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ترجمه کتاب ☐

خشکسالی و امنیت غذایی در خاورمیانه: چارچوب تحلیلی

چکیده

بلایای طبیعی ممکن است به عنوان یکی از عوامل مضر عدم امنیت غذایی در خاورمیانه نقش مهمی داشته باشند. اتفاقات پی در پی خشکسالی، کمبود آب و شیوه‌های کشاورزی به صورت فشرده و ناپایدار ممکن است بر امنیت غذایی در منطقه تأثیر بگذارد. در این مقاله رابطه بین خشکسالی و امنیت غذایی در سراسر خاورمیانه بررسی شده است. خشکسالی‌های آب و هوایی، کشاورزی و هیدرولوژیکی در بازه‌های زمانی متعدد بیش از هفت دهه در طول دوره‌های ۱۹۴۸ تا ۲۰۱۷ در منطقه مورد تجزیه و تحلیل قرار گرفته‌اند. ما امنیت غذایی را در خاورمیانه به عنوان تابعی از خشکسالی (عامل تنش آبی) و همچنین چندین محرک اقتصادی - اجتماعی دیگر، شبیه سازی می‌کنیم. یک رویکرد بیزی برای ادغام این محرک‌ها به منظور پیش‌بینی دقیق امنیت غذایی در منطقه اجرا شده است. نتایج نشان می‌دهد که خشکسالی هیدرولوژیکی شدیدترین نوع خشکسالی در منطقه، به ویژه در مصر، در طول دوره مطالعه است. علاوه بر این، نتایجْ تأثیراتِ قابل توجه دام، رشد جمعیت، محصولات کشاورزی و خشکسالی بر امنیت غذایی در خاورمیانه را نشان می‌دهد. یافته‌های ما همچنین نشان می‌دهد که محصولات کشاورزی در خاورمیانه به دنبال خشکسالی اخیر که در سال ۲۰۱۰ اتفاق افتاد، کاهش یافته است.

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Drought and food security in the middle east: An analytical framework

Maysoun Hameed, Ali Ahmadalipour, Hamid Moradkhani*

Center for Complex Hydrosystems Research Department of Civil, Construction and Environmental Engineering, University of Alabama, Tuscaloosa, AL 35487, USA

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ABSTRACT

Natural disasters may act as harmful causes of food insecurity in the Middle East. Frequent drought events, water scarcity, and unsustainable intensive agricultural practices may impact food security in the region. This paper investigates a causal relationship between drought and food security across the Middle East. Meteorological, agricultural, and hydrological droughts are analyzed at multiple timescales over the region for seven decades during the period of 1948–2017. We simulate food security in the Middle East as a function of drought (representing a water stress factor) as well as several other socio-economic drivers. A Bayesian approach is implemented to integrate these drivers in order to accurately predict food security in the region. Results reveal that hydrological drought is the most intensified drought type over the region, especially in Egypt, during the study period. Moreover, the results demonstrate the significant impacts of livestock, population growth, agricultural products, and drought on food security in the Middle East. Our findings further indicate that the agricultural products decreased in the Middle East following the recent drought event that happened in 2010.

1. Introduction

Frequent drought events with increasing severity can substantially impact agricultural productivity and food security in the regions with semi-arid hot climate. Drought as a recurring natural hazard may impact water resources such as: water supply, water quality, surface and subsurface water availability, and management of water resources (Amin et al., 2016; FAO, 2017; Scanlon et al., 2017; van Loon et al., 2014). In general, four types of drought are identified: (1) Meteorological drought which accounts for precipitation shortage (Ahmadalipour et al., 2016; Beguería et al., 2014; Das et al., 2015; Hameed et al., 2018); (2) Agricultural drought which considers soil moisture deficiency (Gao et al., 2015; Mishra et al., 2015; Nichol and Abbas, 2015; Vicente-Serrano et al., 2015; Yan et al., 2017); (3) Hydrological drought which is a lack of surface and subsurface water (Barker et al., 2016; Lorenzo-Lacruz et al., 2013; Madadgar and Moradkhani, 2013; Mo and Lettenmaier, 2014; Van Loon and Laaha, 2015; Zhang et al., 2015); (4) Socioeconomic drought that accounts for water resources system deficit resulting from other types of drought (Huang et al., 2016; Maia et al., 2015; Rajsekhar et al., 2015; van Loon et al., 2014).

It has been identified that food security is vulnerable to extreme weather events. Extreme weather events may negatively influence food supply and security of vulnerable regions (Silva et al., 2018). Moreover, climate change can negatively impact crop, livestock, and fisheries production; therefore, more attention should be paid to action-oriented research (Wollenberg et al., 2016). Rosegrant and Cline (2003) mentioned that food security will continue to be a global concern in the twenty first century given the crop yield failure in many regions due to lack of research and infrastructure as well as increasing water scarcity. Kang et al. (2009) suggested that climate change may markedly affect the growing period, harvest date, and crop rotation period. The United Nations reported that rain-fed agricultural lands are extremely influenced by drought in the Arab region. It consequently results in decreasing yields and depleting vegetation in pasture lands, which in turn affects livestock in the region. Furthermore, land degradation can be another consequence of drought that may decrease the land area covered by native plants (UN, 2015).

Given that adaptation for agriculture is complicated, crop-climate studies should be applied to improve the understanding of food security other than availability (Beveridge et al., 2018). Climate change may pose major challenges to food security and thus agricultural systems need to incorporate adaptive measures considering the negative impacts of climate change on food security along with growing population and demand worldwide (Kumar, 2016). Changes in population, income, and climate, among other drivers play essential role in achieving and maintaining global food security. Hence, predictive models that account for such factors can be helpful for planning and management of