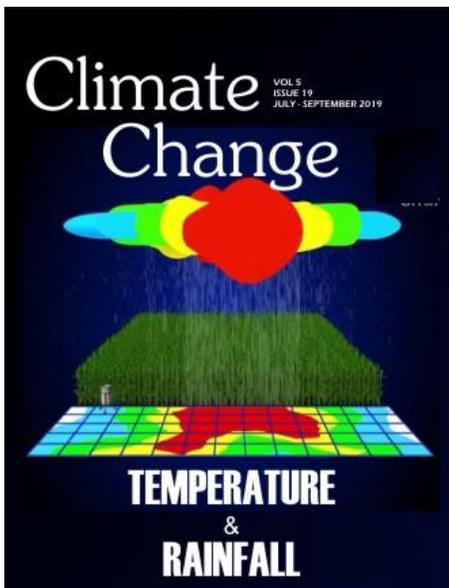


Climate Change

About the Cover



Changing climates have had considerable effect on the erratic rainfall and temperature patterns over the years for both locally and nationally for Ghana. The main objective of this paper is to perform a Mann-Kendall trend analysis of rainfall and temperature variables spanning the period 1986-2015 for the South-central districts of Ghana. The trend analysis was used as proxies to analyze the changing trends of rainfall and temperature regimes within four seasons Pre-Harmattan, Harmattan, Post-Harmattan and the Wet Seasons, to correspond with local 'Autumn', 'Winter', 'Spring' and 'Summer' respectively. Results for temperature indicated that the maximum temperature for the period was 29.55°C recorded in the Post-Harmattan season in the years 1990 and 1998; whereas the minimum temperature was 22.5°C recorded in the Harmattan season in the year 2008. Results for the rainfall indicated that the month of June which is the Wet season recorded the maximum rainfall of 379.5mm in the year 2010; whereas the minimum rainfall was recorded in the Harmattan months. The results indicate that rainfall and temperature do not have monotonic trends. This has implications for future availability of water for household and other applications. (Ref: Divine Odame Appiah, Keren-Happuch Obeku. Analysis of temperature and rainfall trends as proxy for seasonal climatic variability in South-Central Ghana. *Climate Change*, 2019, 5(19), 131-140).

Analysis of temperature and rainfall trends as proxy for seasonal climatic variability in South-Central Ghana

Divine Odame Appiah, Keren-Happuch Obeku

Changing climates have had considerable effect on the erratic rainfall and temperature patterns over the years for both locally and nationally for Ghana. The main objective of this paper is to perform a Mann-Kendall trend analysis of rainfall and temperature variables spanning the period 1986-2015 for the South-central districts of Ghana. The trend analysis was used as proxies to analyze the changing trends of rainfall and temperature regimes within four seasons Pre-Harmattan, Harmattan, Post-Harmattan and the Wet Seasons, to correspond with local 'Autumn', 'Winter', 'Spring' and 'Summer' respectively. Results for temperature indicated that the maximum temperature for the period was 29.55°C recorded in the Post-Harmattan season in the years 1990 and 1998; whereas the minimum temperature was 22.5°C recorded in the Harmattan season in the year 2008. Results for the rainfall indicated that the month of June which is the Wet season recorded the maximum rainfall of 379.5mm in the year 2010; whereas the minimum rainfall was recorded in the Harmattan months. The results indicate that rainfall and temperature do not have monotonic trends. This has implications for future availability of water for household and other applications.

Climate Change, 2019, 5(19), 131-140

Regional scale spatiotemporal trends of precipitation and temperatures over Afghanistan

Rehana S, Krishna Reddy P, Sai Bhaskar Reddy N, Abdul Raheem Daud, Shoaib Saboory, Shoaib Khaksari, Tomer SK

Afghanistan is the most vulnerable to climate extremes related hazards, including droughts and floods that have caused huge impact on the socio-economic development of the country. The present study analysed the observed precipitation and temperature trends for seven agro-climatic zones of Afghanistan over the period 1951 to 2006 with Asian Precipitation-Highly-Resolved Observational Data Integration towards Evaluation of Water Resources (APHRODITE). The trend analysis was performed on daily data to test the increasing or decreasing rainfall and temperature trends using Mann-Kendall trend test for each agro-climatic zone of Afghanistan. The annual total precipitation has shown an increasing trend for the zones of South, South-West, East and Central, whereas, a decreasing trend has been observed for North, North-East and West zones of Afghanistan. The trend analysis of the precipitation with gridded data sets reveals for most parts of the Afghanistan, the rainfall has been observed to be decreasing. Whereas, an increasing trend of temperatures were observed for all seven agro-climatic zones of Afghanistan.

