



Ministry of Environment,  
Forest and Climate Change  
Government of India



**ESDA CON** 2019  
Annual International Conference of ESDA  
11 to 13 January, 2019 | Delhi (INDIA)

# INTERNATIONAL CONFERENCE

on

# Global Environmental Challenges Human Health and Sustainable Development

The Convention Centre, JNU, New Delhi  
11 to 13 January, 2019



Organised by

Environment and Social  
Development Association (ESDA) Delhi



# Souvenir & Abstracts

*In Association with*



Center for the Study of Regional Development  
Jawaharlal Nehru University, New Delhi



Dr. Bhim Rao Ambedkar College  
University of Delhi



CSIR-National Environmental  
Engineering Research Institute



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*In International Partnership*



Metropolitan University  
San Juan, PR, USA

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Ministry of Environment,  
Forest and Climate Change  
Government of India



**ESDA CON**  
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11 to 13 January, 2019 | Delhi (INDIA)

2019

# INTERNATIONAL CONFERENCE on Global Environmental Challenges Human Health and Sustainable Development

The Convention Centre, JNU, New Delhi  
11 to 13 January, 2019



Organised by  
**Environment and Social  
Development Association (ESDA) Delhi**



## Souvenir & Abstracts

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Center for the Study of Regional Development  
Jawaharlal Nehru University, New Delhi



Dr. Bhim Rao Ambedkar College  
University of Delhi



CSIR-National Environmental  
Engineering Research Institute



GRC India

### In International Partnership



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Metropolitan University  
San Juan, PR, USA

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The Environmental and Consumer  
Protection Foundation, Delhi



Green Society of India  
Delhi

### Knowledge Partner



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Tahirpur, Delhi

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LIVE NEWS

INTERNATIONAL CONFERENCE  
on  
**GLOBAL ENVIRONMENTAL CHALLENGES  
HUMAN HEALTH AND  
SUSTAINABLE DEVELOPMENT**

**11 to 13 January, 2019**  
at The Convention Centre, JNU, New Delhi

Organized by  
Environment and Social Development Association (ESDA), Delhi

# **SOUVENIR & ABSTRACTS BOOK**

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SCIENCE & TECHNOLOGY AND EARTH SCIENCES  
ENVIRONMENT, FOREST AND CLIMATE CHANGE  
GOVERNMENT OF INDIA  
NEW DELHI - 110001



## Messages

I am happy to know that Environment and Social Development Association (ESDA) is organising an International Conference (ESDA CON 2019) on the topic of 'Global Environment Challenges, Human Health and Sustainable Development' in partnership with Metropolitan University, USA in collaboration with Centre for Study of Regional Development (CSR D), Jawaharlal Nehru University, New Delhi, Dr. Bhim Rao Ambedkar College of Delhi University, CSIR, NEERI, Amity University, Rajiv Gandhi Super Speciality Hospital, Delhi and ECPFO Delhi on 11-13 January, 2019 at the Convention Centre, JNU, New Delhi. I am sure the coming together of large number of academicians, scientists, doctors, policy makers, environmentalists, social activists and students across the world will strengthen the cause of environmental protection leading to sustainable development.

I extend my best wishes to the organisers and participating delegates for fruitful deliberations.

  
(Dr Harsh Vardhan)

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सत्येन्द्र जैन  
Satyendar Jain

स्वास्थ्य, उद्योग, लोक निर्माण, ऊर्जा, गृह,  
शहरी विकास, सिंचाई एवं बाढ़ नियंत्रण मंत्री  
Minister of Health, Industries, PWD,  
Power, Home, Urban Development and  
Irrigation & Flood Control



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D.O. No. PA/MO4/RC/38

Date : 04. 01. 2019



## Messages

*I am happy to learn that Environment and Social Development Association (ESDA), Metropolitan University (USA), Jawaharlal Nehru University, Dr. Bhim Rao Ambedkar College (University of Delhi), CSIR-National Environmental Engineering Research Institute (NEERI), Amity University, Rajiv Gandhi Super Speciality Hospital (Delhi) and ECPFO (Delhi) is organizing an International Conference on Global Environmental Challenges, Human Health and Sustainable Development on 11-13 January, 2019 at Jawaharlal Nehru University, Delhi.*

*It is good to note that many eminent speakers from diverse disciplines would be delivering lectures on different areas of sustainability, pollution, climate change, solid waste management, biodiversity, conservation, natural resource management and other environmental challenges. Also noteworthy is the fact that students, research scholars, and academicians from all over the country would be participating and presenting their work in the Conference.*

*I extend all my best wishes to all the Organizing Institutes and the various committee members on this occasion and wish that this Conference would be a grand success.*

  
(SATYENDAR JAIN)

इमरान हुसैन  
Imran Hussain

खाद्य एवं आपूर्ति, पर्यावरण एवं वन,  
चुनाव मंत्री

Minister of Food & Supplies,  
Environment and Forest, Elections.



सत्यमेव जयते

राष्ट्रीय राजधानी क्षेत्र, दिल्ली सरकार  
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D.O. No. F-MOES/EE/2019/76

Date : 04-01-2019



## Messages

I am happy to learn that environment and social development association (ESGA) Metropolitan University, USA Jawaharlal University, Dr Bhim Rao Ambedkar College (University of Delhi), CSIR- National Environmental Engineering Research Institute (NEERI), Amity University, Rajiv Gandhi Super Speciality Hospital (Delhi) and ECPFO (Delhi) is organising an international conference on Global Environmental Challenges, Human Health and sustainable development on 11-13, January, 2019 at Jawahar Lal University, Delhi

It is good to note that many eminent speakers from diverse disciplines would be delivering lectures on different areas of sustainability, pollution, climate change, solid waste management, biodiversity, conservation, natural resource management and other environmental challenges. Also noteworthy is the fact that students, research scholars, and academicians from all over the country would be participating and presenting their work in the Conference.

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Dr. Jitendra K Nagar,  
General Secretary, ESDA,  
F-2, Satyam Plaza (Chetak Complex),  
Pocket B & E Market, Dilshad Garden,  
Delhi - 110095

  
(IMRAN HUSSAIN)



पेड़ लगाएं जीवन बचाएं



*B. P. Singh*

Former Judge, Supreme Court of India

Chamber :  
A-7, Neeti Bagh, 1st Floor, New Delhi-110049, INDIA  
Tel : +91-11-41573056

7<sup>th</sup> January' 2019



## Messages

I am happy to learn that Environment and Social Development Association (ESDA), Metropolitan University (USA) and ECPFO (Delhi) ~~are~~ organizing an International Conference on Global Environmental Challenges, Human Health and Sustainable Development on 11 - 13 January, 2019 at Jawaharlal Nehru University, Delhi.

It is good to note that many eminent speakers from diverse disciplines would be delivering lectures on different areas of sustainability, pollution, climate change, solid waste management, biodiversity, conservation, natural resource management and other environmental challenges. Also noteworthy is the fact that students, research scholars, and academicians from all over the country would be participating and presenting their work in the Conference.

I extend all my best wishes to all the Organizing Institutes and the various committee members on this occasion and wish this Conference a grand success.



B. P. Singh



## Justice Swatanter Kumar (Retd.)

Former Judge, Supreme Court of India  
Former Chairperson, National Green Tribunal

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## Messages

It gives me great pleasure to know that Environment and Social Development Association (ESDA) is going to organize an “International Conference on Global Environmental Challenges, Human Health and Sustainable Development” in collaboration with Metropolitan University (San Juan, PR, USA), Jawaharlal Nehru University (New Delhi), Dr. Bhim Rao Ambedkar College (Delhi University), CSIR-National Environmental Engineering Research Institute (NEERI), Amity University (Noida), Rajiv Gandhi Super Specialty Hospital (Delhi), GSI Delhi, GRC India and ECPFO (Delhi) on 11-13 January, 2019 at the Convention Centre, Jawaharlal Nehru University, New Delhi.

Given the large-scale problems of climate change, pollution, sustainability, urbanization, human health, infectious diseases, natural disasters, biodiversity extinction and other environmental challenges that the world and India in particular is facing, I feel that this conference is the need of the hour. This conference is being organized on a very important issue and with the most eminent academic institutions of the country. I am sure that the Conference would do a great job in making the local public aware of the consequences and challenges of sustainability, environmental pollution, environmental endangerment and measures of doing environmental protection. I am also sure that the Conference will bring out many innovative solutions and policy framework for curbing pollution problem of Delhi and ensuring environmental justice to each and every citizen of Delhi.

I wish all the participants and organizers the best of luck in all their endeavors.

I wish the Conference a great success.

Best Wishes,

A handwritten signature in black ink, appearing to read 'Swatanter Kumar', written over a horizontal line.

Justice Swatanter Kumar (Retd.)

