searching for better ways to cope with changing climate. FAO too has recognized the need for climate

smart agriculture.

### Understanding the Challenges of Climate Change and Food Security

Climate change has been found to adversely affect agriculture. Agriculture is also found to be contributing to climate change, especially in emissions of greenhouse gases. In the process, agriculture and agro-ecosystems are subjected to such grave issues as dwindling stability in crop yields, unsustainable development and thereby jeopardising the food security and livelihood security of rural people relying on agriculture as their sole livelihood.

FAO estimates that food production must increase by at least 60 percent to respond to the demand of the 9 billion people that are

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expected to inhabit the planet by 2050. Given that one in eight people are currently food insecure, ensuring global food security over the next decades will be essential. In meeting this challenge, there is an opportunity to create sustainable economic growth in rural areas of developing countries where food security and poverty are most prevalent.

According to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), rising temperatures and increased frequency of extreme events will have direct and negative impacts on crops, livestock, forestry, fisheries and aquaculture productivity. Climate change is a universal and critical challenge for global food security. Improving the way, we manage agricultural systems and natural resources is fundamental for effectively achieving food security. We can no longer afford to separate the future of food security from that of natural resources, the environment and climate change – they are inextricably intertwined and our response must be as well.

Efforts to reduce food insecurity must include building the resilience of rural communities to shocks and strengthening their adaptive capacity to cope with increased variability and slow onset changes. The agricultural sectors (crops, livestock, forestry, fisheries) must therefore transform themselves in order to feed a growing global population

and provide the basis for economic growth and poverty reduction. This transformation must be accomplished without hindering the natural resource base.

More productive and resilient agriculture requires a major shift in the way land, water, soil nutrients and genetic resources are managed to ensure that these resources are used more efficiently and sustainably. Making this shift requires considerable changes in national and local governance, legislation, policies and financial mechanisms. This transformation will also involve improving producers' access to markets.

Hence farming systems need to be sustainable to provide for adequate food security to rural people. So, food security calls for such sustainable agriculture systems that

- Ensuring high productivity
- Enhancing Resource use efficiency (RUE)
- Ensuring stability in production and less variability in outputs
- Enhancing Resiliency to risks, shocks and long-term climate variability

To combat the climate change, several agencies have evolved mechanisms to help farmers to become more smart to adjust to changes in climate and to sustain the agro-

ecosystems. Climate-smart agriculture is one such initiative by FAO at the global level.

