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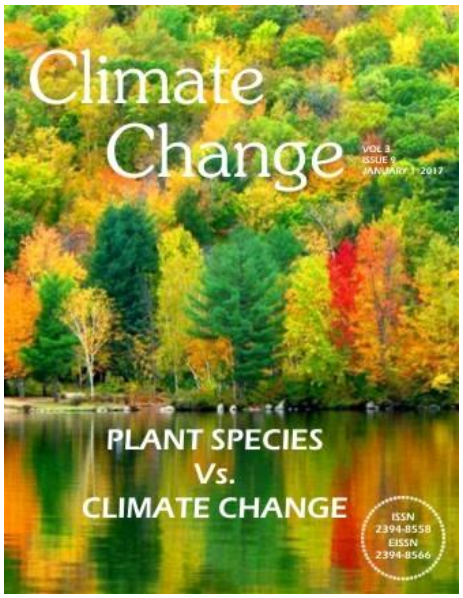
Climate Change

About the Cover



Climate change is a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time period. Global warming influenced plant species response mechanisms including phenology shift; species range shit; diversity and interaction of communities; structure and dynamics of ecosystem or extinction. Highest phenology shift showed an advance of 5.3±0.9 decade^{-1}; and lowest phenology advancement was revealed to be 1.9 days decade^{-1}. The highest species range shift reported is 17.6km and 29.4±10.9m decade^{-1} pole ward and towards higher elevation respectively; whereas the lowest showed to be 6.1±2.4 km and 1-4m decade^{-1} pole ward and towards higher elevation respectively. Phenotypic plasticity is also crucial phenomenon which could help plant species respond to changing climate in situ (Ref: Kflay Gebrehiwot. Plant species responses to climate change: a review. Climate Change, 2017, 3(9), 6-19), (Image: lh3.googleusercontent.com).

Case Study

Monitoring land Use/Land Cover Change Using Remote Sensing and GIS Techniques: a Case Study of Pandharpur City, District Solapur, Maharashtra, India

Prashant Unhale, Ranjitsinh Pawar, Sidgane R

Land use/land cover changes have become major problem in recent worldwide environmental change and sustainability research. The concept can be broadly classified as natural and activities that unenthusiastically impact on all environmental factors. The manmade Land use/land cover changes impact is speedily as compare to the natural changes and most biomes of the world have been changed due to the increasing manmade activities. The present research work examines the use of GIS and Remote Sensing in mapping Land use Land cover in Pandharpur City for the year 1989, 2003 and 2015. Change detection pattern of vegetation, built-up area, water bodies and waste land were studied. The vegetation and water bodies were decreased and built up area and waste land were increased for the time period of 1989, 2003 and 2015.

Climate Change, 2017, 3(9), 1-5

Review

Plant species responses to climate change: a review

Kflay Gebrehiwot

Climate change is a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time period. Global warming influenced plant species response mechanisms including phenology shift; species range shit; diversity and interaction of communities; structure and dynamics of ecosystem or extinction. Highest phenology shift showed an advance of 5.3 ± 0.9 decade^{-1}; and lowest phenology advancement was revealed to be 1.9 days decade^{-1}. The highest species range shift reported is 17.6km and 29.4 ± 10.9m decade^{-1} pole ward and towards higher elevation respectively; whereas the lowest showed to be 6.1 ± 2.4 km and 1-4m decade^{-1} pole ward and towards higher elevation respectively. Phenotypic plasticity is also crucial phenomenon which could help plant species respond to changing climate in situ.

Climate Change, 2017, 3(9), 6-19

Perspective

Climate change and need for proactive policy initiatives in Indian marine fisheries sector

Shyam S Salim, Nivedita Shridar, Reeja Fernandez

The paper involves addressing the potential complexities of climate change interactions and their possible impacts in mainstreaming the cross-sectoral responses into governance frameworks. The paper reviews the global and national climate change conferences and policies and with the available literature, using a livelihoods framework, this paper synthesizes the pathways through which climate variability and change impact fisher folk livelihoods at the household and community level. For an effective policy implementation balancing of results approach has to adopted where the current needs are identified and potential adaptation strategies are explored and the wider implications for local livelihoods, fisheries management and climate policies. The policy should be coupled to broader economic reform opportunities to maximise win - win opportunities and should consider funding mechanism which is relevant to the sector.