Climate Change, 2019, 5(19), 141-149

Climate Change & Agriculture

Measurement of technical efficiency of climatic and non-climatic factors in sugarcane farming in Indian States: Use of stochastic frontier production function approach

Ajay Kumar Singh, Narayanan KGS, Pritee Sharma

Extensive research studies have estimated the influence of climate change on sugarcane yield in India. However, most studies concise their investigations up to one state or group of few states of the nation. Limited studies assessed the impact of climatic factors on sugarcane production and yield at national level. Also, inadequate studies estimate the technical efficiency (TE), and impact of climatic and non-climatic factors on sugarcane farming across Indian states. Therefore, the present study estimates the influence of climate variability on sugarcane yield and production using state-wise panel data during 1971-2014. For this, it used stochastic frontier production function approach through log-linear regression model. Climatic factors (i.e., maximum temperature, minimum temperature and precipitation) are segregated for summer, spring, autumn and winter seasons to assess their impact on growth of sugarcane crop in different weather seasons. Empirical findings of the study implies that climatic factors in different weather seasons have negative and statistically significant impact on sugarcane production and yield. Most states (except Tamil Nadu) are observed technically inefficient to produce sugarcane production. There is existence high variation in TE of sugarcane production across Indian states, thus these states have effective opportunity to increase TE in sugarcane farming. Empirical results of this study provides several policy suggestions to mitigate the negative consequences of climate variability in sugarcane farming.

Climate Change, 2019, 5(19), 150-166

Climate Change & Adaptation/Mitigation

Roles and effects of transformative social learning toward sustainable livelihood transformation to climate change adaptation in the Vietnam Mekong Delta: The VACB model case study in Can Tho

Le Thi Hong Phuong, Nguyen Thi Ngoc Phuc, Tran Duc Tuan

Sustainable livelihood transformation to climate change adaptation is an ongoing challenge worldwide. To cope with changing the climate, demographics, and market conditions in Vietnam, many livelihood models have been established in several localities in the Mekong Delta. This study aims to evaluate the effects of transformative social learning on the transition to the VACB (*V-garden/orchard, A-fishing farm, C-livestock farm, B-biogas*) livelihood model in Can Tho, confirming the needs and requirements to promote livelihood transformation more success for sustainability. This community was selected to conduct the study as it represents the entire nexus of climate change-water-food-energy-social justice and provides insights into the challenges of transformative social learning for sustainability in the Mekong Delta. Primary data was collected through in-depth interviews; focus workshop discussion, and semi-structured interviews. Descriptive statistics was used to analyze the roles of transformative social learning and its effects towards sustainable livelihood transformation to climate change adaptation. The findings showed that transformative social learning has been accompanied and positively impacted on the economic, social, and environmental development. In addition, this learning process also transfers awareness, beliefs, attitudes, and social relationships in the community.

Climate Change, 2019, 5(19), 167-176

Climate Change & Strategy/Policy/Law

Assessment of indigenous climate change coping strategies among small scale farmers in Jos East L.G.A, Nigeria

Wuyep SZ, Arin HB, Samuel AJ

Climate change is conceivably the most serious environmental menace to agricultural production globally. Hence, this study assessed the indigenous strategies employed by small scale farmers to cope with these adverse effects of climate change in Jos East Plateau State. It was carried out in three districts of the local government area. Samples of 150 farmers were randomly selected for this study. Structured questionnaire and interview were employed for data collection. The data collected were analyzed using descriptive statistics, Coping Strategy Index (CSI) and regression analysis. The study found out that farmers are aware of climate change in the study area. Important sources of information on climate change were found to be: other farmers (90.7%), radio (85.3%), television (84.0%) open market (84.7%), government extension agent (56.0%), print media (40%) and internet (36.7%). Key indicators of climate change in the study area include flooding (93.3%), erratic rain pattern, (86.0%), increase in disease incidence (80.7%), warmer temperatures (76.3%), increase in pest incidence (79.3%) and longer dry season (4.0%). Findings also revealed that mixed cropping, use of organic manure, change in sowing date, seed selection, afforestation, seasonal migration, change in date of harvest were the most important indigenous strategies used by the respondents to cope with climate change. Inferential analysis revealed that, age of the respondents, total land size and years of membership of farmers' cooperative were found to be positive and significant at 1% probability level. Also, the parameters regressed are responsible for 54.1% of variation in the CSI. Capacity building and advisory services that enhance documentation and complementing the use of indigenous and modern strategies against climate change particularly in areas of information accessibility and weather prediction are recommended.

