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International Conference on Global Warming and
Climate Change
(GlobeWarm '18)

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Committee of the GlobeWarm '18

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(GlobeWarm '18)

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MESSAGE FROM THE HOSTING PARTNER GlobeWarm '18



On behalf of Universiti Putra Malaysia, I like to take this opportunity to congratulate the International Institute of Knowledge Management (TIKM), Sri Lanka for organizing the International Conference on Global Warming and Climate Change 2018 (GlobeWarm'18) on 4th-5th October, 2018 in Bangkok, Thailand.

With the theme “Creating a global dialogue towards a sustainable future” is an auspicious occasion to bring together all stakeholders involved directly or indirectly in responding to the impact of global warming and climate change. We need to highlight to the world that global warming is real and make it as the top of many policy makers’ agenda for every country. Regardless of whether it is natural or human-induced, its effect is across geopolitical borders. We have seen the devastating effects of extreme weather that resulted in economic loss and reduced quality of life. We must act now; disseminate the latest news on climate research, the application of green technology to curb carbon emission, and most importantly educate the community so that they are better informed on the potential impact of climate change on public health.

I hope the scientific evidences and current findings presented in this conference provide us with a promising sustainable future.

Thank you,

A handwritten signature in black ink, appearing to read 'Zaharin', with a long horizontal stroke extending to the right and a small mark below the end of the signature.

Prof. Dr. Ahmad Zaharin Aris,
Dean, Faculty of Environmental Studies,
Universiti Putra Malaysia,
Malaysia.

MESSAGE FROM THE CONFERENCE CHAIR GlobeWarm '18



GLOBWARM-2018 is a great platform & scientific key to understand the Mother Nature and environment. The definition of environment extends from micro distance of 10-16 m to the macro distance of 1023m which is a near black hole. The Universe and everything is in the control of gravitational force. This Global Atmosphere, Radiation environment, due to spinning and rotational motion creating new situations, new environment, new climate. One should know universe and universal bodies are in a constant state motion.

Today's environmental distance is infinite and related to every individual. It is the duty of every individual to protect the environment. Let us say "No" to the environmental extremes. Protective layers of the atmosphere are losing their identity. Intensity of the radiations is increasing; atmospheric tolerance is ceasing.

Environmental education is important criteria for every individual. Balanced working of present, planning the future with manageable environmental wastage by correction of the past mistakes. Government strong will, participation of Public and Private sector at the root level regularities can sustain the environment and global economy as well. Natural resources, speedy production, imbalanced consumption, non bio-degradable cosmetic products, and wastage production covered larger width & depth of the earth even at larger height of the atmosphere.

The violation of conservation law has been reached maximum. The GHG emission traps more heat and liberation in the climate. It is increasing drastically at every place thus warming the globe. The rising temp is melting up the ice caps at the poles and the latent heat of sea water rises up and in turn cyclic rise of the temperature. Thus exothermal chemical reactions are resulting the global warming.

The Clean Energy, Green technology of smart living with sustainable smart thoughts is the essence of today's life. Climate has no boundaries, with bunch of humanity thoughts, let us accept the mistake. Share the climate innovations. Unite everyone in such occasions. A green economy peer discussion definitely spreads the fragrance of global humanity and peace. Global vision of humanity and peace is greater initiatives of balanced standard of life. The

Food, Water, Air is the global property of the nature. Your positive response & kind cooperation is appreciable forever. You ALL are WELCOME.

Prof. Dr.Kamani K K

CEO APCEO senior Expert Asia and world wide,
Global Economic Adviser,
Department of Higher Education,
Govt of Karnataka,
India.

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|---------------------------|
| ORAL PRESENTATIONS |
|---------------------------|

| |
|--|
| CLIMATE CHANGE, AGRICULTURE AND GREEN INITIATIONS (A) |
|--|

| | | | |
|----|----|---|----|
| A1 | 01 | FSM Biscuits and Doughnuts from Various <i>Camote</i> and Wheat Flour Composites | 02 |
| | | <i>L.N. Ragus</i> | |
| A2 | 02 | Climate Variability and Rice Supply Response in Myanmar | 03 |
| | | <i>Y. Hein, K. Vijitsrikamol, W. Attavanich and P. Janekarnkij</i> | |
| A3 | 03 | Agricultural Adaptation Strategies to Climate Change-Induced Salinity Intrusion in Southwest Coastal Bangladesh | 04 |
| | | <i>M.A. Asad, M. Bodrud-Doza and M. Das</i> | |
| A4 | 04 | Extraction of Bioactive Compounds from Mango (<i>Mangifera indica</i> L. var. <i>Carabao</i>) Seed Kernel with Ethanol–Water Binary Solvent Systems | 05 |
| | | <i>K.J.A. Lim, A.A. Cabajar, C.F.Y. Lobarbio, E.B. Taboada and D.J. Lacks</i> | |
| A5 | 05 | Tillage Practices and Different Nutrient Management on the Growth and Yield of Lowland Rice in Leyte, Philippines | 06 |
| | | <i>M.G.M. Abit and R.O. Escasinas</i> | |
| A6 | 06 | Cellulose Nanocrystals from Mango (<i>Mangifera indica</i> L.) Processing By-Products | 07 |
| | | <i>F.D.C. Siacor, J. Vargas, H. Lai, Q. Chen, E.B. Taboada and R.C. Advincula</i> | |
| A7 | 07 | Successive Extraction of Valuable Components of Waste Mango Peels | 08 |
| | | <i>A.R. Labrada, C.F.Y. Lobarbio and E.B. Taboada</i> | |
| A8 | 08 | Climate Change, Food Security and Growers Insurance Coverage: The Case of Bangladesh | 09 |
| | | <i>A. Rahman</i> | |

- A9 09 Growth, Yield Response and Profitability of Lowland Rice (*Oryza sativa* L. var. PSB Rc18) to Various Organic Production Systems 10
W.B.D. Peña and B.C. Ratilla