---

Office: A-118, Second Floor, Defence Colony, New Delhi-110024

Email : swatanter47@gmail.com

#011 - 40314104, 4031405



## वल्लभभाई पटेल चैस्ट इन्स्टीट्यूट VALLABHBHAI PATEL CHEST INSTITUTE

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UNIVERSITY OF DELHI, DELHI-110007

### Prof. Raj Kumar

MD (Pub. Med.), FAMS, FICAAI, FICS, FNCCP(I), MNAsc, MAAAAI, MACAAI  
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## Messages

As we all know, the world is facing grave environmental and sustainability challenges today. The recent pullout of United States from the Paris Climate Change agreement and report of IPCC on climate change scenarios and challenges has put forward a fresh challenge to the world leaders. For ensuring sustainable solutions and environmental justice to all citizens, the governments, industry professionals, academicians, civil-society groups, communities and individuals have to come together to explore alternatives and sustainable solutions to climate change, natural disasters and pollution problems in today's world. Under Swacch Bharat Abhiyan, the efforts to make India plastic-free and pollution-free have already been started. However, given the context of the environmental problems, the mission is to make the plastic-free movement a pan-India movement. For this, every strata of the society would have to be involved through meetings, seminars and conferences.

I must congratulate to the Environment and Social Development Association (ESDA), Dr. Bhim Rao Ambedkar College, Metropolitan University, San Juan, PR, USA, CSIR-National Environmental Engineering Research Institute (NEERI), Jawaharlal Nehru University, Amity University, Rajiv Gandhi Super Specialty Hospital (Delhi) and ECPEO (Delhi) for taking an initiative in this regard and organizing an International Conference on Global Environmental Challenges, Human Health and Sustainable Development on 11 – 13 January, 2019 at Jawaharlal Nehru University, Delhi. I extend hearty welcome to all the participants, delegates, academicians and environmental practitioners in the International Conference.

I wish the International Conference would succeed in all its endeavors.

  
(Prof. Raj Kumar)

Date: 09/01/2019



सी.एस.आई.आर. - राष्ट्रीय पर्यावरण अभियांत्रिकी अनुसंधान संस्थान  
CSIR - National Environmental Engineering Research Institute  
(वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद् / Council of Scientific & Industrial Research)



(वैज्ञानिक तथा औद्योगिक अनुसंधान विभाग, विज्ञान एवं प्रौद्योगिकी मंत्रालय, भारत सरकार के अंतर्गत स्वायत्त संघटन)  
(Autonomous Organisation under the Dept. of Scientific and Industrial Research, Ministry of Science & Technology, Govt. of India)

डॉ. राकेश कुमार  
निदेशक  
Dr. Rakesh Kumar  
Director



## Messages

I am glad to know that the Environment and Social Development Association (ESDA), Delhi is organizing a three days International Conference on *Global Environmental Challenges focusing on Human Health and Sustainable Development* in association with various organizations including CSIR-National Environmental Engineering Research Institute (NEERI), Delhi Zonal Centre during January 11-13, 2019 at JNU, New Delhi.

Environmental issues have become very crucial even for our day to day life/activities, be it air pollution, water pollution, solid waste management, ecological biodiversity, socio-economic aspects and so on... The larger perspective of these becomes the issues like climate change, ecological disasters... leading to health diseases and epidemics. These problems are not confined to any particular country. The challenges are across the world and hence require concerted efforts, discussions, deliberations to come out with simple solutions within the each country, learning experiences from the other countries to ensure sustainable progress/development within the available resources on the planet. Further, involvement of large number of institutions is a very positive step to tackle the environmental challenges.

I hope and wish all these issues will be discussed in detail in the conference and some meaningful outcome will emerge in the form of recommendations to meet the environmental challenges/sustainable development goals, which United Nations have envisaged to meet by 2030.

I wish the conference a big success.

07/01/2019

(Rakesh Kumar)



सी. एस.आई. आर.- राष्ट्रीय पर्यावरण अभियांत्रिकी अनुसंधान संस्थान  
दिल्ली क्षेत्रीय केंद्र, ए - 93, 94, फेज -1  
नारायणा औद्योगिक क्षेत्र, नई दिल्ली - 110 028, भारत

**CSIR-National Environmental Engineering Research  
Institute, Delhi Zonal Centre**

A-93/94, Phase-I, Naraina Industrial Area, **New Delhi - 110 028, India**

**Headquarters:** CSIR-NEERI, Nehru Marg, Nagpur 440020

From:

**Dr. S.K. Goyal**

Sr. Principal Scientist & Head

**January 7, 2018**



## Messages

With continuous increase in population, worldwide and in India as well, the pace of development required to meet the needs and aspirations of people has put tremendous pressure on the natural resources and in-turn on the mother Earth. However, all the resources shall remain limited in the universe and can not be enhanced. The only possible way is to continuously evolve new technologies/processes that use lesser resources and generate more products to meet the continuously increasing requirements, while minimizing/eliminating the wastes generation. Even the minimal wastes generated, which are not understood how to be utilized by the present generation, are put back to the environment, should be within the assimilative capacity of that region/environment. The wastes of today will become resources tomorrow for future generations.

It is indeed pleasure for me that the Environment and Social Development Association (ESDA), Delhi is organizing three days "*International Conference on Global Environmental Challenges with particular focus on Human Health and Sustainable Development*" with the support/collaboration/partnership/association/involvement of various academic/ research/social organizations during January 11-13, 2019. I am sure with the participation and deliberations by various stakeholders including various subject experts, academicians, researchers, students, policy makers and media in the conference will help positively in addressing the national as well as global environmental challenges leading to attain the sustainable development goals for the people.

I congratulate the Organizers and wish the Conference a Grand Success.

(S.K. Goyal)



## DR. BHIM RAO AMBEDKAR COLLEGE

(UNIVERSITY OF DELHI)

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Ref. DBRAC/

Dated : 09.01.2019

**DEEPANSHU SHRIVASTAV**  
Chairperson, College Governing Body



## Messages

At the outset, I would like to congratulate Environment and Social Development Association (ESDA) for organizing the “International Conference on Global Environmental Challenges, Human Health and Sustainable Development” in collaboration with our College (Dr. Bhim Rao Ambedkar College) and Metropolitan University (USA), Jawaharlal Nehru University, CSIR-National Environmental Engineering Research Institute (NEERI), Amity University (Noida), Rajiv Gandhi Super Specialty Hospital and ECPFO (Delhi) on 11-13 January, 2019 at the Convention Centre, Jawaharlal Nehru University, New Delhi. Our College really feels honored and privileged to be a part of this three-day International Conference with some of the eminent national and global academic institutions.

Pollution, climate change, deforestation and unmanaged urbanization are some of the most important global challenges in today's world. Very well thought of solutions are needed to tackle these pressing problems in order to ensure sustainable development and conserving resources for the future generations. India cannot afford to lag behind other countries in addressing these pressing issues. Of late, we have seen Delhi experiencing serious health hazards due to different types of pollution including air, water and solid waste. The water availability has also been dwindling at a rapid rate in Delhi and at times, the situation takes the form of 'water emergency' in some parts of the city. Given these facts, I believe this Conference is a very timely and relevant event. I hope academic deliberations in this Conference would dwell some light on these pressing issues and would bring out many innovative solutions and policy frameworks for curbing local-level and global scale environmental problems and ensuring sustainable development for all.

I congratulate all the participants and the organizing committee members who have toiled hard to make this event a meaningful deliberation.

Thanks and Regards,

(Deepanshu Shrivastav)



## भीम राव अम्बेडकर महाविद्यालय BHIM RAO AMBEDKAR COLLEGE

(दिल्ली विश्वविद्यालय)

(University of Delhi)

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Ref. No. BRAC

Date: 08.01.2019

**Dr. G.K. Arora**  
Principal



## Messages

Environment Health and Sustainable Development (SD) are interconnected and offer synergies and tradeoffs. Issues related to those have assumed serious concerns in all countries due to vast poverty, inequalities lack of basic services, water scarcity, food insecurity, unemployment, food insecurity etc. co-exist with rapid industrialization, urbanization and technological developments. The Climate change and its likely socio-economic and political consequences deeply add to those linkages and compound matters related to Inclusive, Peaceful and Sustainable Human Development and Welfare. The nature and scope of these concerns have been changing and their implications have taken both local and global implications combining both new and long-standing challenges.

WHO estimates about 13 million deaths each year and about one quarter of the global burden of disease caused by known avoidable environmental risk factors. It identifies triple burden of environmental risks: direct impact of emergencies; infectious disease risks; and non-communicable diseases. The rising level of human interferences and influences contribute to climate change with damage to health infrastructure due to extreme weather conditions and technological developments recently ranging from gene-sequencing to nano-technology and from renewables to quantum computing, covering physical, digital and biological spheres. The latter termed as 'Fourth Industrial Revolution'. Such developments have serious repercussions and require strong measures to protect populations from the effects of climate change and against human actions which adversely affect environment and health. This will ultimately invoke human rights issue on the most economically, demographically and geographically vulnerable populations are adversely affected in large number.