Climate Change, 2019, 5(19), 177-187

Climate Change & Geotechnology

Integration of standardized precipitation index and drought severity index for assessment of drought in the Sudano-Sahelian ecological zone of Nigeria

Odewale OM, Adebola AO

Drought is a natural hazard characterized by lower than expected normal precipitation which is insufficient to meet demands of human activities and the environment. It occurs in both high and low rainfall areas and virtually all climatic regimes. A quantitative assessment of drought characteristics and their associated variability in the Sudano-Sahelian Ecological Zone (SSEZ) of Nigeria was carried out. Monthly Rainfall data for seven selected meteorological stations were collected and used. The long term rainfall records were analyzed for drought using Standardized Precipitation Index (SPI) and Palmers Drought Severity Index (PDSI) to assess the Drought period in the SSEZ. The annual rainfall data for the period 50years (1965-2015) were collected from the Nigeria Meteorological Agency. The results of SPI and PSDI analysis revealed that there were several drought years in the study area within

the study period .These were classified into mild, moderate, severe and extreme drought conditions. 20years of total drought occurrence was noted, in which the prominent extreme drought years across the zone were 1973, 1983 and 1987 proved to be more devastating due to its duration and severity. The study has provided useful information and pro- active intervention to reduce the impact of drought which will be helpful to effectively plan for a rain fed agriculture within the SSEZ of Nigeria.

Climate Change, 2019, 5(19), 188-199

Climate Change & Carbon

Carbon emissions in Indian marine fisheries sector: Cradle to Grave Analysis

Shyam S Salim, Nivedita Shridhar

Climate change impacts the oceans globally, its resources, resource users and environment; since 1960 there has been a paradigm shift in Indian marine fisheries from subsistence to mechanisation and consequent commercialisation. Though yielding high landings, the shift catapulted consumption of soaring levels of fossil-fuel and resultant carbon emissions. The study employed the "Cradle to Grave" approach in assessing emissions between fishing sectors across the value chain. The results indicate highest emissions from mechanized sector, however minimal when compared with developed countries. The study suggests incentive based approaches for minimal carbon emissions in fishing leading to a blue carbon economy.

Climate Change, 2019, 5(19), 200-210

Climate Change & Urban planning/Rural development

Remote sensing of the urban heat island effect in Srinagar city, India

Arshad Amin

The acceleration of population growth and the associated economic growth in urban areas leads to multiplier effects on many aspects of development. In India urban population has increased more than four times after independence. It was 62.5 million in 1951, 284.5 million in 2001 and 377 million in 2011. With increase in the population, the demand for residential space has also increased which has unplanned growth of the urban areas. Srinagar city is one such urban area in the hill state of Jammu and Kashmir, India. Being the summer capital of Jammu and Kashmir, population of the city has increased many folds since 1980s. Choked and unmanageable planning and various other anthropogenic interventions in certain areas of this ecologically fragile hill ecosystem have given birth to many climatic issues like Urban Heat Island (UHI) phenomenon. The present study tries to map out the pattern of land use, Land Surface Temperature (LST) using satellite data and field measurements to assess the UHI effect and identify the urban hot spots in Srinagar city. The study used Thermal Infrared data from Landsat 8 TIRS band-10 and field data, collected using IR Gun in various locations pertaining to different materials and land use/cover features of Srinagar city. The results showed that there is a strong relationship between the land use/cover features and the associated differentials in the land surface temperatures during winter and summer season. The study helped to identify urban heat island intensities and hotspots in Srinagar city.

Climate Change, 2019, 5(19), 211-227