CLIMATE CHANGE, WEATHER INFORMATION MANAGEMENT AND TECHNOLOGY (B)

- B1 10 A Review of Current Technical Development of Vertical Axis Wind Turbines and Their Braking System Technology for Low Speed, Urban and Offshore Areas 11
T.P. Syawitri, Y.F. Yao and B. Chandra
- B2 11 Non-Stationary Frequency Analysis Considering Location Parameter and Covariate of Meteorological Variables: Yangpyeong Site 12
O. Lee and S. Kim
- B3 12 Tehri Dam - An Unprecedented Climate Change Disaster 13
M. Chaudhary

CLIMATE MODELLING AND PREDICTIONS (C)

- C1 13 Bamboo Ecosystem: An Overlooked Carbon Sink 14
D.C. Vanlalfakawma, S.K. Sen and S.K. Tripathi
- C2 14 CFD Simulation of Three-Straight-Bladed Vertical Axis Wind Turbine at Low Speed Ratios 15
T.P. Syawitri, Y.F. Yao and B. Chandra
- C3 15 Performance Evaluation of an Automated Two-Wire Data Acquisition Mechanism for Tipping-Bucket Rain Gauge 16
M.T. Tabada Jr. and M.E. Loretero
- C4 16 Comparative Study of Surface Ozone, Black Carbon and Particulate Matter in Delhi, India during 2017 17
C. Tyagi, N.C. Gupta, K. Sarma, V.K. Soni and U. Pathak

| | | | |
|----|----|---|----|
| C5 | 17 | Community Preparedness for Flood: The Malaysia Experience | 18 |
| | | <i>T.I.T. Hanidza and A.A. Makmom</i> | |

CLIMATE CHANGE ADAPTATION AND ENERGY (D)

| | | | |
|----|----|--|----|
| D1 | 18 | Adaptation to Climate Change: An Anthropological Study on Changing Livelihood Strategies in South-west Coastal Bangladesh | 19 |
| | | <i>M.A. Sarder</i> | |
| D2 | 19 | Impact of Climate Change on the Mangroves of Indian Sundarbans | 20 |
| | | <i>S.B. Nandan and S. Sreelekshmi</i> | |
| D3 | 20 | Capacity Credit Approximation Based on Capacity Factors of Solar Power in Korea | 21 |
| | | <i>C. Paik and Y.J. Chung</i> | |
| D4 | 21 | The Role of the Environmental Protection Police Unit in the Protection of Wetlands: A Case Study of Kajansi Peri-Urban Areas in Uganda | 22 |
| | | <i>K.A. Ronald, B. Hannington and J. Lar</i> | |

CLIMATE CHANGE, POVERTY, GENDER ISSUES AND MIGRATION (E)

| | | | |
|----|----|--|----|
| E1 | 22 | Female Contribution to Grassroots Innovation for Climate Change Adaptation in Bangladesh | 23 |
| | | <i>M.B. Khalil, B.C. Jacobs, N. Kuruppu and K. McKenna</i> | |
| E2 | 23 | Climate Change and the Realization of the Right to Food in Urban South Africa | 24 |
| | | <i>U.C.A. Mokoena and A.O. Jegede</i> | |
| E3 | 24 | Is Critical Slowing Down A Good Indicator for Climate Change? | 25 |
| | | <i>J. Tredicce, C. Metayer and J.M. Boyer</i> | |

VIRTUAL PRESENTATIONS

- 25 Sustainable Infrastructure for Climate Change Adaptation: Good Practices from Water Treatment Facilities 27

C.C. Casado

- 26 The Effects of the Climatic Conditions Changes in the British Isles for the Next 85 Years and the Measures of Government 28

Y. Xin

ORAL PRESENTATIONS

A1

[01]

FSM BISCUITS AND DOUGHNUTS FROM VARIOUS CAMOTE AND WHEAT FLOUR COMPOSITES

L.N. Ragus

*College of Micronesia-Federated States of Micronesia Cooperative Research and Extension,
Federated States of Micronesia*

ABSTRACT

Camote (Ipomoea batatas (L.) Lam var. batatas) is considered a typhoon and famine crop, which is a potential import substitute for wheat flour in preparing popular snacks particularly biscuits and doughnuts at the Federated States of Micronesia (FSM). This study aimed to determine the appropriate mixture of *camote* flour from dry-, medium- and wet- fleshed roots and the wheat flour acceptable to consumers for making these two snacks. *Camote* flour from dry-, medium- dry and moist-fleshed roots was mixed with wheat flour in different proportions (0, 1/2 and 2/3 cup for every one measurement cup). Pure wheat flour and pure *camote* flour served as control treatments. Doughnut preparation consisted of eight flour composites. Biscuit making included seven combinations. Descriptive ratings for eating qualities (texture, color, taste, and general acceptability) ranged from 1 to 4 indicating different levels of acceptability. Twenty seven panelists conducted biscuit sensory evaluation while 26 evaluators judged doughnuts from different flour composites for eating qualities. Results of sensory evaluation of biscuits and doughnuts showed no significant differences among the treatments using Excel t-test paired two samples for means. This trend provides opportunity for *camote* as a potential substitute to wheat flour in these pastries. Substitution of *camote* to *wheat* flour in biscuit and doughnut production will reduce the FSM wheat flour import expenditures. In the long run, local *camote* production for food security and livelihood with this plant as raw materials for flour will be increased.