The United Nations has worked hard to mobilize the international world to address these threats, and set 17 Sustainable Development Goals for 2030 with food, water, and energy for all. But the progress has been uneven and unequal across countries. It is known that there are competing political and pressure groups interests, between the various nations and also within nations, which are largely driven by the the nexus of politics-business-bureaucracy-Media-NGOs and have the least regard for the people and their land, forests, water resources, and animals. They all

deserve mutual respect and require healthy and sustainable future with safe living space for all. The continued environmental degradation and limited carrying capacity of the Earth destroys the most fundamental aspect of human security linked to the natural support systems, which accommodate all human activity. Simultaneously, the serious efforts at all national and international levels under the guidance of the Visionary political class and its leaders are required to eradicate poverty, promote sustainable productions and consumption, and manage natural resource base for the benefit of all humanity.

Since a lot requires to be done at the academic levels, such Conferences are a welcome step. It will help in bringing various stakeholders to a common minimum understanding of various complexities, vulnerabilities and uncertainties of these issues and their interlinkages further deepened by the globalization induced side effects and 'Fourth Industrial Revolution'.

It is in this background our College with the active support the Chairperson has acceded to the request of Environment and Social Development Association (ESDA) to collaborate in their venture to organize this Conference. I am sure, this Conference would serve as an active platform and a pivotal event for delegates to exchange ideas, hold discussions and share experiences along with spreading awareness among the different stakeholders particularly the young students.

I take this opportunity to welcome and thank all the distinguished Guest, Expert Speakers, Research Scholars and Students for their participation. We also appreciate the ESDA's efforts and initiatives. Our College teams led by Dr. Ravinder Singh and Dr. Jitendra Kumar Nagar deserve appreciation for their constant and untiring efforts

With Best Wishes and Good Luck,



**(Dr. G.K. Arora)**  
Principal



# ENVIRONMENT AND SOCIAL DEVELOPMENT ASSOCIATION (ESDA)

Head Office: F-2, Satyam Plaza (Chetak Complex), Pocket B & E Market Dilshad Garden, Delhi-110095 (INDIA)

**Er. Umesh Chandra**

Executive President

Date: 07.01.2019



## Messages

It gives me great pleasure to know that our organization 'Environment and Social Development Association (ESDA) is going to organize its International Conference (ESDACON 2019) on Global Environmental Challenges, Human Health and Sustainable Development" in collaboration with Metropolitan University (San Juan, PR, USA), Jawaharlal Nehru University (New Delhi), Dr. Bhim Rao Ambedkar College (Delhi University), CSIR-National Environmental Engineering Research Institute (NEERI), Amity University (Noida), Rajiv Gandhi Super Specialty Hospital (Delhi), ECPFO (Delhi) and GSI Delhi on 11-13 January, 2019 at the Convention Centre, Jawaharlal Nehru University, New Delhi.

Given the large-scale problems of climate change, pollution, sustainability, urbanization, human health, infectious diseases, natural disasters, biodiversity extinction and other environmental challenges that the world and India in particular is facing, I feel that this conference is the need of the hour. This conference is being organized on a very important issue and with the most eminent academic institutions of the country. I am sure that the Conference would do a great job in making the local public aware of the consequences and challenges of sustainability, environmental pollution, environmental endangerment and measures of doing environmental protection. I am also sure that the Conference will bring out many innovative solutions and policy framework for curbing pollution problem of Delhi and ensuring environmental justice to each and every citizen of Delhi.

I would like to congratulate all the organizing committee members, Chancellor of Metropolitan University, Chairman of Governing Body and Principal of Dr. Bhim Rao Ambedkar College, Director of CSIR-NEERI, Prof Punia from CSRD-JNU, Director of RGSSH, Vice Chancellor of Amity University Noida, President of GSI Delhi and President of ECPFO Delhi for organizing this conference. I sincerely appreciate and acknowledge to our dynamic and energetic personality with great leadership quality of ESDA General Secretary Dr. Jitendra Kumar Nagar, Organizing Secretary of the Conference for his cooperation, dedication and hard work to organize the conference successfully.

I wish the Conference a great success

(Er. Umesh Chandra)  
President, ESDA Delhi

Regd. Office: A-1, Main Pusta Road, Milan Vihar, Sant Nagar, Buradi, Delhi-110084



# RAJIV GANDHI SUPER SPECIALITY HOSPITAL

Tahirpur, Delhi-110093  
Tel.: 011-22890600 / 22890601  
Email ID: dpgrgssh@gmail.com  
Website: www.rgssh.in



## Messages

It gives me immense pleasure to present this message to the organizing committee and members of ESDACON 2019.

I would like to congratulate Environment and Social Development Association (ESDA) and other universities and institutes including Rajiv Gandhi Super Speciality Hospital (Delhi) for organizing an International Conference on Global Environmental Challenges, Human Health and Sustainable Development on 11 – 13 January, 2019 at Jawaharlal Nehru University, Delhi. This conference would be providing a great platform for a healthy interaction amongst eminent speakers of different disciplines on various topics of environmental challenges like human health linkage, community resilience, sustainable development goals and human well-being etc.

It is very good news that students, research scholars, and academicians from all over the world would be participating and presenting their work in the Conference.

I would like to extend my best wishes to all the members associated with this Conference and wish that this Conference would be a huge success.



**Dr B.L. Sherwal**  
Director  
Rajiv Gandhi Super Speciality Hospital  
Tahirpur, Delhi-110093



# GREEN SOCIETY OF INDIA

(Let's make the world green & healthy)



## Messages

It gives me great pleasure to know that Environment and Social Development Association (ESDA) is going to organize an "International Conference on Global Environmental Challenges, Human Health and Sustainable Development" in collaboration with Metropolitan University (San Juan, PR, USA), Jawaharlal Nehru University (New Delhi), Dr. Bhim Rao Ambedkar College (Delhi University), CSIR-National Environmental Engineering Research Institute (NEERI), Amity University (Noida), Rajiv Gandhi Super Specialty Hospital (Delhi), GSI Delhi, GRC India and ECPFO (Delhi) on 11-13 January, 2019 at the Convention Centre, Jawaharlal Nehru University, New Delhi.

Given the large-scale problems of climate change, pollution, sustainability, urbanization, human health, infectious diseases, natural disasters, biodiversity extinction and other environmental challenges that the world and India in particular is facing, I feel that this conference is the need of the hour. This conference is being organized on a very important issue and with the most eminent academic institutions of the country. I am sure that the Conference would do a great job in making the local public aware of the consequences and challenges of sustainability, environmental pollution, environmental endangerment and measures of doing environmental protection. I am also sure that the Conference will bring out many innovative solutions and policy framework for curbing pollution problem of Delhi and ensuring environmental justice to each and every citizen of Delhi.

I wish all the participants and organizers the best of luck in all their endeavors.

I wish the Conference a great success.

Best Wishes,

Swadesh Kumar  
President  
Green Society of India

H-146-147, 3rd Floor, Sector -63, Noida - 201307 (U.P.) India

Tel: +91-120-6500511 • Mobile No.: +91- 9811913376

Email: [gsi@gsindia.org](mailto:gsi@gsindia.org), [greensocietyofindia@gmail.com](mailto:greensocietyofindia@gmail.com) • Web: [www.gsindia.org](http://www.gsindia.org)



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In view of the several environmental challenges like increasing threat of climate change, pollution, deforestation, disasters, land use change, biodiversity and ecosystem services losses, environmental health diseases & epidemics and impinging challenges of socio economic inequalities etc. faced not only in India but also throughout the Globe, I am happy to note that this important International Conference on "Global Environmental Challenges - Human Health and Sustainable Development along with Global Environmental Exhibition" is being convened by Environment and Social Development Association (ESDA) Delhi in association with Center for the Study of Regional Development, Jawaharlal Nehru University, New Delhi; Metropolitan University, San Juan, PR, USA; Dr. Bhim Rao Ambedkar College, University of Delhi; CSIR-NEERI and Grass Roots Research & Creation India (P) Ltd (GRC India) from 11<sup>th</sup>-13<sup>th</sup> January, 2019 at The Convention Centre, JNU, New Delhi and a souvenir is being released on this occasion.



Dr. Dhiraj K Singh

In fact our planet is poised at the brink of a severe environmental crisis. Current environmental problems make us vulnerable to disasters and tragedies, now and in the future. We are in a state of planetary emergency, with environmental problems piling up high around us. Unless we address the various issues prudently and seriously we are surely doomed for disaster. Therefore, Current environmental problems require urgent attention.

