Chapter 4

Food Security and Climate Change

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ABSTRACT

Climate change may potentially disrupt progress toward a world without hunger. Today, a clear and consistent global pattern is perceptible of the different impacts of climate change on crop productivity that could have repercussions on food security. Consequently, the stability of the whole food systems may be at risk under climate change because of its unpredictable variations. Indeed, agricultural production is highly vulnerable even to 2°C predictions augmentation for global mean temperatures in 2100, with major implications for poverty and for food security. The climate change impacts seem to be clear in areas currently affected by hunger and undernutrition, which will heighten food insecurity in these parts of the world. Therefore, adapting food systems both to increase food security and to prevent future negative impacts from climate change will require attention to more than just agricultural production. The evidence sustains the need for thoughtful investment in adaptation and mitigation actions toward an efficient management of climate change influences on food security.

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INTRODUCTION

Approaching hunger is one of the substantial challenges of our time (Ban, 2012). Hunger has many aspects and causes, including, increasing food demands, changes in diet and extreme climatic events, among other factors. Moreover, further pressures on the global food system are expected to increase in the future. For example, demand for agricultural products is estimated to heighten by about 50% by 2030 as the global population increases (Bruinsma, 2003), which will demand a shift toward sustainable intensification of food systems (Garnett et al., 2013). Though present-day global food supplies achieve current global calorie requirements to feed the world population, food insecurity prevails in several parts of the world. Two billion people around the world are food insecure at least during a period of the year (Gleadow et al., 2009) and around 815 million people in developing countries, 60% of which live in Sub-Saharan Africa and South Asia, have calorie-deficient diets (FAO, 2017).

Climate change, which is due in large part to economic activity, is directly affecting agricultural production and thereby food security (Easterling et al., 2007; Schmidhuber and Tubiello, 2007; Thornton et al., 2009). Even so, adaptation to climate change through interventions in agricultural systems or through changing social and institutional structures has potential to reduce food insecurity (Easterling et al., 2007; Howden et al., 2007). It is estimated that agriculture contributes to about 14% of annual greenhouse gas (GHG) emissions (Johnson et al., 2007; Cohen et al., 2008; Nelson, 2009; Sarris, 2009), while land use change, including forest loss, contributes by another 19% (Cohen et al., 2008; Nelson, 2009). Accommodations in the agricultural sector thus could play a significant role in climate change mitigation and may as a result influence food security.

In this chapter, we will examine climate change status in North Africa because of the scarcity of studies about climate variations in this area and we will describe the possible impact of the projected global climate change on agriculture with its different components and consequently on food security.

CLIMATE CHANGE IN NORTH AFRICA

Climate change poses a significant challenge for North Africa, which emits low levels of greenhouse gases (between 1.5 and 3.5 emission tonnes of CO₂/inhabitant/year) (Radhouane, 2013). It affects environmental systems, major socio-economic and agricultural developments in the region. The severity of climate change affecting these countries is related to the ecological and geographic particularity of the region. The biophysical and socio-economic conditions, as well as the state of technology in the region are the major factors behind the extreme vulnerability of the region to climate change (Scott, 2008). Rising the sea level, increasing annual mean temperatures and decreasing precipitation, which has been observed for the second half of the 20th century in North Africa are likely to continue and to cause heater and drier conditions. The dynamical regional model REMO showed that temperatures are likely to rise between 2 and 3°C in North Africa, while precipitation is likely to decrease between 10% and 20% by 2050 (Paeth et al., 2009). Furthermore, the sea level could rise by 23-47 cm by the end of the 21st century. Then, many Mediterranean regions would run a major risk of being submerged and eroded. The main economic and social activities in North Africa are concentrated along the coastal zones. Population within 100 km of coast is 68.8% in Algeria, 78.7% in Libya, 65.1% in Morocco, and 84% in Tunisia. Thus, sea level rise could result in major population movements and adversely affect many economic activities like tourism; a major source of employment and income in Morocco and Tunisia (Schilling et al., 2012).