Keywords: *Camote*, flour composites, biscuits, doughnuts, acceptability

A2

[02]

CLIMATE VARIABILITY AND RICE SUPPLY RESPONSE IN MYANMAR

Y. Hein, K. Vijitsrikamol, W. Attavanich and P. Janekarnkij

*Faculty of economics, Kasetsart University, Thailand***ABSTRACT**

Myanmar produces 28 million ton of rice per year and it has an enormous potential to increase its rice supply for regional food security. However, its production is not stable over time because of the challenges of climate change. As facing climate variability, Myanmar rice supply is not primarily depended on its own price, but also significantly on climatic factors. Aimed at the steady production with respect to climatic factors, it is essential to estimate how the climate variability effects on rice supply of the country. The study attempts to analyze the four different rice supply responses to climate variability and its price, using the annual data at 14 different regions of Myanmar during 1987-2016. The empirical outcome of panel data analysis shows the rice supply response follow the theoretical concept, positive response to own price in three cases, except in Delta regions. In relation to climate variability, maximum temperature and annual precipitation tied the annual rice production in specific regions. Increasing maximum temperatures threaten the annual production of the country, aside from the hilly regions. Annual precipitation is significantly associated with the annual rice production, positively in the dry zone and hilly regions, but negatively in the coastal area. As to diverse rice supply responses to climate conditions in different regions, it highlights the important of location specified strategy for climate adaptation and locally fixed policy implementation to maintain stable rice supply in the country.

Keywords: climate variability, Myanmar rice sector, supply response

A3

[03]

**AGRICULTURAL ADAPTATION STRATEGIES TO CLIMATE CHANGE-
INDUCED SALINITY INTRUSION IN SOUTHWEST COASTAL BANGLADESH**

M. A. Asad, M. Bodrud-Doza and M. Das

*Disaster Management and Climate Change Programme, BRAC Centre, Bangladesh***ABSTRACT**

The southwest coastal region of Bangladesh is experiencing salinity intrusion and the situation is only expected to exacerbate under the influence of climate change. This study explores the current and future scenario of salinity intrusion and its impact on the agricultural production. The adaptation capacities of the local community and the current strategies are also reviewed to identify the gaps in adaptation practices. In this study, impacts of salinity intrusion on agriculture in the coastal area of Bangladesh is outlined, incorporated with GIS mapping, and illustrating highly vulnerable areas. Local communities experience direct damage of crops, decreasing freshwater fish stocks, and income loss, which leads to an increased vulnerability. People are shifting towards aquaculture which is also a prime economic activity in this region but it is becoming evident that land used for shrimp farming are causing devastating effects on farmers as it can no longer be used for growing crops and vegetables. This, subsequently, triggers and demands adaptive responses in livelihood choices and production patterns. In this vulnerable situation, introduction of high yield saline tolerant crops with proper land use management can enhance agricultural production in the study area. Other adaptation technologies in the agricultural sectors e.g. aquageoponics, hydroponics, integrated soil nutrient management, crop diversification, vertical gardening, rain feed irrigation etc. can be introduced in the community as feasible adaptation options. Policy makers should consider high salinity as a disaster for the affected areas and promote ecosystem friendly community based climate change adaptation technologies for sustainable agricultural development and livelihood creation.

Keywords: salinity intrusion, agriculture, climate change adaptation, southwest coastal zone Bangladesh

A4

[04]

**EXTRACTION OF BIOACTIVE COMPOUNDS FROM MANGO (*Mangifera indica*
L. VAR. *Carabao*) SEED KERNEL WITH ETHANOL–WATER BINARY SOLVENT
SYSTEMS**

K.J.A. Lim, A.A. Cabajar, C.F.Y. Lobarbio, E.B. Taboada and D.J. Lacks

University of San Carlos, Philippines

ABSTRACT

Mango seed kernel, a waste material obtained from the mango fruit processing industry, can be valorized as a potential source of bioactive compounds. Binary mixtures of ethanol and water, used in solid-liquid extraction (SLE), have drawn interest as an effective means of recovering phytochemicals from plant materials because these solvents can be used in food applications and their synergistic effect makes them a superior solvent over their pure counterparts. Total phenolic content (TPC) and HPLC chromatograms of each ethanolic extract revealed that ethanol concentration has a significant effect on phenolic compound recovery, wherein, TPC of mango kernel vary from 18.19 – 101.68 mg gallic acid equivalence (GAE) per gram of sample. Subsequently, the antioxidant activities (AOAc) of the extracts, measured by scavenging activities with the DPPH⁺ radical and reducing capability with FRAP assay, range from 8.19-85.45 mmol/L and 3.82-55.61 mmol/L Trolox equivalence, respectively. The solvent containing 50% (w/w) ethanol-water has the highest TPC and exhibited the most potent reducing and radical scavenging activities. With the use of an HPLC-UV/Vis, gallic acid, caffeic acid, rutin and penta-*O*-galloyl- β -D-glucose are identified to be present in the mango seed kernel. Results show that the mango seed kernel is a viable source of bioactive compounds which can be recovered with water-ethanol binary solvent systems.

Keywords: mango seed kernel, valorization, solid-liquid extraction, bioactive compounds, polyphenols

A5

[05]

TILLAGE PRACTICES AND DIFFERENT NUTRIENT MANAGEMENT ON THE GROWTH AND YIELD OF LOWLAND RICE IN LEYTE, PHILIPPINES

M.G.M. Abit and R.O. Escasinas

*Department of Agronomy, Visayas State University, Philippines***ABSTRACT**

Reduced intensity of tillage and proper nutrient management are measures of climate change mitigation and these are frequently proposed to reduce loss of soil organic carbon and improvement of soil quality. A field study was conducted to determine if minimum tillage and nutrient management can be utilized by Leyte irrigated-lowland farmers and to determine the influence of tillage and nutrient management on the growth and yield of rice under irrigated-lowland condition. Tillage practices: minimum (single rotavation, without plowing and leveling) and conventional (plowing, harrowing, and leveling) and different nutrient management (unfertilized, organic fertilizer (2 t ha⁻¹), organic (2 t ha⁻¹) plus inorganic (60-30-30 kg ha⁻¹ N, P₂O₅, K₂O) fertilizers, and inorganic alone (120-60-60 kg ha⁻¹ N, P₂O₅, K₂O) were arranged in a split-plot RCBD. Organic fertilizers were applied one week before transplanting. Two (12 and 35 DAT) and three (12, 35, and 55 DAT) split applications of N were carried for low and high rates of inorganic fertilizers, respectively. Minimum tillage resulted in 3.2 t ha⁻¹ grain yield but was not different from the conventional tillage (3.26 t ha⁻¹). Combination of organic plus low level of inorganic fertilizers produced similar grain yield rice with plants applied high rate of pure inorganic fertilizer but reduced the production cost by 12.4%. Land prepared using minimum tillage lowered the production cost by 19.6% compared to the conventional tillage. Results demonstrated that there is opportunity for Leyte farmers to utilize minimum tillage and organic plus low level of inorganic fertilizers in irrigated-lowland rice production.