Though Government of India & several International organisations have been taking several important steps in the direction of improving the Environmental Health, but given the severity of the issue, more hands to help will make implementation easier & faster and hence, I am very optimistic & hopeful that these 3 days International conference would provide a platform for active deliberations among various stakeholders and would produce actionable suggestions for the policy makers in drafting a strategic environmental restoration action plan based on best practices on affordable, alternative solutions, sustainable and clean energy, pollution control and management, restoration of ecosystem services, cure & prevention of environmental health diseases, affordable and sustainable spatial planning techniques and sustainable transport systems etc. Moreover, I am very much confident that these 3 days deliberations of the International conference will facilitate in exploring the inter-linkages between global environmental challenges, human health and sustainable development in light of SDG's 2030, SENDAI Framework 2030 and Paris agreement 2015, leading to fruitful and productive outcomes in terms of sharing knowledge and mobilizing action for global sustainable development and better global health.

I wish the Conference all success and thanking all the participants & the esteemed speakers for their benign participation & deliberations.

Thanking You.

Yours sincerely,

Dr. Dhiraj Kumar Singh  
MD, GRC India

- SEARCH Foundation – Chairman,
- Official Alumni Association of JNU (AAJ) – Joint Secretary
- Royal Association for Science-led Socio-cultural Advancement (RASSA) – Member
- International Development Centre Foundation (IDC) – Member (Governing Council)
- Recycling & Environment Industry Association of India (REIAI) – Member (Managing Committee)
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Centre for the Study of Regional Development  
School of Social Science  
New Delhi-110 067

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**Milap Punia**, Ph.D., M. Tech., P.M. (ITC)  
*Professor*



## Messages

I am happy to learn that Environment and Social Development Association (ESDA), Metropolitan University (USA), CSRD-Jawaharlal Nehru University, Dr. Bhim Rao Ambedkar College (University of Delhi), CSIR-National Environmental Engineering Research Institute (NEERI), Amity University, Rajiv Gandhi Super Speciality Hospital (Delhi) and ECPFO Delhi is organizing an *International Conference on Global Environmental Challenges, Human Health and Sustainable Development* on *11 – 13 January, 2019 at Jawaharlal Nehru University, Delhi.*

It is good to note that many eminent speakers from diverse disciplines would be delivering lectures on different areas of sustainability, pollution, climate change, solid waste management, biodiversity, conservation, natural resource management and other environmental challenges. Also noteworthy is the fact that students, research scholars, and academicians from all over the country would be participating and presenting their work in the Conference.

I extend all my best wishes to all the Organizing Institutes and the various committee members on this occasion and wish that this Conference would be a grand success.

  
(Prof Milap Punia)



# ENVIRONMENT AND SOCIAL DEVELOPMENT ASSOCIATION (ESDA)

Head Office: F-2, Satyam Plaza (Chetak Complex), Pocket B & E Market Dilshad Garden, Delhi-110095 (INDIA)

**Dr. Jitendra Kumar Nagar**

Dated: 09.01.2019

*Hony. General Secretary, ESDA*

Organizing Secretary, ESDACON-2019

Ass. Professor, Dept. of Environmental Science

Dr. Bhim Rao Ambedkar College

University of Delhi, Delhi

Email: jitendranagar79@gmail.com



## Messages

Respected Guests, Speakers, Delegates, Faculties, Volunteers and Colleagues,

It gives me immense pleasure to welcome you in the International Conference (ESDACON 2019) on Global Environmental Challenges, Human Health and Sustainable Development held on 11 to 13 January 2019 at the Convention Centre of JNU, New Delhi on behalf of the organizer, Environment and Social Development Association (ESDA), Delhi and Collaborators, Center for the Study of Regional Development (CSRD), Jawaharlal Nehru University, New Delhi, Metropolitan University, San Juan, PR, USA, Dr. Bhim Rao Ambedkar College of Delhi University, CSIR-National Environmental Engineering Research Institute (NEERI), Rajiv Gandhi Super Speciality Hospital Delhi, Amity University Noida, GRC India, ECPFO Delhi and GSI Delhi.

I think it is our utmost duty not only to educate the academicians but also the masses regarding forthcoming challenges of environment and development. The conference has been neatly divided into tracks, which covers all the issues relevant to the topic. It has been divided in such a way that it would be able to create discussion among academicians and researchers and will lead to concrete solution.

As we are moving in the process of development, we face enormous environmental challenges. Today, the choice is not of either development or environmental protection rather real issue is to strike the balance between development and environmental protection. I hope this academic deliberation would dwell upon these issues and would come up with some concrete recommendation in this regard.

I acknowledge with gratitude, the relentless support received from Executive President of ESDA Er. Umesh Chandra, Head of CSIR-NEERI Delhi Zonal Centre Dr. S. K. Goyal, Conference Convener Prof Milap Punia from CSRD-JNU, Governing Body Chairman Shri Deepanshu Shrivastav and Principal Dr. G.K. Arora of Dr. Bhim Rao Ambedkar College, Dr Ajay Kumar from Metropolitan University USA, DMS of RGSSH Dr. Chhavi Gupta and Executive Chairman of ECPFO Mr. Rakesh Agarwal in organizing this International Conference smooth and successfully. I am grateful to all the eminent speakers and distinguished dignitaries who in spite of their busy schedules readily agreed to be a part of this Conference. I am also thankful to all members of organizing committee of BRAC including Dr. Ravindra Singh, Dr S. S. Chawla, Dr. C. M. Meena, Ms. Sonam Dutta, Dr. Kumar Manish, Dr. Yogesh Murariya & Dr. Rajbala Gauttam and ESDA faculties Dr. Pallavi Mittal, Prof. N. P. Melkania, Prof. R. D. Doi, Mr. Anil Kumar Mavi, Mr. Ashok Kumar & Mr. Kamal Singh & other Members of ESDA, fellow faculty members, colleagues and BRAC students who have worked tirelessly in making this Conference a grand success.

I would like to extend my best wishes to the organizers, collaborators and participants.

**(Dr Jitendra K Nagar)**

Organizing Secretary, ESDACON 2019

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**Dr. Tara Shankar**



# ESDA CON 2019

Annual International Conference of ESDA  
11 to 13 January, 2019 | Delhi (INDIA)

## INTERNATIONAL CONFERENCE *on* **Global Environmental Challenges Human Health and Sustainable Development**

*at*  
The Convention Centre, Jawaharlal Nehru University, New Delhi  
11 to 13 January 2019

Organized by  
**Environment and Social Development Association (ESDA), Delhi**

In Collaboration With  
CSR-D-Jawaharlal Nehru University, New Delhi  
Metropolitan University, San Juan, PR, USA,  
Dr. Bhim Rao Ambedkar College, University of Delhi  
CSIR-National Environmental Engineering Research Institute  
Rajiv Gandhi Super Speciality Hospital, Tahirpur, Delhi  
Amity University Noida, GRC India, ECPFO Delhi and GSI Delhi

### Technical Schedule of the Conference

**DAY – I: 11<sup>th</sup> January, 2019 (Friday)**

Registration: 09:00 AM – 10:30 AM  
Breakfast 09:30 AM – 10:30 AM

**INAUGURAL SESSION (10:30 – 13:00) (Hall A-Auditorium-II)**

**Lunch: 13:00 – 14:00 PM**

**DAY – I: 11<sup>th</sup> January, 2019 (Friday) – Technical Sessions 14.00-15.30 PM**

Time (Hrs)	Hall A- Auditorium II		Time (Hrs)	Hall B- Committee Hall	
14.00-15.30	Session 1: Plenary Session/Presentations Environmental Challenges, Community Resilience and Regional Development		14.00-15.30	Session 2: Plenary Session/Presentations Clean & Renewable Energy, Resource Management & Green GDP	
14.00-14.15	Session Chairman	<b>Prof Kaushal Kumar Sharma</b> Hony. Director, NRC, ICSSR, New Delhi & Professor, CSR-D, JNU	14.00-14.15	Session Chairman	<b>Dr. Anil K Garg</b> CEO, Energy & Environment Foundation, New Delhi
14.15-14.30	Eminent Speaker 1	<b>Prof Milap Punia</b> CSR-D, Jawaharlal Nehru University, New Delhi	14.15-14.30	Eminent Speaker 1	<b>Dr. D. N. Singh</b> Former Professor, IIT Delhi and President, SG Solar Power Energy, Greater Noida
14.30-14.45	Eminent Speaker 2	<b>Prof. Shahab Fazal</b> Department of Geography, Aligarh Muslim University, Aligarh, U.P.	14.30-14.45	Eminent Speaker 2	<b>Dr Suneel Pandey,</b> Director, Environment & Waste Management Division, TERI, Delhi

