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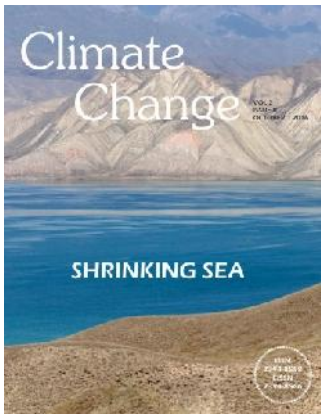
Climate Change

About the Cover

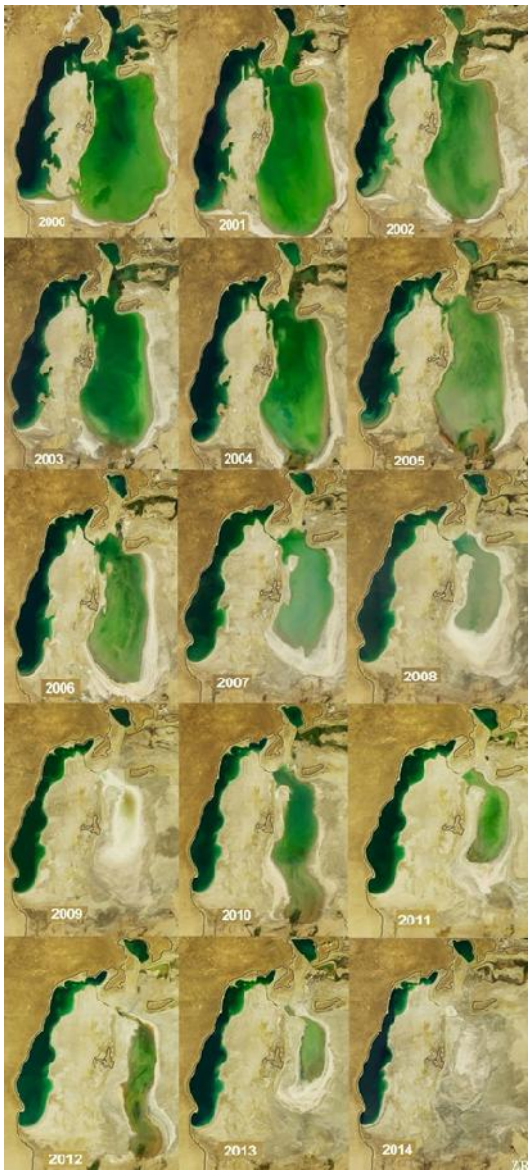


Environmental problems have emerged as a serious threat not only to the economic development of the countries but are also to human security. The threats posed by environmental crisis have gone beyond the traditional concepts of security (e.g. terrorism, border conflicts and other threats to the territorial integrity of a state or country). Since long Kazakhstan is suffering from many environmental problems especially nuclear contamination, shrinking of Aral Sea followed by desertification and destruction of aquatic and terrestrial habitat, monoculture farming followed by land degradation and soil pollution, urban pollution and natural disasters. These are endangering the security of human life in terms of economic loss, health problems and degrading the quality of some essential resources. There is increasing rate of out migration from the areas adjacent to Aral Sea and the areas of nuclear contamination. Deep ecological problems of the region can be considered as an indirect threat for regional security. In this context, this paper aims to determine the major non-traditional security threats in Central Asia in general and in Kazakhstan in particular, the impact of environmental problems as non-traditional security threats to the country and the major policy initiatives taken by Kazakhstan to deal with environmental problems. Concluding part of this study offers some recommendations for a better environmental health and human security of Kazakhstan (Ref: Sutandra Singha. Non-traditional security threats in Kazakhstan: an account of environmental problems. *Climate Change*, 2016, 2(8), 247-261); (Image: http://herwigphoto.com/).

ANALYSIS

Non-traditional security threats in Kazakhstan: an account of environmental problems

Sutandra Singha

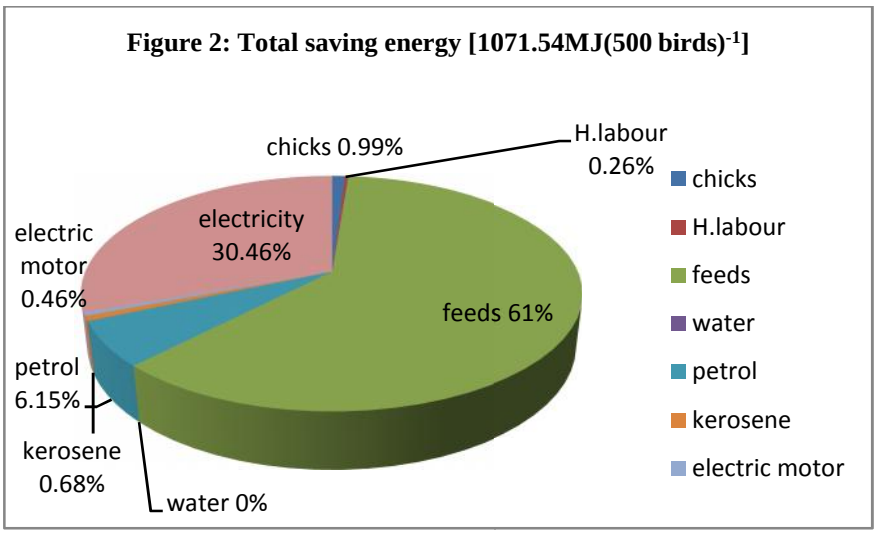


Environmental problems have emerged as a serious threat not only to the economic development of the countries but are also to human security. The threats posed by environmental crisis have gone beyond the traditional concepts of security (e.g. terrorism, border conflicts and other threats to the territorial integrity of a state or country). Since long Kazakhstan is suffering from many environmental problems especially nuclear contamination, shrinking of Aral Sea followed by desertification and destruction of aquatic and terrestrial habitat, monoculture farming followed by land degradation and soil pollution, urban pollution and natural disasters. These are endangering the security of human life in terms of economic loss, health problems and degrading the quality of some essential resources. There is increasing rate of out migration from the areas adjacent to Aral Sea and the areas of nuclear contamination. Deep ecological problems of the region can be considered as an indirect threat for regional security. In this context, this paper aims to determine the major non-traditional security threats in Central Asia in general and in Kazakhstan in particular, the impact of environmental problems as non-traditional security threats to the country and the major policy initiatives taken by Kazakhstan to deal with environmental problems. Concluding part of this study offers some recommendations for a better environmental health and human security of Kazakhstan.