Keywords: tillage practice, inorganic fertilizer, organic fertilizer, lowland rice

A6

[06]

**CELLULOSE NANOCRYSTALS FROM MANGO (*Mangifera indica* L.)
PROCESSING BY-PRODUCTS**

F.D.C. Siacor, J. Vargas, H. Lai, Q. Chen, E.B. Taboada and R.C. Advincula

University of San Carlos, Philippines

ABSTRACT

One of the major fruit species grown in the Philippines is mango. During mango processing, huge amounts of peels and seeds are generated. As of 2016, over 350,000 MT of by-products are produced that are simply discarded and left to degrade in dumpsites. Among these waste materials, mango husks contain the highest amount of cellulose (55% - 58%), hemicellulose (23% - 29%) and lignin (16% - 24%). Hence, this biomass can be a raw material for cellulose nanocrystals (CNC) production. CNC is a green material used as a reinforcing agent for polymer nanocomposites that increases the performance of the polymer in terms of its chemical, thermal and mechanical properties. In this work, CNC was extracted from mango husk through the conventional acid hydrolysis method using concentrated aqueous sulfuric acid. Mango-derived CNC was initially characterized in terms of its thermal stability and the presence of functional group on its structure. The FT-IR spectrum of CNC revealed that hemicellulose and lignin were continuously removed as extraction progresses, leaving mostly cellulose in the structure of CNC. The degradation temperature of CNC is ~400°C, which is relatively high than those reported from previous studies. Finally, a process yield equal to 30% is obtained and this is comparable with CNC from pineapple, cotton and flax. To fully understand its properties and functionalities, the mango-derived CNC will be further characterized for its morphology, crystallinity index and thermal properties.

Keywords: mango husk, cellulose nanocrystal, hydrolysis

A7

[07]

SUCCESSIVE EXTRACTION OF VALUABLE COMPONENTS OF WASTE MANGO PEELS

A.R. Labrada, C.F.Y. Lobarbio and E.B. Taboada

*Department of Chemical Engineering, BioProcess Engineering and Research Center
(BioPERC), University of San Carlos, Philippines*

ABSTRACT

Mango (*Mangifera indica* L. Anacardiaceae) is among the tropical fruits abundant in the Philippines. It has established local and international markets both as fresh and processed fruit. Waste mango peels are generated daily in large quantities in mango processing industry adding up to the existing disposal problems. The recovery of valuable components from these waste by-products can address both economic and environmental concerns. Valuable components of mango peels include phenolic compounds, fat/oil, pectin and other dietary fibers. Industrial mango peel waste contains pulp residues having high sugar concentration. These soluble sugar are part of the valuable component of industrial mango peel waste. The use of ethanol at different concentration in removing the soluble sugar component of mango peel while preventing loss of pectin content was investigated. Dried waste mango peel powders were successively extracted with ethanol solvent of increasing concentration prior to pectin extraction. Sugar-rich stream and fat/oil-rich stream were successively extracted from mango peel waste leaving a mango peel residue having high dietary fiber content including pectin. Most of the phenolic compounds were extracted together with the sugar-rich stream.

Keywords: mango peel, extraction, pectin, lipids, sugar, phenolic compound

A8

[08]

**CLIMATE CHANGE, FOOD SECURITY AND GROWERS INSURANCE
COVERAGE: THE CASE OF BANGLADESH**

A. Rahman

Department of Economics, Independent University, Bangladesh

ABSTRACT

Bangladesh produced 39.10 Million tonnes of food grain in the year 2016-2017 which was lower than the previous year due to untimely flooding. The meteorologist relates this to climate change affect. Since Bangladesh is a climate vulnerable country with the heavy risk of climate related natural catastrophe the issue of food security has been echoed heavily in all concerned quarters of the country. Climate change is a reality and the growing numbers of people heavily depend for their food mostly on local supply. However, a little effort can reduce this risk to a large extent. It is well known that Bangladesh is full of wetland and a large number of “Char” (silted land) remains unused all over the country. These wetland and Char areas are very productive in producing cash crops with very little investment. But people living there are quite reluctant in taking risk. So if these people are given some sort of protection by providing insurance coverage in case of loss of output due to natural calamity the food shortage will disappear and most likely the country can export food. The paper will look into some vital char area and a particular wetland in North Eastern Bangladesh to see how the insurance issues convince them to produce more at a vulnerable situation.

Keywords: food security, climate change, Charland, insurance coverage

A9

[09]

GROWTH, YIELD RESPONSE AND PROFITABILITY OF LOWLAND RICE (*Oryza sativa* L. VAR. PSB RC18) TO VARIOUS ORGANIC PRODUCTION SYSTEMS

W.B.D. Peña and B.C. Ratilla

*Department of Agronomy, Visayas State University, Philippines***ABSTRACT**

Organic farming is the leading agricultural alternative to address the negative issues of conventional farming and an agriculture mitigation and adaptation practice addressing the climate change (Kasterine and Niggli, 2008). However, farmers are reluctant to adopt this practice due to limited proof its benefits. The study was conducted to evaluate the growth and yield response as well as profitability of lowland rice var. PSB Rc18 as affected by various organic production systems. The experiment was conducted at the Department of Agronomy, Visayas State University, Visca, Baybay City, Leyte, Philippines using PSB Rc18 rice variety in a lowland area which had been exposed to a similar system exposure for 5 croppings. Data on agronomic, yield and yield characteristics as well as treatment expenses and income were gathered. The findings disclosed that organic farmers' practice in Leyte promoted early heading and maturity of lowland rice, produced more filled grains, and promoted higher harvest index than the other production systems. The same treatment likewise generated higher net income than the other production systems. This indicates the profitability advantage of the organic production system in Leyte over the conventional system brought about by increasing yield and relatively lower production cost.