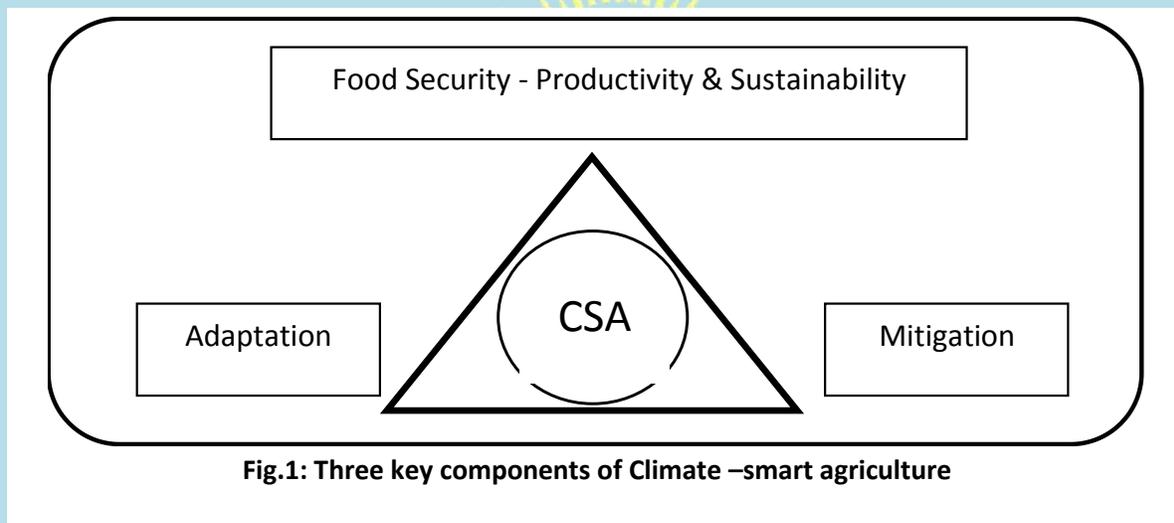
### Climate-Smart Agriculture

Climate-smart agriculture (CSA) embodies the ambition to improve integration of climate change responsiveness into agriculture development planning. CSA is defined as “agriculture that sustainably increases productivity, enhances resilience (adaptation), reduces/removes GHGs (mitigation), and enhances achievement of national food security and development goals” (FAO, 2010).

sustainable agricultural development for food security under climate change. It contributes to the achievement of national food security and development goals with three objectives:

1. Sustainably increase agricultural productivity and incomes
2. Adapt and build resilience to climate change
3. Reduce or remove greenhouse gases wherever possible

The magnitude, immediacy and broad scope of the effects of climate change on agricultural systems create a compelling need



**Fig.1: Three key components of Climate –smart agriculture**

FAO has recognized that for agriculture to feed the world in a way that can ensure sustainable rural development, it must become ‘climate-smart’. Climate-smart agriculture (CSA), as defined and presented by FAO at The Hague Conference on Agriculture, Food Security and Climate Change in 2010 is an approach to developing the technical, policy and investment conditions to achieve

to ensure their comprehensive integration into national agricultural planning, investments and programs. The climate-smart agriculture approach is designed to identify and operationalize sustainable agricultural development explicitly integrating climate change as a major parameter.

For climate-smart agriculture to become a reality an integrated approach

responsive to specific local conditions are required. Integrated landscape approaches and coordination across agricultural sectors is essential to capitalize on potential synergies, reduce trade-offs and optimize the use of natural resources and ecosystem services.

### Main features of climate-smart agriculture (CSA)

- Addresses adaptation and builds resilience to shocks
- Considers climate change mitigation as a potential co-benefit
- CSA is a locale-specific and knowledge intensive approach
- Identifies integrated options that create synergies and reduce trade-offs
- Identifies barriers to adoption and provides appropriate solutions
- Strengthens livelihoods by improving access to services, knowledge and resources
- Integrates climate financing with traditional sources of agricultural investment

Climate-smart agriculture (CSA) may be defined as an approach for transforming and reorienting agricultural development under the new realities of climate change. The most commonly used definition is provided by the Food and Agricultural Organisation of the United Nations (FAO), which defines CSA as

*'agriculture that sustainably increases productivity, enhances resilience (adaptation), reduces/removes GHGs (mitigation) where possible, and enhances achievement of national food security and development goals'.*

In this definition, the principal goal of CSA is identified as food security and development; while productivity, adaptation, and mitigation are identified as the three interlinked pillars necessary for achieving this goal.

### The three pillars of Climate-smart agriculture (CSA)

**Productivity:** CSA aims to sustainably increase agricultural productivity and incomes from crops, livestock and fish, without having a negative impact on the environment. This, in turn, will raise food and nutritional security. A key concept related to raising productivity is sustainable intensification

**Adaptation:** CSA aims to reduce the exposure of farmers to short-term risks, while also strengthening their resilience by building their capacity to adapt and prosper in the face of shocks and longer-term stresses. Particular attention is given to protecting the ecosystem services which ecosystems provide to farmers and others. These services are essential for maintaining productivity and our ability to adapt to climate changes.

**Mitigation:** Wherever and whenever possible, CSA should help to reduce and/or

remove greenhouse gas (GHG) emissions. This implies that we reduce emissions for each calorie or kilo of food, fibre and fuel that we produce. That we avoid deforestation from agriculture. And that we manage soils and trees in ways that maximizes their potential to acts as carbon sinks and absorb CO<sub>2</sub> from the atmosphere.