Climate Change, 2016, 2(8), 247-261

Improving Energy Productivity and Environmental Sustainability in Poultry Broiler Production *via* Benchmarking: Data Envelopment Analysis Application

Sadiq MS, Singh IP, Umar SM, Grema IJ, Usman BI, Isah MA

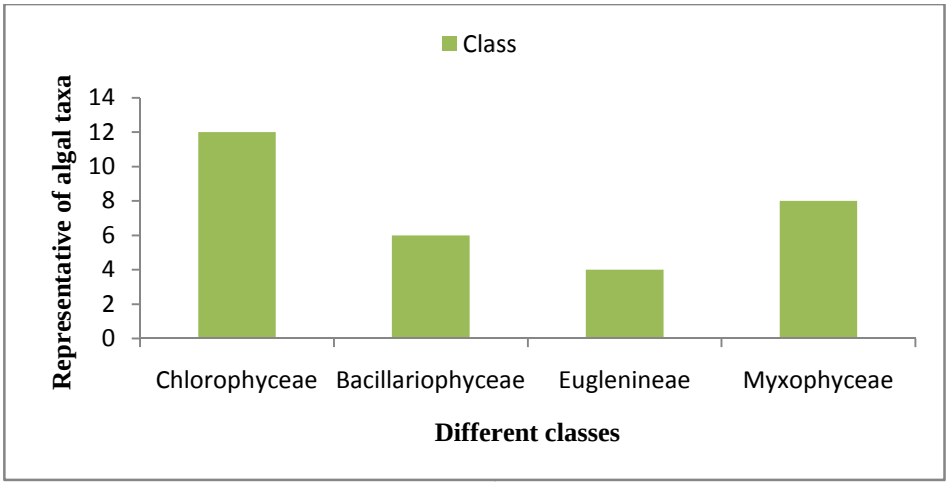


Increasing population level and food demand around the world has made producers and policy makers to utilize scientific models and techniques for taking sustainability into consideration. Energy as an important ingredient in all production systems was the focal point in this study for the production process of broiler in poultry farms in Kaduna state, Nigeria. The research tries to assess an optimal input use for broiler producers and determine the efficient and inefficient farmers. A total sample size of 55 broiler farmers were selected from Kaduna State *via* multi-stage sampling technique, and data analysis was perfected using DEA model. Total energy used in various operations during broiler production was 77916.14 MJ $(500bird)^{-1}$, and findings revealed that 63percent of producers were technically efficient, while 43 producers under PTE were identified efficient (79.6%). Mean value of technical efficiency, pure technical efficiency and scale efficiency scores were 0.976; 0.993 and 0.983, respectively. Based on findings, fossil fuel, machinery and electricity were determined as the most inefficient inputs. Results also indicated that about 1.38 percent [1071.54 MJ $(500birds)^{-1}$] of the total input resources could be saved if the farmers follow the input package recommended by the DEA. Finally, study recommends improvement in the knowledge level of inefficient farmers, application of high-tech equipment and taking advantage of renewable energy sources.

Climate Change, 2016, 2(8), 262-273

Assessment of physico-chemical properties of pond water in relation to seasonal changes of algal floral composition at Balagarh, Hooghly in West Bengal, India

Nilu Halder



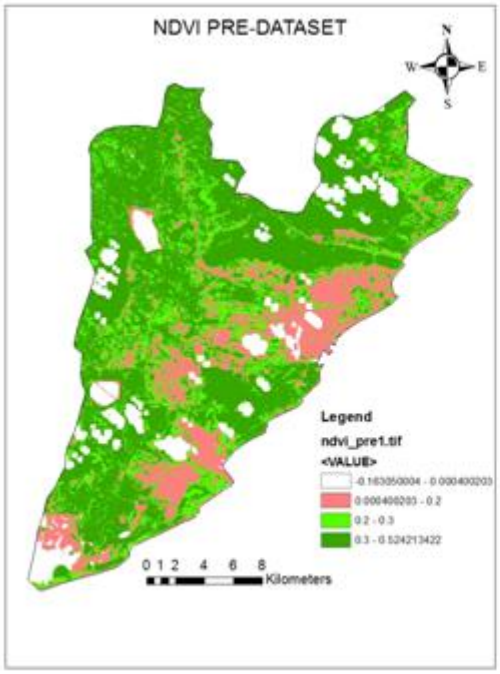
The usual changes of water physico-chemical properties from one season to another resulted in the formation and development of different algal species in a stagnant aquatic ecosystem (pond) located at Balagarh, Hooghly in West Bengal, India. The shifting of climatic conditions as well as water nutrients status probably triggered the variations in the algal floral diversities in the studied freshwater pond. Taxonomically, 30 different algal species have been identified from this water body. During the study period in 2015, it has been found that Chlorophyceae was dominated over the other algal classes, followed by members of Myxophyceae, Bacillariophyceae and Euglenineae. Five algal species had been found through out the year of investigation. Nine physico-chemical