Keywords: growth and yield, lowland rice, organic production systems, profitability

B1

[10]

**A REVIEW OF CURRENT TECHNICAL DEVELOPMENT OF VERTICAL AXIS
WIND TURBINES AND THEIR BRAKING SYSTEM TECHNOLOGY FOR LOW
SPEED, URBAN AND OFFSHORE AREAS**

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ABSTRACT

Recently, there are growing interests of using Vertical Axis Wind Turbine (VAWT) to harvest wind energy from low wind speed and urban areas to deep water offshore wind farm fields. It is primarily due to better performance of VAWT under high turbulence conditions, lower wind speed operations and less wake defects than Horizontal Axis Wind Turbine (HAWT). In order to improve the performance of current VAWT design to make it as commercially attractive as HAWT, novel technologies must be developed and implemented particularly for operation conditions at low speed, urban and offshore environments. This paper intends to provide a thorough review of advanced innovative technologies developed recently by focusing on two key areas: the enhancement of the self-starting ability and power coefficient, and the use of air-braking system instead of mechanical-braking to simplify the design and also to protect the turbine at high wind speed above the limit. This paper starts with a survey of the state-of-the-art on the latest development of air-braking systems for VAWTs with suggestions and recommendations on the most effective air-braking system design for performance enhancement. It continues on the discussion of the remaining challenges of VAWTs for low speed, urban and offshore application to maintain good self-starting ability, better power coefficient and relatively light weight. The paper concludes that the VAWT design coupled with low-weight air-braking system could achieve the best performance at mentioned regions, thus this design has a great economic potential in the future, in terms of reliability, costs and ease of maintenance.

Keywords: wind energy harvest, vertical axis wind turbine, performance enhancement, self-starting ability, air-braking system, urban and offshore environments

B2

[11]

**NON-STATIONARY FREQUENCY ANALYSIS CONSIDERING LOCATION
PARAMETER AND COVARIATE OF METEOROLOGICAL
VARIABLES: YANGPYEONG SITE**

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ABSTRACT

The frequency and intensity of extreme rainfall are increasing with climate change. In addition to extreme rainfall, changes in dew point due to changes in average temperature and saturated vapor pressure of atmospheric water vapor are also increasing steadily with climate change. To simulate this climate change, meteorological models are used worldwide. The projection result of surface air temperature (SAT) or dew-point temperature (DPT) is relatively stable compared to the precipitation result. In order to design hydraulic structures related to extreme rainfall, the stationary frequency analysis has been used. However, Stationary assumptions are reported to be inappropriate for the climate change era. In this study, the SAT and the DPT are applied as the covariance of the location parameter among the parameters of the GEV distribution to reflect the non-stationarity of extreme rainfall due to climate change. Yangpyeong site in Korea is selected as the study site and the monthly maximum daily rainfall depth from May to October is used for analysis. Various models are constructed to select functions that best reflect SAT and DPT, and the smallest AIC (Akaike Information Criterion) model is selected as the optimal model. The impact of global warming on design rainfall depth is also analyzed using the selected model.

Keywords: non-stationary frequency analysis, GEV distribution, meteorological variables

B3

[12]

TEHRI DAM - AN UNPRECEDENTED CLIMATE CHANGE DISASTER

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Tehri Dam, one of the five largest Hydroelectric projects in the world, the largest so far in India, built in the Seismically active, landslide and cloudburst prone Himalayan Zone, this study shows, is both a short term and a long term Climate Change disaster. This is a study based on collection of direct evidence, collation of different study reports and indirect correlations between diverse environmental and geological sciences, supported by simple mathematical calculations. Its import clearly indicates that in its current form and shape, the Tehri Dam, constructed in the foothills of Himalayas, damming the great Indian river Ganges at its very early stages in the form of its major tributary, Bhagirathi, is not only going to cause a major agrarian, water, environmental and socio-economic crisis in entire North India, over the long term, but that it has already begun to cause havoc in its immediate and further downstream areas. And this disaster, is nothing compared to the havoc it may unleash on entire India, in the event of a high Richter Scale earthquake combined with concurrent events of Cloudburst, Landslide and Heavy Rains. The study also presents the cost-benefit analysis for the Tehri Dam, to highlight its lopsided value proposition. At the same time, the study also offers much more sustainable and viable alternatives to such a disastrous project, which are based on the Holistic and Systems based approach, which is so essential to achieving the SDGs, and goes on to show that the Tehri Dam project is just the opposite to such an approach.

C1

[13]

BAMBOO ECOSYSTEM: AN OVERLOOKED CARBON SINKD.C. Vanlalfakawma¹, S.K. Sen¹ and S.K. Tripathi²¹*Department of Botany, VisvaBharati University, India*²*Department of Forestry, Mizoram University, India***ABSTRACT**

Carbon change mitigation and carbon sink are interrelated. Many researchers have been put forth to develop an archetype for climate change mitigation. Naturally, carbon is stored as a biomass in the plants, soil and oceans. It is now a well-known fact that forest, especially trees, stores huge amount of carbon. Hence, researches on the carbon sequestration potential of forests are mainly confined to trees. However, recent researches revealed that bamboo, biologically a grass, functionally a tree, may be the archetype of carbon sequestration. The mean carbon storage and sequestration rate in bamboos ranges from 30 – 121 Mg ha⁻¹ and 6 – 13 Mg ha⁻¹ yr⁻¹ respectively. The rapid accumulation of biomass and effective fixation of CO₂ by bamboo are attributed to its high potential in the sequestration of carbon. The dynamics of bamboo ecosystems and its efficiency as a carbon sink is now a matter of interest. The potential of bamboo ecosystem as a carbon sink and its capacity in climate change mitigation are discussed in this paper.