### **Key characteristics of Climate-smart agriculture (CSA)**

- CSA addresses climate change: Contrary to conventional agricultural development, CSA systematically integrates climate change into the planning and development of sustainable agricultural systems (Lipper et al. 2014).
- CSA integrates multiple goals and manages trade-offs: Ideally, CSA produces triple-win outcomes: increased productivity, enhanced resilience and reduced emissions. But often it is not possible to achieve all three. Frequently, when it comes time to implement CSA, trade-offs must be made. This requires us to identify synergies and weigh the costs and benefits of different options based on stakeholder objectives identified through participatory approaches
- CSA maintains ecosystems services: Ecosystems provide farmers with essential services, including clean air, water, food and materials. It is imperative that CSA interventions do not contribute to their degradation. Thus, CSA adopts a landscape approach that builds upon the principles of sustainable agriculture but goes beyond the narrow sectoral approaches that result in uncoordinated and competing land uses, to integrated planning and management (FAO 2012b; FAO 2013a).
- CSA has multiple entry points at different levels: CSA should not be perceived as a set of practices and technologies. It has multiple entry points, ranging from the development of technologies and practices to the elaboration of climate change models and scenarios, information technologies, insurance schemes, value chains and the strengthening of institutional and political enabling environments. As such, it goes beyond single technologies at the farm level and includes the integration of multiple interventions at the food system, landscape, value chain or policy level.

- CSA is context specific: What is climate-smart in one-place may not be climate-smart in another, and no interventions are climate-smart everywhere or every time. Interventions must take into account how different elements interact at the landscape level, within or among ecosystems and as a part of different institutional arrangements and political realities. The fact that CSA often strives to reach multiple objectives at the system level makes it particularly difficult to transfer experiences from one context to another.
- CSA engages women and marginalised groups: To achieve food security goals and enhance resilience, CSA approaches must involve the poorest and most vulnerable groups. These groups often live on marginal lands which are most vulnerable to climate events like drought and floods. They are, thus, most likely to be affected by climate change. Gender is another central aspect of CSA. Women typically have less access and legal right to the land which they farm, or to other productive and economic resources which could help build their adaptive capacity to cope with

events like droughts and floods. CSA strives to involve all local, regional and national stakeholders in decision-making. Only by doing so, is it possible to identify the most appropriate interventions and form the partnerships and alliances needed to enable sustainable development.

### Some more views on CSA

Climate-smart agriculture (CSA) is an approach that helps to guide actions needed to transform and reorient agricultural systems to effectively support development and ensure food security in a changing climate.

Climate Smart Agriculture (CSA) is defined as agricultural practices that sustainably increase productivity and system resilience while reducing greenhouse gas emissions<sup>1</sup>. ... Our perspective on CSA is sustainable agriculture, based upon integrated management of water, land and ecosystems at landscape scale.

Climate-smart agriculture (CSA) is an approach that helps to guide actions needed to transform and reorient agricultural systems to effectively support development and ensure food security in a changing climate. CSA aims to tackle three main objectives: sustainably increasing agricultural productivity and incomes; adapting and building resilience to climate change; and reducing and/or

removing greenhouse gas emissions, where possible.

CSA is an approach for developing agricultural strategies to secure sustainable food security under climate change. CSA provides the means to help stakeholders from local to national and international levels identify agricultural strategies suitable to their local conditions. CSA is one of the 11 Corporate Areas for Resource Mobilization under the FAO's Strategic Objectives. It is in line with FAO's vision for Sustainable Food and Agriculture and supports FAO's goal to make agriculture, forestry and fisheries more productive and more sustainable".

## CONCLUSION

Finding new ways of coping with adversaries of climate change assumes great importance in current scenario of ever changing climate and its adverse effects on livelihoods of people worldwide. Since severe changes are resulting in hydro-meteorological disasters and affecting the whole world, major UN organizations including FAO and World Bank are developing frameworks for action and strategies to combat climate change and agri-food systems. Taking cognizance of the weather parameters and monitoring the regularly and developing appropriate contingency plans is imperative today. Appropriate alternative solutions need to be developed to make countries and people of the

world able to meet the challenges of climate change and the concerns of national food security.

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