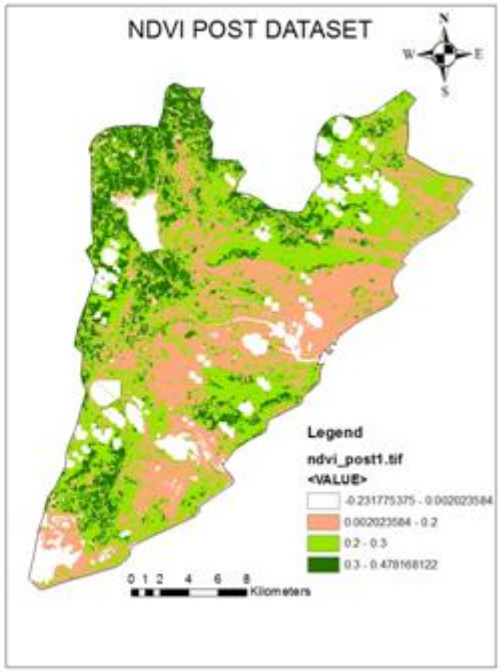
parameters like temperature, pH, DO, BOD, COD, nitrate-nitrogen, phosphate, turbidity and total alkalinity (TA) were analyzed in this work following the standard procedure of APHA (2005). The result of this study showed that water was alkaline and turbid with moderate range of COD and total alkalinity values. This study also exhibited that the pond was productive, beneficial for fish farming and combination of those factors encouraged the periodicity and diversity of algal flora.

Climate Change, 2016, 2(8), 274-282

Spatio Temporal changes of Hudhud Cylclone (pre and post Analysis) Using GIS Technology

Naveen Kumar N, Swaraj J, Manjula Vani K





Developing countries are vulnerable to tropical cyclones due to climatic variability; climate is likely to increase the frequency and magnitude of some extreme weather and disaster events. Cities and towns situated along the coastal belt in Visakhapatnam district experienced severe damage because of HUDHUD cyclone, which occurred on the 12th of October, 2014; Areas around the city of Vishakhapatnam suffered huge damage. In rural areas, thousands of hectares of agriculture, horticulture plantations and roofs of huts were affected due to high wind speed. Urban and rural areas have suffered a lot of economic loss. The main objective of this research was to identify and quantify the damage to agriculture and vegetation caused by HUDHUD cyclone .In this study satellite datasets acquired before and after the cyclone have been used; image processing techniques need to be carried out to assess the changes of pre and post cyclone. Applying Image classification techniques to assess the damage. Vegetation index techniques are being used with special reference to biomass quantification. Eventually HUDHUD cyclone has done significant damage to the rural and urban areas of Visakhapatnam.

Climate Change, 2016, 2(8), 283-291

Hydro-climatic situation and water management practices in parts of trans-Himalayan region of Nepal

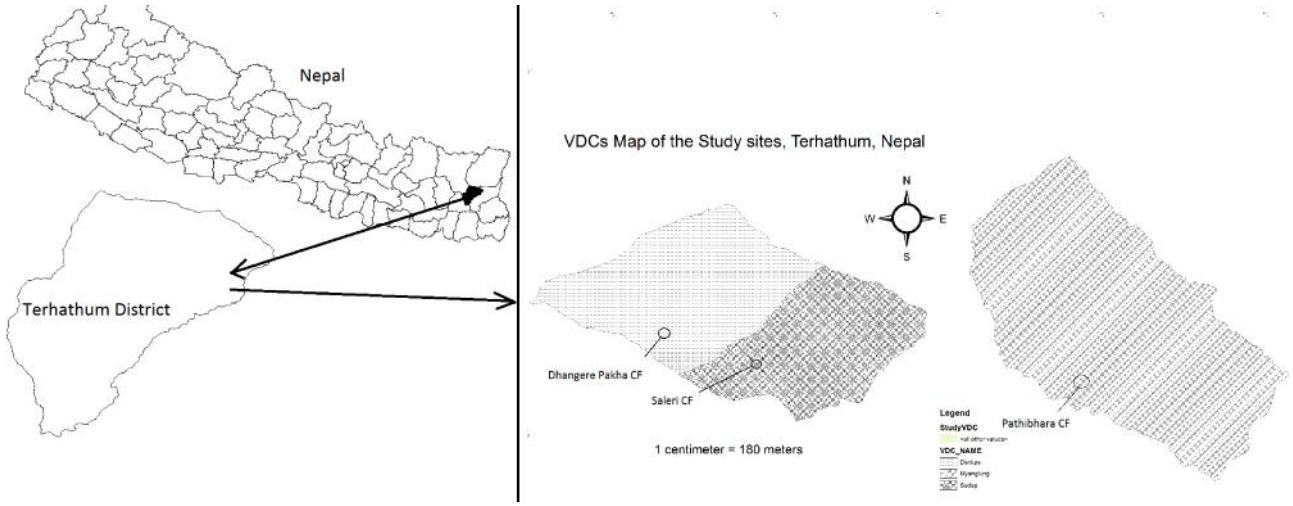
Gautam NP

Mustang is located in North Western part of Nepal and is also known as trans-Himalayan region. This paper is made from recent observation of Jomsom, Dhakarjun and Phalak regions along with rainfall and water flow data availed from Jomsom station of Mustang. The district generally gets very less amount of annual rainfall being a leeward side in Nepal. This paper has been prepared to explore hydro-climatic conditions along with social status especially for water management found on those regions in the Mustang district. Annual and seasonal rainfall patterns were analyzed for Jomsom station. It is learned from this study that water management practices applied on those villages will be inspirational to water scare regions.

Climate Change, 2016, 2(8), 292-299

Evaluating Climate Change Resilience Capacity of Community Forests Users in Terhathum Districts

Ram Asheshwar Mandal, Pramod Kumar Jha, Devi Chandra Pokhrel



Nepal is implementing the national adaptation programme of action (NAPA) through local adaptation plan of action (LAPA) to address issues of climate change. Therefore, this research was objectively carried out to explore the climate change impacts and susceptibility of community forest users and assess and compare their resilience capacity. Three community forests and users namely Dhangere Pakha, Saleri and Pathibhara of Terhathum district, Nepal were selected for the study. The stratified random sampling was used to gather the data applying randomized block experimental design (RBD). Altogether, ninety two households were interviewed. In addition, nine meetings, three field observations and four workshops were done to list out impacts of climate change and rank them. Besides, interactions were carried out to find the availability of human, social, financial, natural and institutional capacity and assess its susceptibility, resilience capacity and effectiveness. The vulnerability scoring was assessed using Likert scale. Statistically available resources and resilience capacity of users of community forests were assessed and then compared applying Kruskal Wallis and Mann- Whitney U test. The major climate change impacts like drought, invasion of *Lantana camara* and drying water sources were listed and ranked as 1st, 2nd and 3rd respectively. The resilience capacity was scored 4 to control fire, medium nearly 1.33 to 2.67 to manage water and it was the least to fight against invasion of *Lantana camara* only 0.67. The statistical tests showed that there were no significant differences in livelihood resources among and between the users at 5 % level of significant.