Keywords: bamboo ecosystem, carbon sequestration, carbon sink, climate change, mitigation

C2

[14]

CFD SIMULATION OF THREE-STRAIGHT-BLADED VERTICAL AXIS WIND TURBINE AT LOW SPEED RATIOS

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ABSTRACT

There are growing interests of Vertical Axis Wind Turbine (VAWT) applications for low-speed, urban and offshore areas that attract researchers to design and investigate numerous innovative concepts to enhance the performance of VAWTs. In numerical study, Computational Fluid Dynamics (CFD) has demonstrated its capability for a more accurate prediction of flow characteristics around wind turbines compared to other empirical and low-order models. Yet any CFD prediction can be affected by many parameters such as shape simplifications, boundary conditions and the choice of turbulence models. To address these issues, this study aims to investigate the effects of a rod, inflow conditions and turbulence models on 2D three-straight-bladed VAWT performance. Precursor simulations include the grid convergence based on the Richardson Extrapolation, domain influence analysis and time step for unsteady simulation. It was proven that 1° azimuthal increment is adequate to give good prediction of the power coefficient (C_p). Main simulations include cases with and without a rod, two different boundary conditions and applying Unsteady Reynolds-averaged Navier-Stokes (URANS) model. The results have shown reasonably good agreement with available test data and it also reveals that modelling the rod effect indeed increases the accuracy of C_p prediction, but it only has marginal improvement. The pressure far field boundary condition somehow gives poor power coefficient prediction, hence it is recommended to use velocity inlet and pressure outlet in the simulation. Simulations are still ongoing with more advanced methods such as Delayed Detached Eddy Simulation (DDES) and Improved wall-modelling capability of DDES (IDDES) models.

Keywords: vertical axis wind turbine (VAWT), CFD, rod, boundary conditions, turbulence model

C3

[15]

PERFORMANCE EVALUATION OF AN AUTOMATED TWO-WIRE DATA ACQUISITION MECHANISM FOR TIPPING-BUCKET RAIN GAUGE

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ABSTRACT

The purpose of this study is to implement a data acquisition mechanism working on similar functionality to that of conventional Tipping-Bucket Rain Gauge (TBRG) but unaffected from magnetic and electromagnetic interferences. Unlike the common reed switch application, the mechanism of this project only uses a two-wire probe for pulse detection of the TBRG with a real-time sensing. Specifically, a different method of detecting the tipping count of the rain gauge through a switching type scheme is introduced without using the conventional magnetic detection concept. Aside from its simplicity, the designed electronic two-wire TBRG has so many features with low-cost and resistance to metallic or electromagnetic interference the most important. The sensor design makes the circuit assembly applicable to any cylindrical or cube-type rain gauge sizes. The only important thing to properly mount is the placement of the wire contacts. The measuring performance of the device proved that it has the capability to work in similar as the conventional TBRG. It was tested through water volume and rain intensity measurement with predefined water samples. Although it proves its measuring ability through its slight measurement underestimation results, only error correction through software adjustment is suggested for a more accurate rain intensity measurement since the hardware and its corresponding mechanism has proven reliable in accordance to its functionality. The automated mechanism for data acquisition of this design is recommendable as replacement for reed switches on Tipping-Bucket Rain Gauges.

Keywords: rain gauge, rainfall measurement, tipping-bucket

C4

[16]

COMPARATIVE STUDY OF SURFACE OZONE, BLACK CARBON AND PARTICULATE MATTER IN DELHI, INDIA DURING 2017C. Tyagi¹, N.C. Gupta¹, K. Sarma¹, V.K. Soni² and U. Pathak¹¹*GGS Indraprastha University, India*²*University School of Environment Management (USEM), GGS Indraprastha University, India***ABSTRACT**

This study presents real time measurements and correlation analysis of Surface ozone (O₃), Black carbon (BC), PM₁₀, PM_{2.5} and meteorological parameters. Parallel measurements for all parameters were performed over a period of about one year (January 2017 to December 2017) in Delhi, India. The present work suggests that BC correlates positively with particulate matter (PM) and contributes about 2.55-10.09% to the PM₁₀ fraction and 5.25-20.94% to the PM_{2.5} fraction. BC and PM showed an inverse relationship to surface ozone, a higher concentration of ozone was reported during the hours of sunshine (11:00- 17:30 hrs). Ozone concentrations ranged between 17.88±12.27ppb (December) to 47.05±23.94ppb (May), while the highest concentration of BC was reported in December and lowest in August due to rainfall. PM and BC had higher values during heavy traffic hours and lower nocturnal concentrations due to decreased anthropogenic activity. Monthly quantification revealed the highest concentrations of PM₁₀ (391.03±254.12µg/m³) and PM_{2.5} (241.66±171.04µg/m³) in November. PM and BC showed a positive relationship with relative humidity and fluctuated inversely with wind speed, while ozone concentration increased during hours of high wind speed. The quantitative results presented here may be of great importance for further research and modeling studies.

Keywords: black carbon (BC), particulate matter (PM), surface ozone (O₃), monthly variation

C5

[17]

COMMUNITY PREPAREDNESS FOR FLOOD: THE MALAYSIA EXPERIENCE

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ABSTRACT

In the late December 2014, Malaysia was hit by the worst flood in 30 years. Heavy monsoon rainfall and have triggered floods along the east coast states of Malaysia, where the state of Kelantan suffered the most devastating effect. This study looks at how the affected residents cope with flood aftermath. This paper contains a detailed analysis of the community preparedness for flood based on the flood event during December 2015 and also the factors that affecting the preparedness level. A house to house interview was conducted in August 2015, using the structured questionnaire. The key question is 'What are the factors that influence individual decisions to prepare for flooding? A total of 507 of respondents participated in this study. From this study, 68.8% of the respondents are 'Not prepared', 15.8% are 'Prepared' and 15.4% are 'Not sure'. The result indicate that, the residents who are educated, high household income and older age group are more prepared ($p < 0.05$) towards flood. Using the principal component analysis (PCA) followed by regression models, seven factors were significant predictors for residents' preparedness for flood. The factors are: 'financial and emotional fear', 'Trust in government', 'economic and property loss', 'awareness', 'self-preparedness', 'basic needs', and 'flood education'.

