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### ***The Greatest Challenge Facing Agriculture Over the Next 5 Years***

The agricultural sector is one of the most important of all primary sectors of the economy, and I think we can all agree on why; the very existence of society and civilization as we know it depends entirely on its very own ability to provide for its people. That is why agriculture was the key development in the rise of sedentary human civilization, whereby farming created food surpluses that nurtured the development of civilization (Guisepi, 2006). Unfortunately, the fabric of our very own existence is increasingly being threatened. This is not to say that over the centuries civilizations did not face challenges that threatened their food-getting abilities; but current studies have shown that the world will be increasingly impacted by the effects of global climate change, thus why I believe that this will be the greatest challenge facing agriculture over the next five years.

According to the Intergovernmental Panel on Climate Change (IPCC), there is now widespread agreement that the changes underway in the earth's climate system have no precedent in the history of human civilization. As a macro-driver of many kinds of environmental degradation such as coastal erosion, declining precipitation and soil moisture, increased storm intensity, and species migration, climate change poses direct risks to agriculture and human security (Barnett & Adger, 2007, 640).

The National Oceanic and Atmospheric Administration (NOAA) suggests that one of the main—if not the main—catalysts of climate change is global warming. Global CO<sup>2</sup> concentrations in the atmosphere are expected to rise from 390 ppm to well over our long-feared milestone of 400 ppm over the next five years (global levels during the 1950s were 310 ppm). This will have a great impact on less well-watered areas, as the rise in temperatures will increase evapo-transpiration and lower soil moisture levels. Some cultivated areas will become increasingly unsuitable for any type of agricultural activities and some tropical grassland will become increasingly arid. Rises in temperature will also expand the wealth and range of pests, and increase their ability to survive the winter and attack spring crops. However, the effects of global warming on agriculture are more symbiotic than one-sided: a major factor contributing towards global warming is the current state of unsustainable crop and livestock production practices, as fertilizers and animal wastes create immensely large emissions of nitrous oxide and ammonia.

The climate system is also expected to vary more than it presently does, with increases in the frequency and severity of natural disasters such as cyclones, hurricanes, typhoons, tornadoes, floods, hailstorms and droughts. These variations will bring greater fluctuations in crop yields and adversely affect local food supplies. From an International

Relations perspective, the Food and Agriculture Organization of the UN (FAO) indicates that global warming will benefit agriculture in some developed countries located in temperate zones but will have adverse effects in many developing countries in tropical and subtropical zones. Hence, global climate change could increase developing countries' dependency on imports and further accentuate existing North-South differences in food security. From a Human Security perspective, these differences in food security have the capacity to provoke or further exacerbate existing intra/interstate conflicts.

Interestingly enough, climate change will also impact agriculture in positive ways. According to the FAO, CO<sup>2</sup> causes plant stomata to narrow, therefore an increase in atmospheric concentrations of CO<sup>2</sup> will lead water loss in plants to reduce, improving the efficiency of water use. Increasing atmospheric CO<sup>2</sup> levels will also stimulate photosynthesis and have a fertilizing effect on many types of crops. The areas suitable for crop production will expand, the length of the growing periods will increase, the costs of overwintering livestock will fall, crop yields will improve, and forests may even grow faster. Agriculture may also have positive effects on climate change itself as slower deforestation, coupled with regeneration and plantation development could reduce CO<sup>2</sup> emissions. Here the symbiotic relationship may be beneficial, however, these gains may not necessarily compensate for the potential losses.

These examples highlight the complexities of global climate change and its relationship and implications on agriculture and the agricultural sector. It undoubtedly serves as the greatest challenge agriculture faces over the next five years, as it threatens to disrupt the agricultural sector's ability to provide healthy food in adequate levels to people around the world. Furthermore, it proposes challenges to policymakers on what policies to enact in order to mitigate its effects, which leads to the secondary challenge facing agriculture over the next five years: convincing policymakers worldwide and the general public of the importance of Genetically Modified (GM) foods.

GM crops have been developed to improve yields while reducing the use of pesticides. Furthermore, genetic modification could be aimed at boosting the nutrient content of food, reducing its allergenic potential, or improving the efficiency of food production systems around the world. Most importantly, GM crops and foods are crucial tools in the struggle against global hunger. Instilling proper understandings and creating mass awareness about the importance of GM foods is crucial in order to mitigate the effects of global climate change, and move towards more efficient and sustainable agricultural practices and activities.

As a graduate student and an emerging professional with a deep interest in food security issues related to urban availability/access/use, I would greatly benefit from this dynamic opportunity to gain insight and explore current and future trends, the latest research, and policy in contemporary agriculture. Furthermore, these insights will serve as an incredible resource for my capstone research program, where under the mentorship of the USDA I will conduct a systematic review that will help to ensure that rigorous evidence is used to inform policy and practice, particularly in the prioritization and design of food security projects.