Climate Change, 2016, 2(8), 300-312

RESEARCH

Restoration of saltmarsh as mitigative measure of climate change impact at Chittagong coastal area of Bangladesh

Islam MS, Al. Imran M, Mandol S, Bhuyan MS

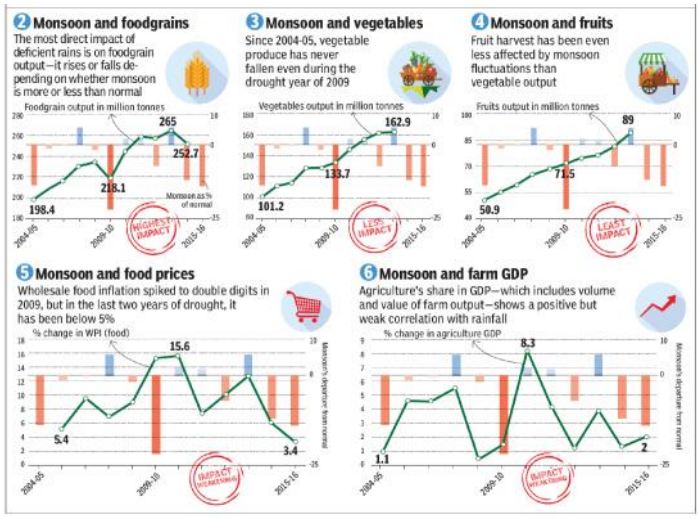
The present study was carried out at Chittagong coastal area of Bangladesh to restore the saltmarsh from the month of December' 2009 to the month of November' 2010. Restoration of existing coastal salt marshes of Bangladesh will enhance the accretion of land in the coastal region by increasing sedimentation and reducing erosion via the establishment of complex root system of salt marsh vegetation in the intertidal zone. The study area was vegetated by salt marsh plant *Porteresia coarctata* with a slope of 1% of plain land topography. In the recent study, there was found significant variations among air temperature, water temperature, soil temperature, sea water salinity, dissolve oxygen, water transparency, tidal height, percentage of sand, bulk density, soil organic carbon and plant biomass with the seasons ($P < 0.05$). Fertilization showed a positive correlation with plant biomass and growth/decay rate of at 5% level of significance and it was negatively correlated with water temperature and soil temperature at 1% and 5% level of significance respectively. From the present study it is evident that in Salt Marsh Restoration Site (SMRS) the remarkable changes in some of the factors studied rather than Reference Site (R) which could be helpful for the coastal environment as well as for the local community in the long run. Restoration, conservation and management of productive albeit degraded saltmarsh needed to cut down piquancy of climate change impacts.

Climate Change, 2016, 2(8), 313-329

SUPPLEMENTARY: WATER & LIVELIHOOD ADAPTATION

National Level Seminar on Climate Change, Water Resource Management and Livelihood Adaptation

Kirit Shelat



Indian Economy is doing extremely well. The rate of growth of GDP is between 7 to 8%. Poverty in rural areas has declined from 80% to 20% prior to Independence. Country used to import food grains in the initial years, but since then it has gained self sufficiency and now exports. Agriculture growth has been steady at the average of 2% to 4% except last two years. Although rural livelihood has improved, there are huge numbers who are behind poverty line. The farmers like to leave farming as it is not profitable – some wed Naxalism – others migrate. Although Country has achieved Food Security, now guaranteed it to the poor people by an enactment, the livelihood is an issue. Irrespective of impact of Climate Change, the Food Security and Livelihood are inter-related and there are problems.

Climate Change, 2016, 2(8), 330-341

Summary of National Level Seminar on Climate Change, Water Resource Management and Livelihood Adaptation

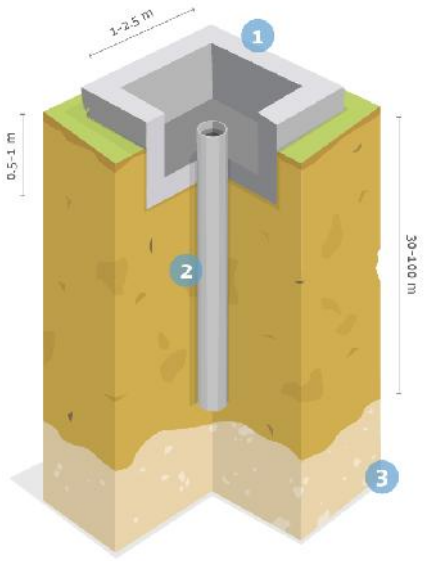
NCCSD

The increase in temperature has already adverse impact on productivity of wheat and rice. There are already traditional stress resilient crops – like Millet, Sorghum, Maize, Nagli ,But due to availability of wheat and rice through public distribution system (PDS) at a cheap price demand for these food grains have gone down. They used to be part of daily food in many most families of Gujarat. There is need to revive them. Perhaps MSP (Minimum Support Price) on these crops can be increased to make them attractive again to farmers and they need to be made available under PDS at cheaper rate then wheat and rice. It must be understand with climate change – crop pattern will have to be changed those crops which are suitable /can survive will have to be promoted. This is the need of time for providing Food Security.

