BILL & MELINDA GATES *foundation*

Title: **Crop-based Agriculture Systems and Climate Adaptive Solutions**

Date: 23rd February 2023 | Time: 11:30 AM – 1:00 PM (IST)

Venue: Silver Oak Hall II, India Habitat Centre

Star Partner: Bill and Melinda Gates Foundation

Crop-based agriculture systems account for about 80% of the dietary energy supply, and crops are a significant source of food and income for about 600 million farms in the world (IPCC, 2022)[i]. Climate change poses a serious challenge to the agriculture systems not only given its implications for food security and livelihoods but also given the current agrarian distress characterized by declining growth rates in yield, depleting soil fertility and receding ground water resources, rising cultivation costs and inflation. A study published in Nature Climate Change in 2021 finds that the global average increases in farm productivity over the past 60 years have been 20 per cent lower than they would have been without climate change. IPCC finds that the overall direction of climate change impacts on crop-based systems is negative with high confidence for general impacts, temperature, precipitation and phenology & seasons.

Table: Overall direction of climate impacts in crop-based systems

Climate impacts	Direction
Climate change (general)	−
Temperature (including heat stress)	−
Precipitation (including drought, flood)	−
Phenology & seasons	−
Carbon dioxide	+
Pests & diseases	−
Ecosystem services	−

Average direction of impact

Positive Negative

Average confidence in attribution

Medium High

Source: based on IPCC (2022), Chapter 5, WG-II Report

Considering the impacts of climate change and the limited natural resources, such as water and land, climate adaptation strategies could aim to meet food security needs while ensuring ecosystem integrity. The overall efficiency, resilience and adaptive capacity of the production systems can be enhanced through the management of natural resources (e.g. land, water, soil nutrients, and genetic resources) and ensuring that institutions and incentives are in place to achieve climate-smart transitions. The present Ukraine and Russia conflict has also exposed systemic vulnerabilities that threaten food security.

Approach to climate adaptation in crop-based agriculture systems, primarily focusing on, *infrastructure and technology* (water-efficient irrigation systems); *sustainable intensification* (increase agricultural productivity considering the changing climate and unpredictability of natural resources soil management); *nature-based solutions* (range of farming practices to maximize the ability of nature to provide ecosystem services); and, adaptation channels initiated either at the levels of *society, economy, or institutions*, to secure foodgrain for all by coping with climate change remain largely underutilized in mainstream agriculture.

In the realm of climate change adaptation in agriculture in the Global South there is a pressing need to address issues related to data information in a form and at scales that supports adaptation decision making, access to finance, identifying and tailoring innovation to local realities, devising policy instruments and governance measures involving social, political, and administrative actors, and capacity building and human resources development at all levels.

Objectives of the thematic track

The objective of this thematic track will be to deliberate on solutions-based approach to address climate adaptation challenges in the agriculture sector. The track will also see a framing presentation on policy instruments and stakeholder mapping to guide national actions pertaining to climate adaptation in agriculture sector. Experts from the Global South will share their perspectives on challenges and opportunities on the topic. Some of the potential solution areas could include:

- Water management: Deficit irrigation techniques are frequently mentioned as adaptation options and can minimise the burden on off-farm water supplies.
- Nutrient management: Increasing nutrient use efficiency will contribute to improved biophysical site properties and thus climate change adaptation.
- Climate-resilient crop Varieties: Adoption of climate-resilient crop varieties, such as drought tolerant crop varieties, disease resistant crop varieties, early maturing crop varieties.
- Crop diversification: Crop diversification, alongside crop management and varietal improvement could contribute to food security and enhancing farmer's income.
- Agroecology: Agroecology is a broad concept based on complex system thinking needed and fosters comprehensive adaptation responses that evolve over time. Farm practices evolve to suit aspects of ecosystem services such as pollination, soil organic

carbon, pest and weed control, soil microbial activity, crop yield stability, water quality and biodiversity.

- Climate services: Climate services refer to the collection, analysis, interpretation, and dissemination of information related to climate, including data on temperature, rainfall, humidity, wind and other factors. Interpretation along with other non-climate data, it allows users to assess and project current and future climate risks.
- Finance: Agriculture being one of the climate-sensitive sectors, financial instruments such as climate finance support and risk management instruments such as crop insurance becomes important.

Guiding Questions

Questions that will guide the discussions include:

[1] What are the challenges when it comes to data availability and research pertaining to climate adaptation in crop-based agriculture systems in the Global South?

[2] What climate adaptation policy instruments exist in crop-based agriculture systems in the categories of: (a) infrastructure and technological; (b) sustainable intensification; (c) nature-based adaptation; (d) and social, economic, and institutional.

[3] Who are the key stakeholders involved in adaptation decision-making?

[4] What are the opportunities or/and good practices at the macro-level that promote climate adaptation in agriculture at the implementation level?

About the World Sustainable Development Summit (WSDS)

The World Sustainable Development Summit (WSDS) is the annual flagship Track II initiative organized by The Energy and Resources Institute (TERI). Instituted in 2001, the Summit series has a legacy of over two decades for making 'sustainable development' a globally shared goal. The only independently convened international Summit on sustainable development and environment, based in the Global South, WSDS strives to provide long-term solutions for the benefit of global communities by assembling the world's most enlightened leaders and thinkers on a single platform. The 22nd edition of the annual flagship event is being held from 22-24 February 2023 in New Delhi. The Summit deliberations will focus on the umbrella theme: Mainstreaming Sustainable Development and Climate Resilience for Collective Action.

[i] IPCC. (2022). *Climate Change 2022: Impacts, Adaptation and Vulnerability.* Cambridge, UK and New York, NY, USA: Cambridge University Press. doi:10.1017/9781009325844