WFL Publisher
Science and Technology
Meri-Rastilantie 3 B, FI-00980
Helsinki, Finland
e-mail: info@world-food.net

Journal of Food, Agriculture & Environment Vol.11 (2): 1118-1123. 2013 *www.world-food.net*

Climate change, agriculture and food security issues: Malaysian perspective

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Received 2 January 2013, accepted 29 April 2013.

Abstract

Climate change is a complex environmental problem that is adversely affecting the different sectors of the economy in both developed and developing world. Malaysia is experiencing rapid changes in climate factors over the past few decades. The mean surface temperature for Malaysia increased with the ranges from 0.6°C to 1.2°C during the period of 40 years (1969-2009). It was projected that the surface temperature would increase from 1.5°C to 2.0°C by 2050. Rainfall and river flows are projected to experience greater fluctuations. Changes in climate factors are likely to affect adversely the agriculture production and consequently food security of the country. This paper aims to focus on the potential threats and effects of climate change on agriculture and food security in Malaysia. The paper reviews currently available information on climate change, agriculture and food security issues in Malaysia. Available literatures demonstrate the potential threat of climate change to the production of grains and export earnings from industrial products. It was reported that changes in climate factors could decrease yields of rice, the main staple food in Malaysia, from 13% to 80%. On the other hand, production of industrial crops, particularly oil palm, rubber and cocoa would decline with a range of 10-30% due to negative impacts of climate variability. Moreover, population of the country is expected to increase in the next few decades which will cause increased domestic demand of food. The country would require to increase significantly the production of food commodities in order to meet increased domestic demand of food. However, it is unlikely that a significant increase in food production will be achieved in the short to medium term due to the limited resources in agriculture sector. This might cause the risk of food crises and consequently threaten food security in the country. Therefore, urgent action is very much needed to preserve agriculture sector and sustain production of food in the face of inevitable climate change.

Key words: Climate change, agriculture, food security, Malaysia.

Introduction

Climate change is one of the several unprecedented, large-scale, environmental changes that are affecting our planet adversely [1]. However, the impacts of climate change may vary across different sectors of the economy and geographical location to different degrees [2]. Particularly, the developing countries are experiencing adverse effects of climate change on key economic sectors such as energy, industries, forestry, transport, agriculture, water and coastal resources, public health and waste sector [3]. Agriculture involves with cultivating soil, growing plants and raising animals for producing food, feeds, fibre and a whole range of other services. Together with forestry and fisheries, it provides the primary sources of food and nutritional security for the welfare of the people [4]. Climate change is a complex problem involving varied interactions between the environment, natural resources (land, crops, animals and water) and people [5]. Climate change is becoming a serious threat to agriculture sector by impacting negatively the volume of food production, water supply, natural resources, population migration and poverty [6, 7]. Agriculture sector in both the developed and developing worlds is affecting by climate change though the latter is likely to be harder hit than the former. In the developing countries, the most vulnerable are several millions of poor small farmers and the landless. It is already a major challenge for the resource-poor to efficiently use the available natural resources and seek improvements, and the onset of climate change imposes even greater stresses on their resilience and farming activities [5]. For example, the study conducted by Mwangombe *et al.* [8] found that climate variability resulted in increased dry conditions, crop failures, reduced livestock productivity and increased human and livestock diseases, thereby complicating lives of communities in rural areas of Kenya.

During Malaysia's rapid economic development into becoming a middle income country in the past several decades, environmental changes resulted in altered land use patterns because of agricultural practices such as large scale rice, rubber and oil palm cultivation [9]. Malaysia is experiencing a warming trend for the past few decades. Increasing temperatures would result in more extreme weather and climate variability [10]. The range of annual mean surface temperature for the country as a whole is about 26 to 28°C [11]. Based on 40 years of records (1969-2009), it was observed that the rate of mean surface temperature for Malaysia increased with the ranges from 0.6 to 1.2°C per 50 years. Impacts of climate variability in Malaysia on floods, land erosion, reduced crop yields especially for economically important ones such as oil palm, rubber and paddy have been identified [11]. Several studies have attempted to assess the impact of climate change on agriculture, particularly rice and food grain production in the Southeast Asian countries including Malaysia [12-14]. It was reported that the average potential yield of rice would vary from approximately 10 tons ha^{-1} in the tropical regions and over 13 tons ha^{-1} in temperate regions. However, in Malaysia, the average