Climate Change, 2016, 2(8), 342-362

Gujarat Drip Irrigation Approach

Sugoor RK

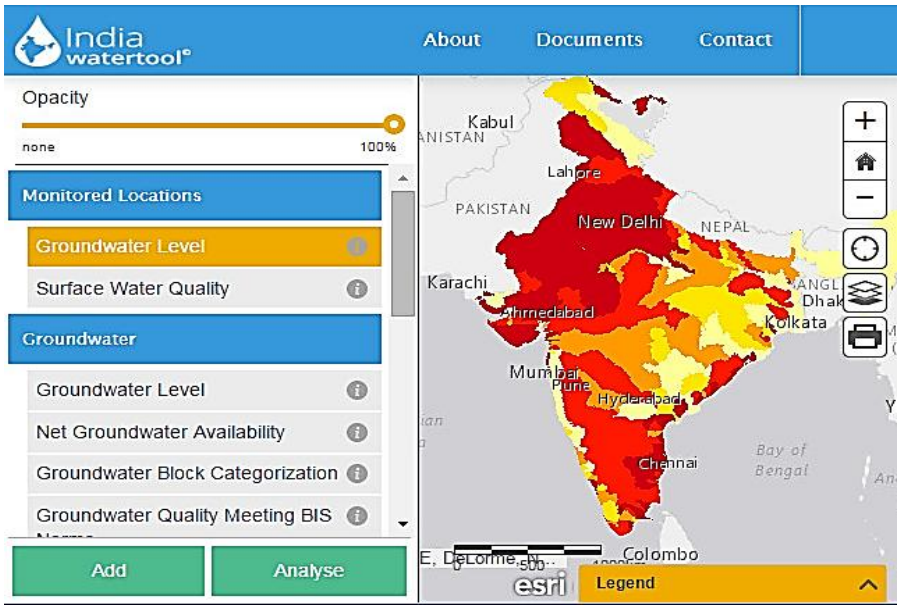


Climate-smart agriculture, forestry and fisheries (CSA), as defined and presented by FAO at the Hague Conference on Agriculture, Food Security and Climate Change in 2010, contributes to the achievement of sustainable development goals. It integrates the three dimensions of sustainable development (economic, social and environmental) by jointly addressing food security and climate challenges. CSA is an approach to developing the technical, policy and investment conditions to achieve sustainable agricultural development for food security under climate change. The magnitude, immediacy and broad scope of the effects of climate change on agricultural systems create a compelling need to ensure comprehensive integration of these effects into national agricultural planning, investments and programs. The CSA approach is designed to identify and operationalize sustainable agricultural development within the explicit parameters of climate change.

Climate Change, 2016, 2(8), 363-414

Indian Food Security Portal

Jaspreet Aulakh



Key Features : Price Watch; A Network of Experts; Themes and Discussions; Interactive Maps; Resources (DNP) (Ag Commodity Prices and Returns); Ag Commodity Market Tools; Media Analysis Tools; Electronic and In person Dialogue.

Climate Change, 2016, 2(8), 415-422

Water resources management in Gujarat

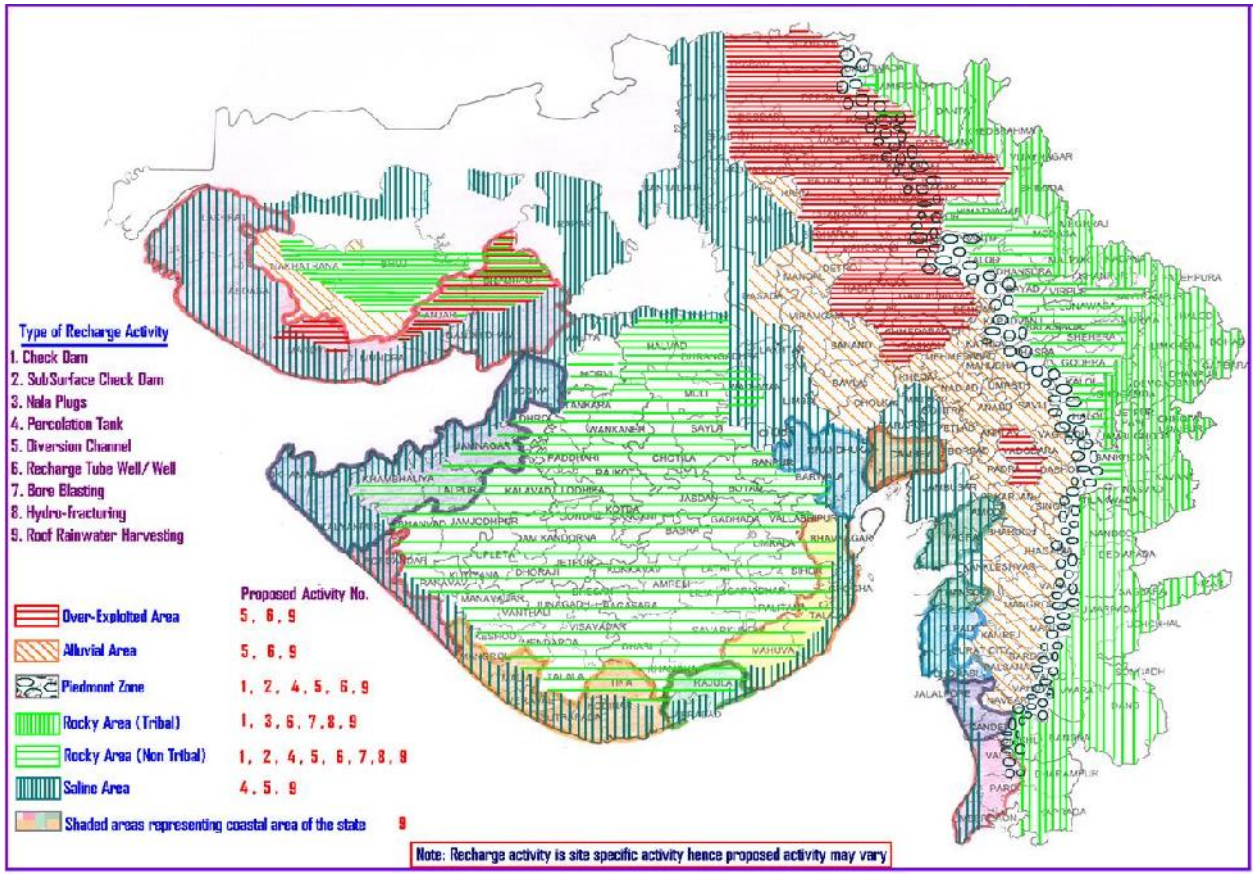
Raval MP

Prevention of salinity ingress and thereby improvement in surface & ground water quality; Flood protection and prevention of land erosion of low lying left bank area; Shorter connectivity to Dahej-Hajira (Olpad-Hansot road) by six lane road on barrage top; Domestic water supply (60 MCM) for 4 towns and 192 villages; Assured water supply (200 MCM) to industries in GIDC and PCPIR, Dahej. Lift irrigation facility to the area located at higher level.

