

## **Agro-ecosystem based sustainability indicators for climate resilient agriculture in India**

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### **Abstract**

The threats posed by climate change are well documented across sectors. The best way to deal with climate risks is to build resilience and resilience. Since the world called for sustainable development indicators at the 1992 Rio Summit, many studies have been carried out worldwide on sustainable development, quality and weather resistance. Agriculture is a system that depends on the strength of communities and ecosystems, which is vulnerable to the effects of climate change. The aim of this article is to incorporate climate change into the assessment of agricultural sustainability through various measures and to highlight local conditions that represent the uniqueness of agricultural ecosystems. The paper also aims to identify indicators of climate resilient agriculture in the Indian subcontinent and develop a strategy to assess the spatial resilience of various agroecosystems for appropriate legal assistance. In the research, 1209 indicators used in various studies were evaluated, grouped according to similarity and purpose, and classified as social, economic, ecological, etc. classified according to various dimensions.

### **Introduction**

Climate change is uncertain and has been reported since the 1950s (IPCC, 2013). Climate change has direct and indirect impacts on agriculture, including changes in rainfall patterns, droughts, floods, and geographical redistribution of insects and diseases (IPCC, 2013). Climate change is disrupting food production processes, affecting the livelihoods and food security of millions of people around the world. Poor people in developing economies will be more affected by climate change than those in rich countries (IPCC, 2007a, IPCC, 2007b). In addition to serious threats, these countries lack the resources needed to prepare for and respond to environmental risks. In addition, agriculture is often affected by climate change due to high dependence on weather conditions, and farmers become like the urban poor.

There is evidence that wheat and rice production has been adversely affected in some parts of India due to high temperatures, water scarcity and fewer rainy days. According to mediumterm (2020-2039) climate change, crop production is estimated to decrease from 4.5% to 9%, depending on the extent and distribution of warming (NICRA, 2013). Given the impact of climate change, increasing and supporting agriculture is critical to ensuring India's food and climate security for future generations.

## **Objective**

- The goal of the research is to determine whether employing climate resilient farming practices can reduce hunger and poverty.
- Investigating water and nutrient management for efficient use of resources and increased productivity.
- Analyzing how climate change affects agricultural productivity.

- **Assumption**

Climate change will reduce farmers' incomes, and now is the time for more aggressive demonstrations and action. Adjust equipment to reduce necessary conditions such as weather stress. Conservation agriculture produces organic carbon in the soil and creates a suitable environment for crop growing and fertilizer management.

## **Research methodology**

This study was conducted on the impact of climate change on agriculture. The second way is to collect information on everything related to climate change in agriculture. Some information has been collected from the Government of India or Ministry of Agriculture website.

## **Climate change effect on agriculture**

### **Deterioration of the Soil**

Changes in temperature and precipitation can affect soil health and fertility, leading to soil erosion, degradation and nutrient depletion. Poor soil health reduces crop yields and increases the risk of crop failure.

### **Difficulties**

### **with**

### **adaptation**

Farmers may face challenges around climate change, including the increasing costs

of using new technologies or practices to reduce climate risks. Small farmers, in particular, may not have the resources and support they need to adapt effectively.

### **Food safety:**

Climate change affects global food security by reducing crop yields, increasing food prices, and increasing hunger and malnutrition, especially in poor regions with limited resources and infrastructure.

### **Climate change effect on product.**

#### **Turmeric:**

The first attempt, to our knowledge, was in Tamil Nadu, India, where members of the Thimble SRI Farmers Association in the Salem district began developing an SCI method for growing turmeric in 2009. This method is described in a book written by. Founder of the organization. And the president. The method used is similar to the method used with sugar cane. Rather than growing all or part of the rhizome in the field, turmeric plants are grown from seedlings in the nursery, starting from small cuttings of the rhizome. They are grown in containers filled with plant material and vermicompost and some biofertilizer added.

#### **Coriander:**

When this SCI-controlled spice was first tested in Gujarat, the results were very significant, though not as good as cumin. Coriander seeds are sown in rows  $\geq 50$  cm apart without scattering. As some of the plants growing on the row are removed throughout the season, the distance between the plants gradually increases, allowing the remaining plants to grow further. Selling the green leaves obtained from the thinning operation at an affordable price in the local market increases the farmer's income.

- **Fruit crops:**

This is not the first time SRI methods can be extended from annual crops to perennials. However, farmers in the United States and India have attempted to popularize SCI standards for cultivation. According to traditional soil tests, fruit yield is greatly affected by the quality of the soil and factors such as the time and place of fertilization, planting and pruning. His colleagues found that the integration of

work in the garden with key stages of tree growth had a good analogy with SCI theory and practice.

### **Conclusions:**

Climate change will affect water supply and water management by affecting the availability and distribution of water. Climate change can cause changes in temperature, rainfall patterns and weather patterns, all of which can negatively impact crops. In summary, although climate change poses serious challenges to agriculture, rapid changes and policy interventions can help mitigate these impacts and secure the strength of agriculture. This can create additional problems for farmers in pest control and crop protection.

### **References:**

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