Climate Change, 2017, 3(9), 20-37

Forest management strategies and adaptation to climate change: Experiences from South Asia

Mangala De Zoysa, Makoto Inoue

Climate change and an increased incidence of extreme weather events are presenting significant threats to forest ecosystems and the wider community in South Asia. The analysis of the severity of these threats and effectiveness of the management strategies of different forest ecosystems for climate change adaptation has become vitally important. Therefore, this paper reviews the literature and discusses the expansion of carbon stocks by forests and trees, conservation and maintenance of existing forest carbon (C) stocks, and management of fragile forest ecosystems for climate change adaptation in South Asia. Expansion of C stocks by forests and trees is facilitated in the region through afforestation, reforestation, and forest restoration; increase of tree cover outside forests; and enhancement of forest carbon stocks. Fire management and reduction of shifting agriculture, management of forest health and vitality, management of forest biodiversity, management of protected areas and wildlife provide great contributions to the conservation and maintenance of existing forest carbon stocks. Management of fragile forest ecosystems, particularly mountain forests and watersheds; dry-land forests; coastal forests; wetlands and peatlands are also vital for forest adaptation to climate change. Sustainable forest management strategies promoting adaptation to climate change should be an integral part of rural development activities with active community participation in the South Asian region.

Climate Change, 2017, 3(9), 38-64

Analysis

Assessment of surface water, of Oji town and its adjoining areas, Anambra basin, se. Nigeria for irrigation purpose

Eyankware MO, Okoeguale BO, Ulakpa ROE

The study tends to assess the quality of surface water for irrigation purpose. The following parameters were test for: pH, Turbidity, Electrical Conductivity, temperature, Total Dissolved Solid (TDS), Mg^{2+}, SO_4^{2-}, Cl^-, K^+, $Na^{2+,}$ HCO^{3-}, Ca^{2+} and NO^{3-}. pH ranges from (6.0 to 6.9), Turbidity ranges from (0.5 to 2.9 NTU), EC ranges from (34.7 to 60.8µS/cm), temperature ranges from (23 to 29^0C), TDS ranges from (22.4 to 31.6 mg L^{-1}), magnesium ranges from (1.2 to 3.5 mg L^{-1}/0.09 - 0.21meq/L), sulphate ranges from (2.1 to 12.2 mg L^{-1}/ 0.04 to 0.25 meq/L), chloride ranges from (1.4 to 17.6 mg L^{-1}/ 0.03 to 0.49 meq/L) potassium ranges from (0.9 to 2.6 mg L^{-1}/0.02 to 0.06 meq/L), sodium ranges from (0.3 to 4.3 mg L^{-1}/ 0.01 to 0.18 meq/L), bicarbonate ranges from (30.8 to 66.7 mg L^{-1}/ 0.5 to 1.09 meq/L), calcium ranges from (4.2 to 12.6 mg L^{-1}/ 0.34 to 0.62 meq/L) and nitrate ranges from (0.0 to 26.0 mg L^{-1} / 0 to 0.41 meq/L). Calculated indices such a SAR, MAR, PI, TH, RSBC, Kelly ratio SSP and CAI indicate that majority of the water are suitable for irrigation. All the sampled values of Na% are excellent for irrigation purpose except for OJI/02 and OJI/06. The water qualities satisfy the condition for use in irrigation. From the Piper an Schoeller diagrams it reveals that OJI/01 is of Ca-HCO_3-NO_3 water type, OJI/02 - 07 are of Ca- HCO_3-Cl water type, OJI/08 is of Mg- HCO_3-Cl-SO_4 water type, while OJI/09 and OJI/10 are of Ca-Mg- HCO_3-Cl with HCO_3 as the dominat ionic specie found in all the water samples.