Climate Change, 2016, 2(8), 423-459

Water resource management at local level

Sama RK



Rain water conservation including rain water harvesting; Effective use of surface run off; increase permeability, absorption and increase bio-mass; Improving ground water storage; natural and artificial recharge; Soil and moisture conservation for raising land productivity; Natural farming: improve soil structure; choose suitable crop variety and better agriculture practices; Reduce evo transpiration: specific form of village, mulching of soil; Ensure efficiency of systems; Zero water foot print in industry.

Climate Change, 2016, 2(8), 460-480

Agriculture: Water Management

Shital Sharma

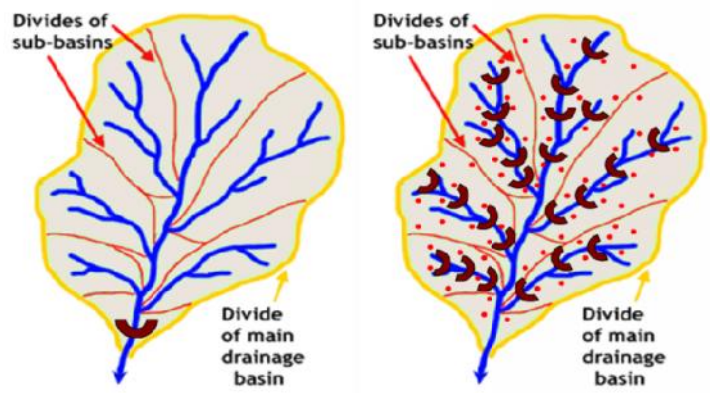
Unit cost of Micro-Irrigation systems should be revised as per prevailing Market rates. Pending liability of 2014-15 could not be cleared by State Govt. hence the permission is sought from GOI to utilize unspent balance of the year 2014-15 to utilize in 2016-17 for clearing the pending liability of 2014-15 as per GOI funding pattern 60:40. State should not be emphasised to follow DBT as the

financial condition of farmers in our state is not good and farmers are not in position to bear the full amount of Drip system. However DBT is being followed in case of Sprinkler systems in our State.

Climate Change, 2016, 2(8), 481-504

Climate Change, Groundwater and Livelihoods: India's Opportunities for Adaptation and Mitigation

Tushaar Shah



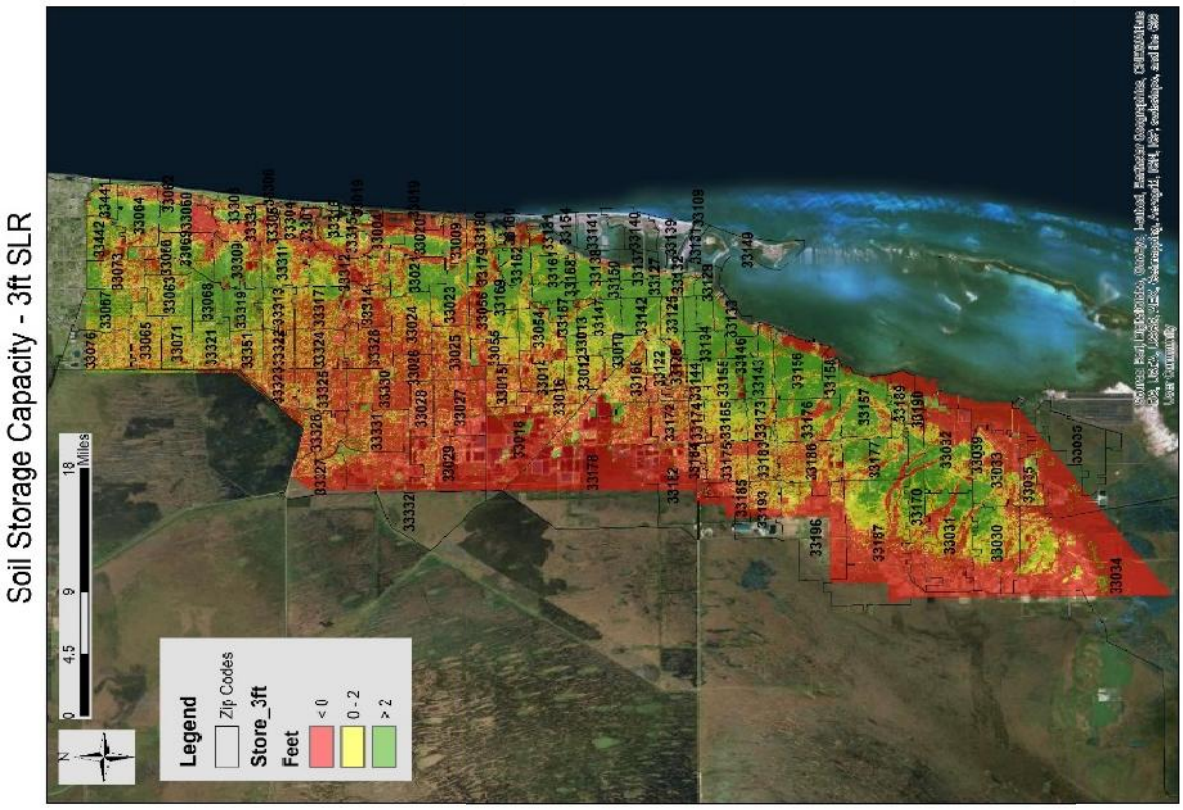
Indo-Gangetic Plains get snow-melt until 2030, and severely reduced snowmelt run off thereafter. Western and peninsular India will get 5-10% more precipitation but in intense rainfall events. Fewer very wet days; more dry days; more frequent floods and droughts; Monsoon crops at higher risk of flood/drought; Rabi and summer will experience higher ET demand; Surface reservoirs get more run-off but will also lose more; irrigating the same command will need larger dam storage.