Keywords: Kelantan, big flood, preparedness, emergency response, catastrophic events

D1

[18]

**ADAPTATION TO CLIMATE CHANGE: AN ANTHROPOLOGICAL STUDY ON
CHANGING LIVELIHOOD STRATEGIES IN SOUTH-WEST COASTAL
BANGLADESH**

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ABSTRACT

Bangladesh is a disaster-prone and one of the most vulnerable countries to climate change. The country has a long coastal area which is frequently being affected by several types of natural disasters due to climate change. The disasters have impacted the life and livelihood of different natural resources depending communities living in the coastal areas. The *Malo* is a Hindu religious traditional fishing community living in Sarafpur Union of Dumuria Upazila of Khulna district of south-west coastal Bangladesh. Fishing is the only means of their livelihood and the community is engaged in fishing practices inherently in rivers, estuaries and sea since more than 300 years. The study “Adaptation to Climate Change: An Anthropological Study on Changing Livelihood Strategies in South-west Coastal Bangladesh” aims to examine the impacts of climate change on the livelihood of *Malo* fishing community and identify the adaptation practices by them from anthropological point of views. The study has outlined the ethnographic profile of *Malo* fishing community and assessed their vulnerability context. The study has identified and analyzed the effects and impacts of climate change on the livelihood of *Malo* fishing community. The study has identified three types of adaptation practices by *Malo* fishing community to cope with the climate change and disasters. The study has suggested some recommendations for overcoming the challenges of climate change and to sustain the traditional fishing livelihood of fishing communities of south-west coastal Bangladesh. The accumulated recommendations would be very useful for the researchers, academicians, policy-makers of Government and non-government organizations.

Keywords: climate change, livelihood, adaptation, anthropology, vulnerability

D2

[19]

IMPACT OF CLIMATE CHANGE ON THE MANGROVES OF INDIAN SUNDARBANS

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ABSTRACT

India is one of the 27 countries which are vulnerable to the global warming induced sea level rise. Sea level rise stimulated by climate change along with anthropogenic impacts leads to an alteration in land dynamics in terms of erosion and accretion and species diversity and structure of mangroves of river deltas. In the study, we analyzed the sea level rise and land transformation of Indian Sundarban delta from the historical data and satellite images and also estimated the structural parameters of mangroves of selected islands of Indian Sundarbans using quadrat (25x25m) method. The relative sea level rise in Sundarban delta (10-20mm yr⁻¹) is higher than any other deltas of the world. Satellite images revealed that islands of western Sundarbans were eroding while islands of central Sundarbans are expanding due to accretion. However, a higher salinity zone was observed in central Sundarbans whereas a lower salinity zone in western Sundarbans. Structural analysis showed that the western Sundarbans was characterized by comparatively higher total densities and total stand basal area of mangrove species revealing good structural development in the western sector than the central sector. The high salinity prevailed in Indian Sundarbans is attributed to the low density of freshwater-loving species like *Heritiera fomes* and *Nypa fruticans*. Hence the study revealed that sea level rise along with the anthropogenic impacts influenced the salinity profile of Indian Sundarbans which greatly affects the species diversity and structure of mangroves. In this context, the data evolved in the study would be fundamental in site-specific management and conservation efforts of mangroves in this world heritage site.

Keywords: Sunderbans, mangroves, Climate change, sea level rise, density, basal area, species diversity

D3

[20]

CAPACITY CREDIT APPROXIMATION BASED ON CAPACITY FACTORS OF SOLAR POWER IN KOREA¹

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ABSTRACT

Solar power is expected to account for a considerable proportion of renewable energy compared to other renewable energy sources in Korea due to nationwide effort to reduce greenhouse gas emission and to enlarge the portion of renewable energy in electricity generation mix. In this study, capacity credits, which are the most important factors for evaluating the effective capacity of solar power, are estimated by capacity factor-based approximation method. To do this, we use the data of solar power generation and capacity over many years and calculate the capacity factors of the solar power. The results of the existing methods and ours proposed in this paper are compared and analyzed.

Keywords: solar power, capacity credit, capacity factor

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D4

[21]

**THE ROLE OF THE ENVIRONMENTAL PROTECTION POLICE UNIT IN THE
PROTECTION OF WETLANDS: A CASE STUDY OF KAJANSI PERI-URBAN
AREAS IN UGANDA**

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ABSTRACT

The study explored the roles of the Environmental Protection Police Unit towards wetland protection in Uganda. Their roles predict variations in wetland resource use given their P and F -values (P=0.000, F=50.134). The results indicate that the Environmental Protection Police Unit roles and responsibilities explain only 50.1% variations in sustainable wetland use revealed by the adjusted R square (R= 0.39). A regression value of 186.823 compared to the residual value of 290.665 was obtained, meaning that although the unit can influence proper wetland use, other factors also strongly influence proper use of wetlands. The relationship between wetland misuse and level of education was a moderate positive evidenced by ($r = 0.626$, $P < 0.01$). Level of education of the respondents and sensitization by the police accounted for 63% for proper wetland use, while the remaining 37% which is unaccounted for is explained by other factors.