Climate Change, 2017, 3(9), 65-85

Outlook

Development of climate policies in India – an outlook

Warrior H

The following document is an original research article on the development of national policies adopted by the Government of India in combating climate change. These policies have been taken from the Intended Nationally Determined Contributions (INDC) submitted to the UNFCCC during Paris agreement. The agreement adopted these INDCs and has agreed to the IPCC's recommendation for a 2 °C over the pre-industrial levels. In this paper, we take a look at the policies GoI has put forward and the hurdles the government had to face over the past few decades to reach here. We discuss on the fairness and ambitiousness of the policies to assess the importance of the political and economic events that led to the framework of policies put forward in INDC.

Climate Change, 2017, 3(9), 86-94

Analysis

What we have seen and experienced, from where we stand! Spatio-temporal assessment of climate change manifestations in the Ashanti region of Ghana

Goodlet Owusu Ansah, Lawrencia Pokuah Siaw, Gabriel Eshun, Foster Frempong, Razak Mohammed Gyasi

The general consensus on climate change manifestations (CCMs) and its adversarial ramifications demand lucid exposition of the subject in developing economies, especially where rain-fed agriculture is the primary source of development and livelihood sustainability. *'What we have seen and experienced, from where we stand'*, is a paper that assesses CCMs in different agro-geographical zones; OSM and SSD in the Ashanti region of Ghana. This study was conducted using a sample representative (*N*=338) between October, 2015 and May, 2016. Data obtained from designed open and close-ended questionnaires were analysed with Pearson's Chi Square test from the Predictive Analytic Software, PASW (version 17). Overall, 90.2% testified knowledge about climate change. Whilst majority (70%) attributed their knowledge of climate change to changing weather patterns, smallholder farmer's personal experiences in the physical environment constituted the major information source about climate change. Although findings validate spatial variation in terms of smallholder farmers' understanding of climate change, perceived human-induced causes and adaptation strategies utilised, syntheses were reported in relation to perceptual changes in weather patterns and reaction to hotter weather, less and unpredictable rains.

Climate Change, 2017, 3(9), 95-116

Climate change response actions the adverse effects of climate change on the Widikum community in Cameroon

Takem Ebangha AD, Mba AA, Ekani Mebenga TA

In Cameroon generally and particularly in the Widikum area, rural farmers are central to agricultural production and therefore the foundation for household food security. The recent events of floods and landslides that have occurred in this area in addition acid rains and plant pathologies have already had a great toll on the effort of these farmers. The absence of figures on agricultural production actually does not help further in finding a solution. This is even worse with the insufficiency and inadequacy of agricultural extension in the area. The absence of weather stations in the area simply implies that the rural farmers have been left to the mercy of nature in their role as food producers. This research has been some form of evaluation of the situation of climate

change and it adverse effects on the Widikum community which this study covered. To analysis the situation, this research applied the participatory methods with the local community. Several participatory activities were carried out such as; mobilization workshops, diagnosis workshop, interviews, guided site visits and mapping. After careful analysis and discussion; seasonal differences, climatic hazards such as frequency of floods and landslides, vulnerable elements exposed to hazards such as food production, food security, agricultural areas, livelihoods and agricultural risks were identified as the main problems to be solved or concerns to be managed. The coping mechenisms and Practices implemented by the rural farmers and local population to solve these problems were discussed and adopted. Also, the Adaptive strategies proposed by the project researchers and experts were discussed and adopted. The major setback of this research project was that implementation and follow up of the adaptation measures was not done since the project lasted just for ten months.

Climate Change, 2017, 3(9), 117-127

Opinion

Climate change challenge – photosynthesis vs. hydro-electrolysis principle

Udhaya Sankar G

In the past 50 years, we did many things in the name of innovation, and we changed our climate as much as possible. In order to solve this kind of problem, we must rectify it and thereby we get a solution. This paper describes more specifically climate change in world and a solution by means of Hydro-Electrolysis.

Climate Change, 2017, 3(9), 128-131

Short Communications

Food, Water, Energy Nexus in arena of Climate Change

Kirit Shelat

Water, energy and food are inextricably linked. Water is an input for producing agricultural goods in the fields and along the entire agro-food supply chain. Energy is required to produce and distribute water and food to pump water from ground water or surface water sources, to power tractors and irrigation machinery, and to process and transport agricultural goods.