Climate Change, 2016, 2(8), 505-525

REPORTS

Assessing Climate Vulnerability in Disparate Places–Alaska and South Florida

Frederick Bloetscher, Colin Polsky, William Schnabel, Billy Connor



Florida and Alaska are opposites when it comes to many things. Alaska is cold; Florida is the land of eternal summer. Alaska has snow and blizzards; Florida has tropical storms with pound in grain. Sea level rise is a critical concern to much of Florida's coast, and loss of beach sand is an enduring issue where storms or development have occurred. In Alaska, the coast is a mix of mountains and huge lengths of coastline that is along low lying terrain which suffer from severe coastal erosion resulting of loss of seaice in the fall months. Temperatures melt the permafrost at ever-increasing depths in Alaska, but heat is not new in Florida, where permafrost has not existed in millions of years, if ever. So how the setwostates are located over 5000 miles apart, similar? That was the question posed before the Arctic-Florida conference in 2016. The result was that Alaska and Florida do share many commonalities, and there is much to learn from each other. For example, Alaska's population continues to grow as does Florida's. In both states there are changes in wildlife. Florida has incurred changes in migration patterns and native populations. In Alaska there is an increased incidence of diseases in wild animals which are a food source for many Alaskans. Warmer waters are causing fish to change migration patterns. Likewise diseases have impacted at-risk communities in Alaska; such a prediction has recently been discussed for Florida. Adaptation strategies are underway in Florida, which can help in Alaska. Roads, water supplies, water storage, waste water and storm water are all issues that pose challenges to both states, so there are answers in infrastructure adaptation strategies. Many common problems can be solved by sharing information. The Florida–Alaska connection is an example of looking outside the box to find ideas that can be useful to those deemed to be far different.

Climate Change, 2016, 2(8), 526-550

Community Education on Climate Change Adaptation: A Biproduct of Integrated Water Resources Management, in Durlung Basin Nepal

Sabita Aryal Khanna, Rijan Bhakta Kayastha

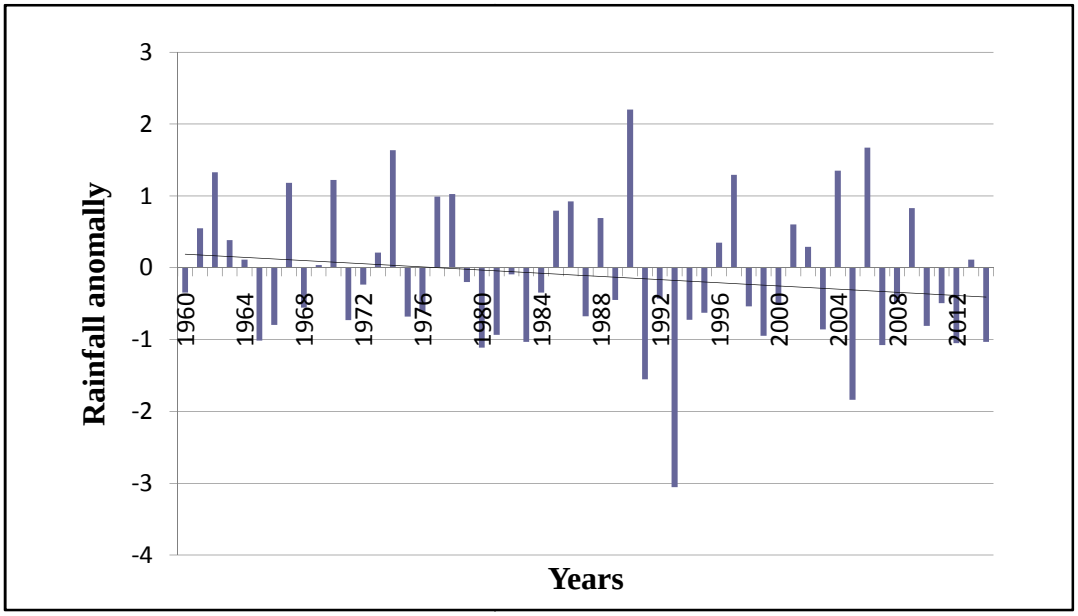
The impacts of climate change on the water cycle are believed to have considerable consequences. Involvement of local government school on measurement of climatic variable such as temperature, humidity, rainfall, river water level etc. and publishing this information on public board has been able to proof a step to build capability on climate Change Adaptation. This process has boost the people's consciousness about the change of water resource availability as well as change in climatic parameter which gets related to water ,agriculture, forest, trading and many more resources on which their livelihood is dependent on.

Climate Change, 2016, 2(8), 551-556

Examining Rainfall and Temperature Pattern Change over Time: A Case of Kishapu District, Shinyanga Region in Tanzania