14.45-15.00	Eminent Speaker 3	<b>Prof.Seema Bathla</b> CSR, Jawaharlal Nehru University, New Delhi	14.45-15.00	Eminent Speaker 3	<b>Dr. Indrani Roy Chaudhry</b> CSR, Jawaharlal Nehru University, New Delhi
15.00-15.15	Eminent Speaker 4		15.00-15.15	Eminent Speaker 4	
15.15-15.30	Q & A	All	15.15-15.30	Q & A	All
<b>Time (Hrs)</b>	<b>Hall C- Lecture Hall</b>				
<b>14.00-15.30</b>	<b>Session 3: Oral Paper Presentation (Open ESDACON Award Session)</b>				
	<b>Chair: Prof. Jaigopal Sharma</b> , Head, Department of Biotechnology, DTU, New Delhi				
	<b>Co-Chair: Dr. Krishnendra Meena</b> , CIPOD, SIS, Jawaharlal Nehru University, New Delhi				
	<b>Co-Chair: Dr. Manoj Kumar</b> , Assistant Professor, Department of Commerce, M.D.U. University, Rohtak				
	<b>Paper Presentation (Oral):</b> 15 participants selected for paper presentation (Oral)				
	<b>Parallel Technical Sessions</b>		<b>15.30-17.00 PM</b>		
<b>Time (Hrs)</b>	<b>Hall A- Auditorium II</b>				
<b>15.30-17.00</b>	<b>Session 4: Plenary Session/Presentations Natural Hazard and Disaster Management as Transdisciplinary Approach</b>				
15.30-15.45	Session Chairperson	<b>Prof. Amita Singh</b> Chairperson, Special Centre for Disaster Research, JNU, New Delhi			
15.45-16.00	Eminent Speaker 1	<b>Lt. General K J Singh</b> Director, ECPFO Delhi and Advisor, Haryana Government			
16.00-16.15	Eminent Speaker 2	<b>Prof. Vinod Kumar Sharma</b> Consultant (Former Senior Professor, Disaster Management) Indian Institute of Public Administration (IIPA) New Delhi			
16.15-16.30	Eminent Speaker 3	<b>Dr Jagbir Singh</b> Associate Professor, Swami Shradhanand College, University of Delhi			
16.30-16.45	Eminent Speaker 4	<b>Dr. Sreeja S. Nair</b> Consultant – Elearning, UNISDR and Visiting Faculty, TERI University, New Delhi			
16.45-17.00	Q & A	All			
<b>Time (Hrs)</b>	<b>Hall B- Committee Hall</b>				
<b>15.30-17.00</b>	<b>Session 5: Oral Paper Presentation (Open ESDACON Award Session)</b>				
	<b>Chair: Dr. Chhavi Gupta</b> , Deputy Medical Superintendent, Rajiv Gandhi Super Sp. Hospital, Delhi				
	<b>Co-Chair: Mr. Pradeep Verma</b> , Vice President, ESDA (U.P. Chapter)				
	<b>Co-Chair: Dr. Anil Kumar Singh</b> , Greek Chair, Jawaharlal Nehru University, New Delhi				
	<b>Paper Presentation (Oral):</b> 15 participants selected for paper presentation (Oral)				
<b>Time (Hrs)</b>	<b>Hall C- Lecture Hall</b>				
<b>15.30-17.00</b>	<b>Session 6: Oral Paper Presentation (Open ESDACON Award Session)</b>				
	<b>Chair: Dr. Jitendra K. Nagar</b> , General Secretary, ESDA Delhi				
	<b>Co-Chair: Dr. Kishor Kumar</b> , Associate Professor, K.M. Govt. Girls PG College, Badalpur, G.B. Nagar				
	<b>Co-Chair: Dr. Arvind Yadav</b> , Assistant Professor, Dr. Bhim Rao Ambedkar College, DU				
	<b>Paper Presentation (Oral):</b> 15 participants selected for paper presentation (Oral)				
	<b>High Tea: 17.00-17.30 PM</b>				

## DAY – 2<sup>ND</sup>: 12<sup>th</sup> January, 2019 (Saturday)

Registration: 09:00 AM – 10:00 AM  
Tea 09:00 AM – 10:00 AM

### Parallel Technical Sessions

**10.00-11.30 AM**

Time (Hrs)	Hall A- Auditorium II		Time (Hrs)	Hall B- Committee Hall	
10.00-11.30	<b>Session 7: Plenary Session/Presentation Municipal Solid Waste: Rules, Management Problems and Solutions</b>		10.00-11.30	<b>Session 8: Plenary Session/Presentation Urban Development, City and the Region/ Smart Cities &amp; Green Buildings</b>	
10.00-10.15	Session Chairperson	<b>Ms. Sanchita Jindal</b> Former Advisor, Ministry of Environment Forest & Climate Change, New Delhi	10.00-10.15	Session Chairman	<b>Prof. D. N. Das</b> CSR, Jawaharlal Nehru University, New Delhi
10.15-10.30	Eminent Speaker 1	<b>Mr. Deepak Agarwal</b> Sr. Vice President IL&FS Environmental Infrastructure & Services Limited, New Delhi	10.15-10.30	Eminent Speaker 1	<b>Dr Rohit Azad</b> CSEP, Jawaharlal Nehru University, New Delhi
10.30-10.45	Eminent Speaker 2	<b>Prof. O. P. Agrawal</b> Former Vice Chancellor, Jiwaji University, Gwalior, M.P.	10.30-10.45	Eminent Speaker 2	<b>Dr. Bikramaditya Choudhary</b> CSR, Jawaharlal Nehru University, New Delhi
10.45-11.00	Eminent Speaker 3	<b>Mr. Pradeep Khandelwal,</b> Chief Engineer, East Delhi Municipal Corporation, Delhi	10.45-11.00	Eminent Speaker 3	<b>Dr. Pritpal Randhawa</b> Assistant Professor, Urban Studies, School of Global Affairs, Ambedkar University Delhi
11.00-11.15	Eminent Speaker 4	<b>Mr. Atul Goyal,</b> President, URJA, Delhi	11.00-11.15	Eminent Speaker 4	<b>Mr. Avinash Kumar</b> Principal Consultant-Asia Pacific, ERM, Gurgaon
11.15-11.30	Q & A	All	11.15-11.30	Q & A	All

**Time (Hrs)**

### Hall C- Lecture Hall

**10.00-11.30**

#### Session 9: Oral Paper Presentation (Open ESDACON Award Session)

**Chair: Dr. S. K. Tyagi**, Former Additional Director, CPCB, Delhi

**Co-Chair: Dr. S. S. Chawla**, Associate Professor, Dr. Bhim Rao Ambedkar College, DU

**Co-Chair: Dr. Vijay Vishwas**, President, ESDA (Punjab Chapter)

**Paper Presentation (Oral):** 15 participants selected for paper presentation (Oral)

### High Tea: 11.30-12.00 PM

### Parallel Technical Sessions

**12.00-13.30 PM**

Time (Hrs)	Hall A- Auditorium II		Time (Hrs)	Hall B- Committee Hall	
12.00-13.30	<b>Session 10: Plenary Session/Presentations Water Pollution, Crises, Conflict and Solutions- Including River Conservation and Rejuvenation</b>		12.00-13.30	<b>Session 11: Plenary Session/Presentations Sustainable Agriculture, Food and Biotechnology/ Biodiversity Conservation, Ecosystem Services &amp; Livelihood</b>	
12.00-12.15	Session Chairperson	<b>Er. Paritosh Tyagi</b> Former Chairman, Central Pollution Control Board, Delhi	12.00-12.15	Session Chairman	<b>Prof. C. K. Varshney</b> , Professor Emeritus, JNU, Delhi Distinguished Adjunct Professor (AIT, Bangkok)
12.15-12.30	Eminent Speaker 1	<b>Prof. S. P. Singh</b> Department of Humanities and Social Sciences, IIT, Roorkee, Uttarakhand	12.15-12.30	Eminent Speaker 1	<b>Prof. N. P. Melkania</b> , Dean, Gautam Buddha University, Greater Noida

