

# Climate Change and Food Security: Bridging the Interaction Gaps for Future Integrity

Suzan M. Shahin<sup>1</sup>, Rahaf M. Ajaj<sup>2</sup>, Mohammed A. Salem<sup>3</sup>

<sup>1, 2 & 3</sup> Aridland Agriculture Department, College of Food and Agriculture,  
United Arab Emirates University (UAEU), Al Ain, United Arab Emirates (UAE)



جامعة الإمارات العربية المتحدة  
United Arab Emirates University

UAEU College of Food and Agriculture

## Abstract

Climate change and global warming has become a real threat to the global food security, through affecting the agricultural capability and productivity. Whereas the projected global population is expected to continue in an increasing trend, the world will be facing a food and hunger crisis. Food-insecure populations will be enlarged, especially in low-income countries. The extent and diversity of the climate change, made the regional long-term strategies for climate change adaptation, mitigation and impact assessment an impossible tasks in the absence of the cross regional collaboration and the international strategic planning. Consequently, there is a crucial necessity for bridging the interaction gaps between farmers, households, scientists and decision makers, among major hot spots; including climate information services, seasonal forecasting, farming practices, tolerance of emerging pests and diseases, agricultural intensification, enabling action policies and integrated research projects. Bridging such gaps is urgently needed; in order to guarantee the future global sustainability and integrity.

## Introduction

Currently, one of the worst environmental issues is knocking the global forum. While the current world is suffering from the consequences of climate change and global warming, the world population is continuously increasing in a sharp growing trend [1], which is projected to jump from around 7.2 billion to reach over 9 billion by 2050, based on medium growth scenarios [2]. Leading to raise many critical questions on the discussion panels, about the continuity of the earth resources to secure and sustain the future of the food production system to such large scale ever known. According to FAO projects, the global demand for cereals will grow up to 70% by 2050, and even will be doubled in many low income countries [3]. As well as, demand for food will sharply increase for high income countries, which have high per capita consumption rates among communities [4]. Agricultural systems are very sensitive to climate modification [5]. Even a slightly increase in the average mean temperature from 2°C to 3°C could adversely impact the agricultural efficiency and productivity [4], and thus raising the risks of hunger. Recent estimates declare that, climate change was responsible in increasing the number of the hungry people, mostly from countries in South Asia and sub-Saharan Africa, from under 800 million in 1996 to be over billion [6]. Consequently, at ground level, the farmers are facing hard times in enhancing the quality and magnifying the quantity of their production, adding severe pressure on the environmental resources (e.g. water, land, labor, energy). At the same time, the scientists are struggling with their research groups, in order to provide the decision makers and the whole humanity with the best possible options, that mitigate and adapt the consequences of climate change and global warming in the era of the population explosion.

## Objectives

There are two main objectives for this work, which are to:

- Highlight the main interaction gaps in the expanded global food production system
- Provide keys and options to overcome such gaps in the era of climate change and global warming.

The same is crucially required to further enhance the understanding of the current situation, through providing an integrated overview for the main food production system components, functions, interaction gaps and an integrated overview to fill such gaps. As well as, to illustrate the quick necessity for upgrading the national strategic planning up to international level; in order to secure an integrated and sustainable food production system for the next generations.

## What are the Main Components?

In summary, the agricultural food production system consists from four main components or sectors; including farmers (who are the producers in the food production system, and generally belonging to the low income category of the community), researchers and scientists (responsible for conducting relevant researches and projects; seeking for providing adequate solutions to the emerging problems in the research field), decision makers (taking the responsibilities at the managerial level, and enforcing policies and action plans), households (are the general members of the community, who act as consumers and end users in the food production system).

## What are the Interaction Gaps?

While, the consequences of climate change became more aggressive on the agricultural food production system, it became more crucial to apply adaptation actions; through accelerating adaptation to progressive climate change over the time scale [7, 8], and through enhancing the agricultural impact assessment and management to overcome the increasing threats of the extreme events. Mitigation actions are also required, through the efficient investment and application of the innovative technology; for reducing the anthropogenic emissions of greenhouse gasses (GHGs), while increasing the agricultural yield and efficiency [8].

However, as long as climate change and global warming phenomenon has no specific geographical boundaries [1, 9], the regional strategic planning option for the adaptation, mitigation and risk assessment actions are becoming mission impossible tasks, especially in the absence of the cross regional collaboration and the international strategic planning [8].

There is no doubt that, the active involvement of the main food production system components (including farmers, scientists, decision makers and households) is an essential step. The establishment of clear roles and functions for each of the food production system component, while enhancing the interaction and knowledge exchange between all the system's parties, are crucially required.