Katunzi, Bushesha, Mwakalila

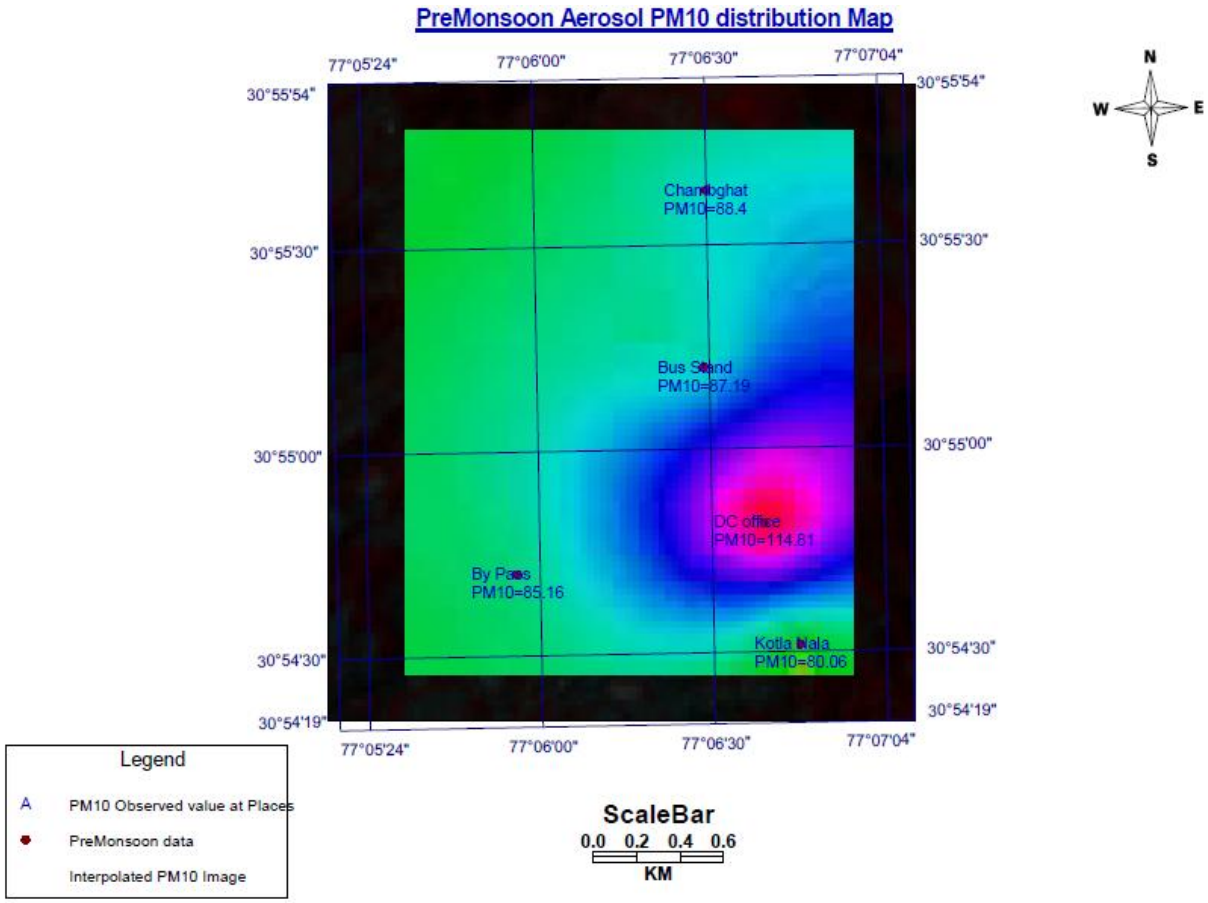
This paper examined rainfall and temperature pattern change over time in Kishapu district of Shinyanga region in Tanzania. Specifically, the study identified changes in rainfall and temperature patterns for the period 1960s-2010s in the study area. Six villages were selected representing three agro-ecological zones: highlands, middle and lower lands. A total of 235 heads of households (10%) were selected for the study. Data was collected using semi-structured questionnaires and focus group discussions. Descriptive statistical analysis was used to analyse quantitative data using Statistical Package for Social Sciences (SPSS) version 20. Microsoft Excel was used for trend analysis. Content analysis was used to analyse qualitative data from key informants and focus group discussions. Findings from rainfall and temperature records analysis showed that rainfall was decreasing while temperature was increasing between 1960 and 2014 by 1.1% and 2.5% respectively. Findings indicated further that 99% of respondents perceived amount of rainfall in the area to have decreased in the past 30 years and 96% were of the opinion that temperature has been increasing.



Climate Change, 2016, 2(8), 557-572

Air quality status in fast developing city of Western Himalayan State of India

Kartikey Sahil, Aggarwal RK, Bhardwaj SK



A study was carried out to assess the status of air pollutants in Solan city and to find out the air quality index (AQI). The concentration of PM_{10}, SO_2, NO_2 and VOCs was found highest at commercial area while the minimum concentration was found at state highway except VOCs which was lowest at industrial area. The air quality index during post monsoon and pre monsoon

seasons was “Moderately polluted” at three locations while at other two locations it was found to be “Fairly clean”. The investigation found that the maximum concentration of Fe was observed in the city followed by Mn while the concentrations of As, Pb, Ni and Cu was found in less concentration.

Climate Change, 2016, 2(8), 573-588

Changing Climate and its effect on Cyanobacteria

Gupta P

Cyanobacteria are the most primitive life form on earth, play major role in scavenging volume of carbon dioxide and produces maximum oxygen in the atmosphere and metabolites through photosynthetic process. Summer month and elevated water temperature for longer period in combination with pollutants and liquid waste discharge created suitable environmental condition for growth of cyanobacteria. During the survey, altogether 105 cyanobacteria comprising 93 species, 09 variety and 03 forms were identified in samples collected from 55 water bodies of Maldah District. Out of 93 species, 37 species have been scruitinised for properties of benefit and nuisance. *Oscillatoria* was recorded most dominant genus followed by *Anabaena* and *Microcystis*. Property-wise maximum 24 species were recorded as indicators of pollution followed by 14 species for antibiotic, medicines, vitamins, etc., 10 species for lipid and 4 species for protein and for other beneficial properties like carbohydrates and bio-fertilizer & land reclamation recorded in 3 species and metal removal and indicator of clean water and taste and odor recorded in 2 species. However, as 13 species were recorded under the category toxin necessary precautionary measures have been suggested for preventing from any deleterious impacts likely to cause due to toxins of varying nature as reported for its production by the bloom forming species. Overall, as compared to the beneficial properties, nuisance species were evaluated 22.89% only. Hence, keeping in view of 77.10% species of beneficial properties as recorded may help in betterment of mankind in future.

Climate Change, 2016, 2(8), 589-600