12.30-12.45	Eminent Speaker 2	<b>Prof. Sirajuddin Ahmed</b> Department of Civil Engineering, JamiaMilliaIslamia, Delhi	12.30-12.45	Eminent Speaker 2	<b>Prof. Tanu Jindal</b> Director, Amity Institute of Environmental Sciences, Amity University, Noida
12.45-13.00	Eminent Speaker 3	<b>Dr. Ajay Kumar</b> Associate Professor, Metropolitan University, San Juan, PR, USA	12.45-13.00	Eminent Speaker 3	<b>Prof. G. S. Solanki</b> Head, Department of Zoology Mizoram University
13.00-13.15	Eminent Speaker 4	<b>Er. J. K. Bassin,</b> Former Head, CSIR-NEERI, Delhi Zonal Centre, Delhi	13.00-13.15	Eminent Speaker 4	<b>Dr. Neelesh Kapoor</b> Assistant Professor Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut, U.P
13.15-13.30	Q & A	All	13.15-13.30	Q & A	
<b>Time (Hrs)</b>	<b>Hall C- Lecture Hall</b>				
<b>12.00-13.30</b>	<b>Session 12: Oral Paper Presentation (Open ESDACON Award Session)</b>				
	<b>Chair: Prof. Javed Ahmed,</b> President, National Environmental Science Academy, Delhi				
	<b>Co-Chair: Dr Rakesh Rana,</b> President, Environment and Social Development Association, Delhi				
	<b>Co-Chair: Mr. Anil Kumar,</b> Assistant Professor, Dr. Bhim Rao Ambedkar College, DU				
	<b>Paper Presentation (Oral):</b> 15 participants selected for paper presentation (Oral)				
	<b>Lunch: 13:30 – 14:30 PM</b>				
	<b>Parallel Technical Sessions</b>		<b>14.30-16.30 PM</b>		
<b>Time (Hrs)</b>	<b>Hall A- Auditorium II</b>		<b>Time (Hrs)</b>	<b>Hall B- Committee Hall</b>	
<b>14.30-16.30</b>	<b>Session 13: Panel Discussions/Presentations Sustainable Development Goals and Human Wellbeing / Carrying Capacity based Planning for Sustainable Development</b>		<b>14.30-16.30</b>	<b>Session 14: Panel Discussion/Presentations Citizen Environmental Activism, Communication, Evidence based outcomes and Policy Intervention</b>	
14.30-14.45	Session Chairman	<b>Dr. J. S. Kamyotra,</b> Former Member Secretary, CPCB, Delhi	14.30-14.45	Session Chairman	<b>Dr. Markandey Rai,</b> Senior Advisor, UN-Habitat & President, GPDSA
14.45-15.00	Eminent Speaker 1	<b>Dr. Anil Kumar</b> Director, Department of Environment, Government of NCT, Delhi	14.45-15.00	Eminent Speaker 1	<b>Prof. Ritu Priya Mehrotra,</b> Centre of Social Medicine and Community Health, School of Social Sciences, JNU, New Delhi
15.00-15.15	Eminent Speaker 2	<b>Dr. G. K. Arora,</b> Principal, Dr. Bhim Rao Ambedkar College, University of Delhi	15.00-15.15	Eminent Speaker 2	<b>Dr. Ratan Lal</b> Hindu College, University of Delhi
15.15-15.30	Eminent Speaker 3	<b>Dr. S. K. Goyal</b> Head, CSIR-NEERI, DZC, Delhi	15.15-15.30	Eminent Speaker 3	<b>Mr. Sanjay Kumar Swami,</b> Environmental Activist & Co-Coordinator, SSUN, Delhi
15.30-15.45	Eminent Speaker 4	<b>Dr J. K. Moitra</b> Managing Director, EMTRC Consultants Pvt. Ltd, Ghaziabad	15.30-15.45	Eminent Speaker 4	<b>Dr. Piyush Jain,</b> President, Academy of Family Physicians of India (UP Chapter), Agra, U.P.
15.45-16.00	Eminent Speaker 5	<b>Prof. A. L. Aggarwal</b> Professor (Emeritus), Amity University, Noida	15.45-16.00	Eminent Speaker 5	<b>Mr. Ranveer Tanwar</b> Environment Activist, Greater Noida
16.00-16.15	Eminent Speaker 6	<b>Prof. Madan Lal</b> Delhi School of Economics, University of Delhi	16.00-16.15	Eminent Speaker 6	<b>Mr. Sanjay Kumar Mishra</b> Editor, Enviro Annotations Newspaper, Delhi
16.15-16.30	Q & A	All	16.15-16.30	Q & A	All

Time (Hrs)	Hall C- Lecture Hall
14.30-16.30	Session 15: Oral Paper Presentation (Open ESDACON Award Session)
	Chair: <b>Mr. Rakesh Agarwal</b> , Executive Chairman, ECPFO Delhi
	Co-Chair: <b>Dr. Ravindra Singh</b> , Assistant Professor, Dr. Bhim Rao Ambedkar College, University of Delhi
	Co-Chair: <b>Dr. Pallavi Mittal</b> , Assistant Professor, ITS Para Medical College, Ghaziabad, U.P.
	Paper Presentation (Oral): 20 participants selected for paper presentation (Oral)
	<b>High Tea: 16.30-17.00 PM</b>

### DAY -3<sup>rd</sup>: 13<sup>th</sup> January, 2019 (Sunday)

Registration: 09:00 AM – 10:00 AM

Tea 09:00 AM – 10:00 AM

#### Parallel Technical Sessions

10.00-11.30 AM

Time (Hrs)	Hall A- Auditorium II		Time (Hrs)	Hall B- Committee Hall	
10.00-11.30	Session 16: Panel Discussions/Presentations <b>Air Pollution &amp; Smog in Metro Cities: Sources, Trends, Air Quality Monitoring and Innovative Solutions</b>		10.00-11.30	Session 17: Plenary Session/Presentations <b>Climate Change, Clean Development Mechanism (CDM) and International Community efforts to mitigate &amp; reduce GHGs</b>	
10.00-10.15	Session Chairperson	<b>Hon'ble Justice Mr. Swatanter Kumar</b> , Former Chairman, NGT Former Judge, Supreme Court of India	10.00-10.15	Session Chairman	<b>Prof. P. K. Joshi</b> School of Environmental Studies, Jawaharlal Nehru University, New Delhi
10.15-10.30	Eminent Speaker 1	<b>Dr. K. J. Ramesh</b> Director General of Meteorology, India Meteorological Department Government of India, Lodi Road, New Delhi	10.15-10.30	Eminent Speaker 1	<b>Dr. Anuradha Shukla</b> Chief Scientist, CSIR-Central Road Research Institute, New Delhi
10.30-10.45	Eminent Speaker 2	<b>Prof. B. R. Gurjar</b> Department of Civil Engineering, IIT Roorkee, U. K.	10.30-10.45	Eminent Speaker 2	<b>Dr. R. B. Lal</b> Additional Director, Ministry of Environment Forest & Climate Change, New Delhi
10.45-11.00	Eminent Speaker 3	<b>Prof. Umesh Kulshrestha</b> Director, Transdisciplinary Research Cluster, SES, JNU Delhi	10.45-11.00	Eminent Speaker 3	<b>Dr Rajendra Prasad</b> Managing Director, Ecotech Pvt. Ltd., Greater Noida, U.P.
11.00-11.15	Eminent Speaker 4	<b>Dr. Jitendra K. Nagar</b> Assistant Professor, Dr. Bhim Rao Ambedkar College, University of Delhi	11.00-11.15	Eminent Speaker 4	<b>Dr. Kaviraj Singh</b> , Managing Director, Earthood Services Pvt. Ltd., Gurgaon
11.15-11.30	Q & A		11.15-11.30	Q & A	All

<b>Hall C- Lecture Hall</b>					
<b>Session 18: Oral Paper Presentation (Open ESDACON Award Session)</b>					
<b>Chair: Mr. Swadesh Kumar</b> , President, Green Society of India & CEO, Indian Exhibition Services					
<b>Co-Chair: Prof. N. P. Melkania</b> , Dean, Gautam Buddha University, Greater Noida					
<b>Co-Chair: Dr. Hemlata Pant</b> , Assistant Professor, CMP P G College, Allahabad, U. P.					
<b>Paper Presentation (Oral):</b> 15 participants selected for paper presentation (Oral)					
<b>High Tea: 11.30 - 12.00 PM</b>					
<b>Parallel Technical Sessions</b>			<b>12.00-13.30 PM</b>		
<b>Time (Hrs)</b>	<b>Hall A- Auditorium II</b>		<b>Time (Hrs)</b>	<b>Hall B- Committee Hall</b>	
<b>12.00-13.30</b>	<b>Session 19: Plenary Session/Presentations Environmental Challenges and Human Health Hazards- Air Pollution and Human Health</b>		<b>12.00-13.30</b>	<b>Session 20: Plenary Session/Presentations Environment change-Industry linkages, impact on Health, &amp; Environment/ Technological Innovation in EHS measures, ETP and STP</b>	
12.00-12.15	Session Chairperson	<b>Prof. Raj Kumar</b> Director Vallabhbhai Patel Chest Institute, University of Delhi	12.00-12.15	Session Chairman	<b>Mr. Bijan Mishra</b> Sr. Vice President-Environment, Reliance Power Ltd., Noida
12.15-12.30	Eminent Speaker 1	<b>Dr. S K Rasania</b> , Director Professor & Head, Department of Community Medicine, Lady Hardinge Medical College, Delhi	12.15-12.30	Eminent Speaker 1	<b>Mr. Rajnish Mehrotra</b> Head, Environment, Forest and Wildlife, Essel Infrastructures, Noida
12.30-12.45	Eminent Speaker 2	<b>Dr. Rajiv Adhana</b> Senior ENT Surgeon, Adhana ENT Hospital, Delhi	12.30-12.45	Eminent Speaker 2	<b>Mr. Devender Gill</b> General Manager - Safety, Delhi Metro Rail Corporation, New Delhi
12.45-13.00	Eminent Speaker 3	<b>Dr. Awanindra</b> Head, Department of Blood Bank & Pathology, Swami Daya Nand Hospital, Dilshad Garden, Delhi	12.45-13.00	Eminent Speaker 3	<b>Mr. Lalit Sharma</b> Technical Advisor, SEIP, GIZ, Ministry of Env. Forest & Climate Change, New Delhi
13.00-13.15	Eminent Speaker 4	<b>Dr. Vikas Dogra</b> Assistant Professor, School of Pulmonology, RGSSH, Tahirpur, Delhi	13.00-13.15	Eminent Speaker 4	<b>Dr Sunali Khanna</b> President, Asian Academy of Oral and Maxillofacial Radiology Nair Hospital Dental College, Mumbai
13.15-13.30	Q & A	All	13.15-13.30	Q & A	All