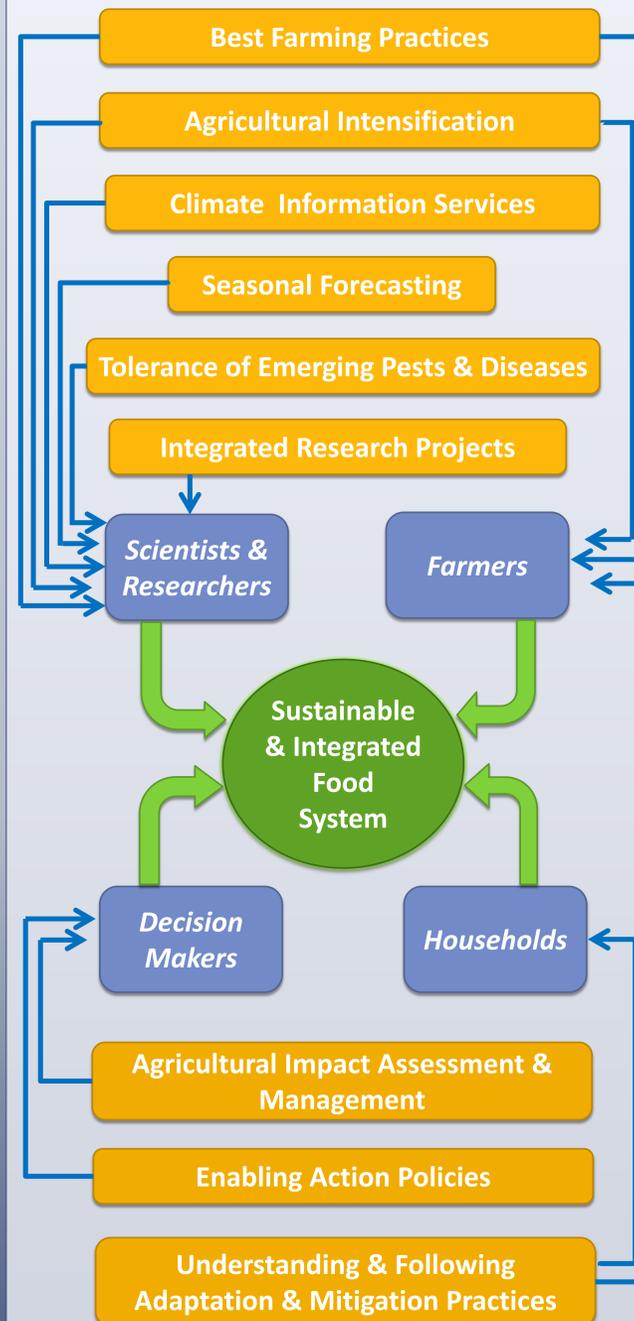
## How to Overcome the Interaction Gaps?

The effective coordination in the food systems is a key factor in achieving food security in the global market. For example, in case of extreme events and food production shocks countries have to positively act in the food global strategies related to food price volatility and trading restrictions [10].

As a result, there is a crucial necessity for bridging the interaction gaps between the main food system components, at national and international level and among major hot spots; including climate information services (e.g. data sharing), seasonal forecasting (e.g. data monitoring and modeling), farming practices (e.g. transfer of best ground practices to similar climatological regions), tolerance of emerging pests and diseases (e.g. genetics and biotechnology), agricultural intensification (e.g. crop breeding and applied biotechnology), enabling action policies (e.g. trade restrictions and trade-offs) and integrated research projects (e.g. collaboration between governmental and private sectors).

## How it Works?

This section provide an overview about the main food production system components, and their major responsibilities under the fact of climate modifications, as illustrated in **Diagram 1**. The deep understanding and the implementation of the same at cross regional level is fundamental in bridging the interaction gaps, and achieving food security at larger geographical scales and for the long run.



**Diagram 1: Roles & responsibilities for bridging the interaction gaps.**

## Conclusions

It is concluded that, each of the food production system components have to play significant role in the implementation of climate change adaptation and mitigation actions. Which will only functionally work through bridging the interaction gaps at both regional and cross regional level.

Serious and quick actions for achieving food security under climate change is a must, for insuring a sustainable, integrated and secure agricultural system for the next generations and for the planet.

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## Contact

1. Suzan Shahin - Email: [suzan.shahin@uaeu.ac.ae](mailto:suzan.shahin@uaeu.ac.ae)  
2. Rahaf Ajaj - Email: [200004384@uaeu.ac.ae](mailto:200004384@uaeu.ac.ae)  
3. Dr. Mohammed Salem Alyafei - Email: [mohammed.s@uaeu.ac.ae](mailto:mohammed.s@uaeu.ac.ae)  
Aridland Agriculture Department – College of Food and Agriculture – UAE University  
Address: United Arab Emirates University (UAEU), P.O. Box 15551, Al-Ain, United Arab Emirates (UAE)  
Website: <http://www.uaeu.ac.ae/>  
Facebook: <http://www.facebook.com/UAEUNews>  
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