Keywords: environmental protection police unit, protection of wetlands, wetland degradation

E1

[22]

FEMALE CONTRIBUTION TO GRASSROOTS INNOVATION FOR CLIMATE CHANGE ADAPTATION IN BANGLADESH

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ABSTRACT

In common with other developing countries, women in coastal Bangladesh are highly vulnerable to climate change impacts. Their vulnerability is intensified due to local social, cultural, and religious factors that fail to recognize women's contribution to vulnerability reduction through adaptation. This paper reports a section of the lead author's PhD findings derived through a mixed-method approach to examine adaptation strategies of communities in the coastal village of Gabura, Bangladesh that was devastated by the cyclone Ailain 2009. The study revealed that in the post-Aila context, a remarkable shift occurred in grassroots innovation by women within their domestic confinements. The experience of cyclone Aila appears to have stimulated Gabura women to adapt management of their domestic situations through a range of novel strategies, such as innovative farming methods to secure food production. Integral to the development of these post-disaster adaptive strategies is the critical role played by women in reinforcing local social capital, thereby maintaining household and village level social relations and building networks and trust with NGOs. It is evident that local knowledge was mobilized for grassroots innovation in support of adaptation to climate change that is informed by 'linking' social capital but is largely autonomous. Through this paper, we support calls for a re-evaluation of the role of women to improve recognition of the significance of gendered dimensions of climate change adaptation.

Keywords: Bangladesh, women, local knowledge, grassroots innovation, social capital, climate change adaptation

E2

[23]

CLIMATE CHANGE AND THE REALIZATION OF THE RIGHT TO FOOD IN URBAN SOUTH AFRICA

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ABSTRACT

Considered one of the major challenges faced by the 21st century, climate change impacts on among other factors, food security. Although both urban and rural population experience the pandemic of climate change, the degree and intensity vary based on different circumstances. Aggravating the gravity of climate change in South Africa is the rapid urbanization which the nation faces. Both climate change and urbanization impact negatively on food security. Urban population suffer food insecurity through several factors including severe food supply problems caused by floods, droughts and hailstorms that affect food production. Food security in urban areas is also affected by lack of arable land for farming. While this work acknowledges harm done by climate change to food security, it endeavors to address the present lacuna in the implementation and full realization of the right to food in South Africa. Despite the ratification of international human rights instruments on the right to food, and the provision of section 27(1) (b) of the 1996 Constitution which guarantees the right to food, multitudes of people continue to suffer food insecurity in South Africa. With various studies anticipating climate change to worsen food insecurity in urban areas, an urgent need exists to rethink and explore food sustainability measures as well as policy statements or extensive, stand-alone legislation addressing food security. Employing doctrinal approach, this paper aims to examine urban agriculture as one of the possible solutions in alleviating food insecurity in urban areas and explore possible legal framework to implement the proposition.

Keywords: climate change, food security, urban agriculture, rights

E3

[24]

IS CRITICAL SLOWING DOWN A GOOD INDICATOR FOR CLIMATE CHANGE?

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ABSTRACT

It has been recently suggested [1-2] that the increase in variance and autocorrelation function can be used as indicators that a dynamical system is approaching a tipping point. However those indicators could generate false alarms because their increase is not an unambiguous mark of the existence of a bifurcation [3]. Critical slowing down is generally accepted as a unique property of a bifurcation process. Most theoretical work related to the prediction of catastrophes are based on this property but they consider that the parameters of the system are fixed. If a dynamic system is approaching a tipping point then it means that a parameter is changing and it is well known that the bifurcation is affected in its position and characteristics by the speed at which the parameter changes [4]. Here we answer the question if the critical slowing down is really an optimum indicator which allows always the prediction of a tipping point or a transformation of the evolution of the system. We show that the value of the parameter, at which the effects of the critical slowing down process appear, depends on the speed of change of the parameter and the amount of dissipation in the system. The divergence on the time of a decaying perturbation may appear when the control parameter value already crossed the threshold of the bifurcation. It is clear that in such a case the critical slowing down fails in the prediction of the catastrophe. We discuss the consequences of such behavior on different real systems.

Keywords: tipping point, critical slowing down

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VIRTUAL PRESENTATIONS

[25]

**SUSTAINABLE INFRASTRUCTURE FOR CLIMATE CHANGE
ADAPTATION:GOOD PRACTICES FROM WATER TREATMENT FACILITIES**

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ABSTRACT

Sustainable Infrastructure (SI) has been recognized as the central pillar of the new global agenda—for strong, sustainable and inclusive growth— for delivery of the SDGs as well as a core strategy to combine and mitigate the climate change impacts. Despite the importance of Sustainable Infrastructure to achieve those targets, the existing projects -in most cases- do not require to comply with sustainability performance indicators.

In order to address these challenges this paper will introduce the Envision rating system, a framework developed at Harvard University to quantify resiliency performance in infrastructure projects (among others), looking at a specific case study “Altonilco water treatment plant”. This facility, located in Mexico is the largest in the world of this kind, and treats 60% of all wastewater produced in Mexico city. This project has introduced several sustainability strategies, allowing it to minimize the GHG emission, improving the resilience, and generate energy onsite by using the byproducts of the water treatment process.

Keywords: sustainability, infrastructure, water-treatment, resilience, good-practices

[26]

THE EFFECTS OF THE CLIMATIC CONDITIONS CHANGES IN THE BRITISH ISLES FOR THE NEXT 85 YEARS AND THE MEASURES OF GOVERNMENT

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ABSTRACT

The impact of climate change is not only a natural problem but involved in people's life. Since pre-industrial period, the concentration of atmospheric carbon dioxide has increased from around 280 ppmv to more than 370 ppmv. Recently, although global green house gas emission is keeping in a stable stage, global warming is irreversible. Therefore, within the next several decades, both in worldwide area and the UK, the changes of climate may lead to sea level rise, floods, air pollution, extreme weather, *etc.* This paper analyses these impacts of increasing surface temperature on climate condition in the UK in the next 85 years and what the government should do to solve this issue.

Keywords: climate change, surface temperature increasing, next-85-years, government policy

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