<b>Time (Hrs)</b>	<b>Hall C- Lecture Hall</b>
<b>12.00-13.30</b>	<b>Session 21: Oral Paper Presentation (Open ESDACON Award Session)</b>
	<b>Chair: Prof. Ram Deo Doi</b> , Former Head, Department of Geography, University of Rajasthan
	<b>Co-Chair: Major Roop Singh Nagar</b> , President Awardee & National Executive Officer, ESDA Delhi
	<b>Co-Chair: Dr. Ram Chandra Singh</b> , Assistant Professor, SMP Government Girls PG College, Meerut
	<b>Paper Presentation (Oral):</b> 15 participants selected for paper presentation (Oral)
	<b>Lunch: 13:30 – 14:30 PM</b>
	<b>Poster Presentation: 10.00 – 12.30</b>

**Valedictory Session and ESDA Green Award Ceremony: 14.30-16.00**

**High Tea: 16.30-17.00 PM**





# BEAT PLASTIC POLLUTION

प्लास्टिक प्रदूषण पर रोक लगाएं





# ABSTRACTS



INTERNATIONAL CONFERENCE  
on  
**GLOBAL ENVIRONMENTAL CHALLENGES**  
**HUMAN HEALTH AND SUSTAINABLE DEVELOPMENT**  
11 to 13 January, 2019  
at The Convention Centre, JNU, New Delhi

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## **EFFECT OF TEMPERATURE ON TRIHALOMETHANE FORMATION IN TREATED WATER AND HEALTH EFFECT**

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### **ABSTRACT**

Disinfection is a critical and essential requirement of drinking water treatment system. Disinfection by chlorination is the last step in the water treatment process to prevent the water borne infections in treated water, and it reduces the regrowth of pathogenic microorganisms in the water distribution system. Trihalomethanes (THMs) formation in treated water is a very common process which involve reaction between chlorine with some naturally dissolved organic matters (NDOM), especially humic and fulvic acids, if present in water. The most common of THMs that are formed in the supply system includes Chloroform ( $\text{CHCl}_3$ ) Bromo-dichloromethane ( $\text{CHCl}_2\text{Br}$ ), Dibromo-chloromethane ( $\text{CHClBr}_2$ ) and Bromoform ( $\text{CHBr}_3$ ). These disinfection by-products (DBPs) create unpleasant taste and odour in drinking water and put high risk to human health. They are supposed to be one of the cancer causing agent. The THMs formation is highly affected by change in temperature of water in supply system, observed during different seasons. It was observed during the study that the THMs formation increase with the increase in the temperature from  $17^\circ\text{C}$  to  $35^\circ\text{C}$ . The observation was in accordance with the earlier studies that revealed that THMs formation potential at  $22^\circ\text{C}$  is 60-70% more than that occur at  $2^\circ\text{C}$ . Therefore, high temperature ( $>20^\circ\text{C}$ ) is an important factor for THMs formation. It was further found that with the decrease in the temperature due to seasonal variation reduces THMs formation.

People can be exposed to THMs in drinking water in number of ways. The different routes of exposure are through ingestion of drinking water (gastro intestinal tract), inhalation of indoor air (lungs), dermal during showering or bathing (topical), but primary exposure is from drinking water. Long-term THMs exposure can result in low accumulation of chemical in human body (biological system), which could be a great human health concern.

The paper presents levels of THMs in the water supply of Delhi during different seasons and highlights its sensitivity for the consumers in different regions of Delhi.

**Keywords:** Disinfection, Trihalomethanes, Temperature effect, Human health.

## HIGH DRAUGHT TECHNOLOGY FOR POLLUTION CONTROL IN BRICK KILN

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### ABSTRACT

The growth of industrial, commercial and residential sector in India is closely linked with the rate of production of important building material namely “Bricks. Presently, there are about 100,000 active brick kilns operating all over India producing approximately 250 billion bricks per year. 70% of the Bricks in India are produced using conventional Fixed Chimney Bull's Trench Kiln technology (FCBTK), consuming approximately 35 million metric tons of low-grade coal. Brick kiln industry is the second largest coal consuming industry after steel industry. Through a Gazette notification from GoI 2015 MoEF, CPCB has made it mandatory for brick kilns that SPM concentration in the effluent gases from stack should not exceed 250 mg/Nm<sup>3</sup>. Appreciating the concern for environment friendly brick production, CSIR-CBRI have designed and developed High Draught Brick Kiln with Zig-zag setting technology for clay bricks. In this Zig-zag kilns, green bricks are arranged in a way that forces hot air to travel in a zigzag path. The length of the Zig-zag air path is about three times that of a straight line air path, which improves the heat transfer from the flue gases to the bricks, making the entire operation more efficient. The technology developed by CBRI is basically an arch less, top-fed, coal-fired continuous kiln in which the fire follows a zig-zag path. The setting area is divided into 24 chambers by partition walls. The partition walls are built with unfired bricks and are dismantled at the time of unloading bricks from a chamber. Depending on the design capacity of a kiln, a chamber can hold from 15,000 to 20,000 bricks. Normally, two chambers are burnt per day (24 hours). Therefore, an output of 30,000 to 40,000 bricks per day can be obtained. An induced draught fan located at the far end on kiln creates draught and the discharging capacity of the fan is 425 m<sup>3</sup>/minute. It is operated by a 12 kw motor. The advantages of a Zig-zag kiln as compared to FCBTK are less fuel (20 %) consumption, lower SPM emission (80 %) and more than 90 % of Class “A” bricks. The technology has been transferred to three licensees for implementation in field in all states of India.

## **EFFECT OF THERMAL, CHEMICAL AND THERMO-CHEMICAL PRETREATMENT OF SUGARCANE BAGASSE ON ENHANCED ANAEROBIC DIGESTION**

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### **ABSTRACT**

Sugarcane bagasse (SB) is a recalcitrant compound with high amount of lignin, cellulose and hemicellulose. It is not much efficient in biogas production and mainly used for ethanol production. Due to non-degradation of SB, it is pre-treated with different chemical, mechanical and biological methods. Therefore, the aim of this study was to assess the enhanced biogas production from pretreatment (thermal, alkali, acid, thermal-alkali and thermal-acid) of SB to break down the recalcitrant compounds. The experimental set consists of six different batch reactors of 500 mL capacity namely (control or without any pre-treatment (WP0), Thermal Pretreatment (T0), Acid Pre-treatment (AC0), Alkali Pre-treatment (AL0), Thermal Acid Pre-treatment (TAC0) and Thermal Alkali Pre-treatment (TAL0). The experiments were carried out for 30d at ambient conditions. The alkali and acid pre-treatment were performed with 1N NaOH and 1N H<sub>2</sub>SO<sub>4</sub> and thermal pre-treatment was performed in an autoclave. The biogas was measured using water displacement method and the highest biogas production was achieved in thermal-alkali pretreatment of SB (5958mL) followed by alkali pretreatment (5331mL). The regression coefficient obtained was greater than 0.95 for all the results. Experimental results were modelled using Gompertz and Logistic model and were well fitted. Based on the results of this study, it was observed that the thermal-alkali pretreatment of SB was most efficient pretreatment methods for enhanced biogas production. The results for pH, VFA and ammonia were statistically significant with  $p < 0.05$ .