Climate Change, 2017, 3(9), 132-145

Recent Initiatives in Agriculture: Improving Efficiency in Markets, Energy and Water Use

Stuti Rawat

Agriculture in India is constrained by input as well as output level factors. Recognising the challenges these factors pose against the spectre of climate change, two areas the National Mission for Sustainable Agriculture (NMSA) identifies for action are 'water use efficiency' and 'markets' ("National Mission for Sustainable Agriculture" 2016). This paper takes a detailed look at three recent government initiatives that are targeted at improving efficiency at the input and output side in this regard through their focus on energy, water usage and markets respectively.

Climate Change, 2017, 3(9), 146-149

Improving Water Use Efficiency to Sustain Crop Production under Climate Change Scenario

Mehboob B Sheikh

Water deficit, caused by lack of water has been a great problem for agriculture worldwide affecting virtually every aspect of plant physiology and metabolism impacting food production. This is especially serious considering other adverse factors such as the high levels of atmospheric CO_2, climate change scenarios and predictions of future global warming, all of which increase drought incidence, frequency and severity.

Climate Change, 2017, 3(9), 150-152

The Energy-Water-Food Nexus and Climate Change: Implications for Policy-making, Research, and Business

Mohamed Behnassi

Energy, water and food resource systems are critically inter depended. Energy is needed to produce food and to treat and move water; water is needed to cultivate food crops and to generate many forms of energy; and food is vital for supporting the growing global population that both generates and relies on energy and water services.

Climate Change, 2017, 3(9), 153-156

Balancing the food, water and energy nexus for climate resilience in Indian Agriculture

Arunachalam A

World is facing the implications of climate change and serious food crises are adding about 200 million people to the 850,000 million people that are already facing absolute hunger and poverty. To mitigate this challenge, promotion of rain fed agriculture is the order of the day.

Climate Change, 2017, 3(9), 157-160

Research Presentations

Gender perspective in the Food, Energy and Water Nexus and adaptation to Climate Change

Kinkini Dasgupta Misra

Developing countries face a difficult challenge in meeting the growing demands for food, water, and energy, which is further compounded by climate change.

Climate Change, 2017, 3(9), 161-178

Food, Water, Energy Nexus in arena of Climate Change: a presentation

Kirit Shelat

Energy is required to produce and distribute water and food to pump water from ground water or surface water sources, to power tractors and irrigation machinery, and to process and transport agricultural goods.

Climate Change, 2017, 3(9), 179-207

Climate Variability in Gujarat and the Role of Sardar Sarovar Project

Joshi MB

The mean temperature in India is projected to increase up to 1.7 °C in *kharif* (July to October) and upto 3.2 °C during *rabi* (November to March) season, while the mean rainfall is expected to increase by 10% by 2070 (IARI, 2012).

Climate Change, 2017, 3(9), 208-246

Climate change: Role of horticulture for sustainability

Sherasiya RA

Climate : Arid & Semi Arid (58%) , Mild tropical; About 50 % land is cultivable; Erratic and irregular rain fall (CV is about 40 %); Long coastal area; 55 % area is unirrigated / rain-fed; Over dependency on Ground water (66%) for irrigation; Drought and dry spell; every third year.

Climate Change, 2017, 3(9), 247-278

Public Leadership for Sustainable Development

Maheshwari RC

Public Leadership for Sustainable Development in social, economical and environmental framework.

Climate Change, 2017, 3(9), 279-284

Reduction of Global Warm Air by Geo-sequestration of Excess CO_2

Dimri VP

With today's action by India, which accounts for 4.1 per cent of the emissions, the Agreement only needs slightly more than 3 percentage points to reach the 55 % threshold," a U.N. statement said.

Climate Change, 2017, 3(9), 285-314

Food Water and Energy Nexus: A New Approach

Koppa GG

Total global water withdrawals for irrigation are projected to increase by 10 percent by 2050 (FAO 2011a), and face problems of environmental degradation/resources scarcity. In this context, the Food-Water-Energy Nexus has emerged as a useful concept to describe and address the complex and interrelated nature of our global resource systems, on which we depend to achieve different social, economic and environmental goals.

Climate Change, 2017, 3(9), 315-333

Climate Resilience Livelihoods Framework for a Composite Index

Raju KV

Food can only be produced on a sustainable basis with use of available surface and ground water within limits imposed by hydrological cycle, soil and climate conditions. Current high water and energy intensive food production, preservation and consumption as well as life styles are not sustainable.

Climate Change, 2017, 3(9), 334-343

Geospatial Technology for Climate Change Impact Assessment of Mountain Agriculture

Patel NR

Climate change is likely to adversely impact the Himalayan eco-system through increased temperature, altered precipitation patterns, episodes of drought, and biotic influences. Research on climate change and its impact on various sectors (e.g., forests, water, agricultural resources, etc.) is meager.

Climate Change, 2017, 3(9), 344-371

Technological Advances in Water Management in Relation to Changing Climate

Patel NC

In the last hundred years, the sea level rose by 10–20 cm. In the next millennium, it will continue to rise; even greenhouse gas concentrations will stabilize due to lags in ocean warming & expansion and in the response of land ice. Projections of global sea-level rise from 1990 to 2100 is 0.48 m (IPCC, 2001a) which is 2-4 times the rate of rise over the 20th century.

Climate Change, 2017, 3(9), 372-427

Few nexus – climate policy matters

ER Anuj Sinha

Nine Boundaries:- Climate change; Biodiversity loss; Unstable nitrogen and phosphorous cycles; Ozone depletion; Ocean acidification; Global fresh water usage; Change in land usage; Chemical pollution and Atmospheric aerosol loading.

Climate Change, 2017, 3(9), 428-440

The role of Gujarat Green Revolution Company Ltd. in building resilience among the farmer through adoption of Smart Agricultural Technology in the light of climate change to sustain the food security

Sugoor RK

Climate-smart agriculture, forestry and fisheries (CSA), as defined and presented by FAO at the Hague Conference on Agriculture, Food Security and Climate Change in 2010, contributes to the achievement of sustainable development goals. It integrates the three dimensions of sustainable development (economic, social and environmental) by jointly addressing food security and climate challenges.

Climate Change, 2017, 3(9), 441-490

Some Recent Initiatives in Indian Agriculture in Energy, Water and Markets

Mukul Asher, Stuti Rawat

Under NEAPP farmers can replace inefficient pumps free of cost with BEE star-rated energy efficient agricultural pump-sets (operating efficiency of 40-50%), that come enabled with smart control panel and a SIM card, giving farmers the flexibility to operate their pumps using their mobile phones (PIB, 2016).

Climate Change, 2017, 3(9), 491-517

Organic Food & Farming in the Context of Climate Change and Food, Water & Livelihood Security

Robert Jordan

Few countries in the world are as vulnerable to the effects of climate change as India is with its vast population that is dependent on the growth of its agrarian economy. Agriculture is the source of livelihood for nearly two-thirds of the population. Agriculture is predominantly rain-fed covering about 60% of the country's net sown area and accounts for 40% of the total food production.

Climate Change, 2017, 3(9), 518-567

Water - Energy - Food Nexus Governance Adaptation to Climate Change

Devi Prasad Juvvadi

India : population- around 1.3 billion- soon to become most populous country - creating pressure on natural resources. Reduction of Agriculture Yield in Long Term (2040 and beyond) : > 25% if no measure is taken.

Climate Change, 2017, 3(9), 568-600

Water: The Common Denominator

Mbuya OS

Freshwater is a finite and vulnerable resource essential to sustain life, development and the environment. Management of this resource is expected to emerge as one of the greatest challenges facing humankind during the 21st century.

Climate Change, 2017, 3(9), 601-655

Climate variability, climate change, and food security: the role of more targeted seasonal climate forecasting – opportunities and challenges

Roger C Stone, Mark Harvey

Australia - Utilizing seasonal climate forecasts in management and adaptation – integrating seasonal climate forecasting into crop simulation models – forecasts of potential sorghum yields associated with varying climate regimes (example for a 'consistently negative SOI phase') – varying management decisions (sowing dates) : example for Miles, Australia.

Climate Change, 2017, 3(9), 656-707