**Keywords:** Anaerobic digestion, biogas, pretreatment, SB.

## HEALTH EXTERNALITY AND AIR POLLUTION IN THE OPENCAST COAL MINING REGION OF ODISHA

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### ABSTRACT

Coal production is treated as the most polluting of all energy sources. Given that the coal dust and fly ashes are more contaminating in comparison to other minerals, the health impact of coal exposure is considered to be critical. Apart from the direct impact of the occupational hazards to the coal miners, open cast coal mining, imposes severe negative environmental and health externalities (through air pollution) on the local communities, of the mining region. Thus the present study used the health production function model and focuses on the valuation of productivity loss in terms of work days lost due to severe respiratory illness (RI), induced by air pollution. First we tried to predict the likelihood of RI related sickness (in terms of their sick days) of the residents near the open cast coal mines. Then we tried to estimate the relationship between the mitigating expenditure due to RI related sickness and the level of air pollution. The study is based on the household surveys in the Angul (Talcher) open cast coal mining region of Odisha. We do Count data analysis for estimating productive days lost due RI related sick days by running Poisson and Negative Binomial regression and for the mitigating expenditure we run the Tobit regression model. The result confirms that there is a positive, highly significant relationship between the level of air pollution (RSPM/PM10) and RI related sick days in the Poisson and Negative Binomial model. The positive coefficient of pollution variable depicts a direct relation between air pollution level and RI related sick days. Moreover the coefficient sign of PM10 is also positive in the Tobit model, which indicates a positive association between the PM10 level and RI related mitigating activities.

**Keywords:** Air pollution, Health production function, Count data analysis, Poisson Negative Binomial, Tobit regression model.

## **ASSESSMENT OF WATER QUALITY USING POLLUTION INDEX OF RIVER HINDON, UTTAR PRADESH, INDIA**

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### **ABSTRACT**

Rivers have important positive effect on human civilizations as they meet the demand of water for different uses, including domestic, industrial and irrigation. River Hindon is a most important source of water for the urban and rural population of western Uttar Pradesh, India. A study was conducted to evaluate the spatial and temporal variation of river water quality by determining physicochemical variables and heavy metal concentrations. The monitoring was done for the period of two consequent summer and winter season. Ten sampling sites (Bahadurpur, Maheshpur, Dudhali, Charthawal, Titawi, Budana, Pithlokar, Parasi, Barnava and Pura) have been selected for sampling. The samples were analyzed for pH, EC, TDS, turbidity, BOD, COD, TA, TH, calcium, magnesium, sodium, potassium, bicarbonate, chloride, sulfate, nitrate, phosphate, fluoride, boron and heavy metals i.e. Fe, Mn, Zn, Pb, Ni, Cu, Cr & Cd. Statistical analysis have measured between water quality variables, index scores, principal component analysis (PCA) and cluster analysis (CA) were also investigated. The study revealed that the Water Quality Index (WQI) and comprehensive pollution index (CPI) of river Hindon is slightly polluted in upstream site in Saharanpur and further highly polluted in Pithlokar, Meerut onwards. Study suggested that there is an urgent need for proper management of safe disposal of effluents and their treatments to restore the River water quality.

**Keywords:** River Hindon, Metals, Physicochemical parameters, Water Quality Index.

## REMEDIATION OF 2,4,6-TRINITROTOLUENE (TNT) CONTAMINATED EFFLUENT USING ALKALINE HYDROLYSIS

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### ABSTRACT

Contamination of water by explosives has occurred at military sites throughout the world as a result of manufacturing, assembling, and developing explosives containing devices. 2,4,6-trinitrotoluene (TNT) has been the most extensively produced and used nitroaromatic explosive and, therefore, has been present most abundantly in the environment and pose a risk to human health. TNT and its metabolites are major pollutants of soil and water encountered at military installations. TNT has been shown to be resistant to degradation under environmentally relevant conditions and is therefore recognised as a persistent contaminant. The objective of this study was to assess the effectiveness of alkaline hydrolysis as an alternative ex situ technology for remediation of effluent collected from TNT contaminated site in India. Treatment of the effluent containing TNT in stirred reactor was investigated. TNT reactivity was strongly dependent on the reaction pH investigated (11–13). During treatment, degradation of TNT was followed by high-performance liquid chromatography (HPLC) and degradation was calculated in percentage. Degradation of TNT occurred by the interaction of TNT with bases (nucleophile) to form an initial product which is likely to be either a Meisenheimer complex, direct nitro substitution or proton abstraction products. The highest degradation of 82 % of initial TNT was achieved at pH- 12 in 5 days reaction time under steady state condition. Degradation of TNT was accompanied by the concurrent release of nitrate and nitrite which implies that TNT loses nitro group and become less nitrated. The oxalate was found to be one of the hydrolysate only after 5 days alkaline hydrolysis and indicates that the TNT aromatic ring is cleaved by alkaline hydrolysis. It is concluded that alkaline hydrolysis can be an effective treatment technology for remediation of TNT contaminated effluent.



## **ASSESSMENT OF IMPLEMENTATION OF THE FOREST RIGHTS ACT 2006 IN SONBHADRA DISTRICT OF UTTAR PRADESH**

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### **ABSTRACT**

The “Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006” was enacted to empower the forest dwelling communities for their occupation, habitation and conservation rights who are primarily residing in the forests and also dependent on the forests and forest lands for fulfilling their *bonafide* livelihood needs. The study has been conducted in the Sonbhadra District of Uttar Pradesh in India. Implementation of the “Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006” in Sonbhadra district started in 2009. In the district out of a total of 65, 540 claims, approximately eighty two percent of the claims got rejected. The total number of community claims filed in the District is mere one percent of the total claims. The Act was implemented with the main aim to undo the historical injustice done to the forest dwellers since the colonial period, but the high rate of rejection clearly highlights that the Act is not being implemented in the true spirit of its preamble. This study focuses on the high rate of rejection and focuses on understanding the reasons for such a high rejection rate. The study also deals with the role of evidences that are presented by the right holders to authorize their claims on the forest land. The major finding that comes out in the study is that how some particular evidences are given more weightage in the rights recognition process in Sonbhadra and also how some claims got rejected solely on the basis of producing particular evidence. The study also shows that approximately twenty six percent of the claims have been rejected even when the correct evidences were produced. This makes it a matter of serious concern. The study also brings out the various gaps in the implementation of the Forest Rights Act, 2006 at the individual level and the administrative levels.

**Keywords:** Forest Dwellers, Scheduled Tribes, Evidences, Rejected Claims, Forest Right Act

**THE DYNAMICS OF GURUGRAM'S PERI-URBAN INTERFACE:  
THE JUXTAPOSITION OF 'BECOMING URBAN' AND  
'PRESERVING COMMUNITY RESILIENCE'**

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**ABSTRACT**

The peri-urban debate pops with two distinct character of expansion. Firstly, the linear development along the axis of predominant activities in between two different urban/nearly-urban clusters comprising a rural landscape. Secondly, the urban sub-centres primarily defined by the agrarian character later being identified as the municipalities of rapid growth due the potential of residential developments incorporated for the first time. The preliminary approaches to urban expansion and urban restructuring state that the trans-national collaborations have moulded the decision-making process of the cities by strengthening the 'global-local' nexus. The peri-urban planning and management endorse special attention because the dwellers are heavily dependent on the ecosystem services therein, which gets degraded under the transitional phase of peri-urban discourse. It holds another importance not just to examine the transformations of the city per se, but to enlarge the extent by looking into the dynamics of the spatial changes that has been leading to urban restructuring of the peri-urban regime too. The on-going challenges to manage the rural-urban continuum or the peri-urban discourse are demanding unique mechanism to cater them. One of the lacunae in handling the peri-urban governance is the ignorance of the past mechanism and the formulation of short-term goals. Gurugram, being on the axial motion of economic development has egressed as the hub of financial and industrial performances since last two decades. The territorial base of Gurugram is occupied by various multinational companies and more are in the row. The employment opportunities embedded in its Information Technology (IT), Real Estate, Retail, Business Processing Outsourcing (BPO), and other sectors have drawn huge human resource from states especially from the neighboring ones such as Delhi, Uttar Pradesh, Rajasthan, and Punjab. The following research focus on the Gurugram's path of development and the implications of such developments on the community resilience. The present governance policies of Gurugram require to be restructured on the consideration of the haphazard development that took place to decongest the territorial limits of New Delhi.

## **CLIMATE CHANGE, WATER AND FOOD SECURITY - ADDRESSING THE CHALLENGES**

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### **ABSTRACT**

Water is not only essential for good health, but is also a factor helping in food production. Yet only a small amount of the water on earth is available to meet the competing demands of mankind. Climate change is widely considered to be one of the most difficult challenges facing us, both in terms of the action needed to limit it and the ways in which we will have to adapt to its effects. It is considered as posing the greatest threat to agriculture and food security in the 21st century, especially in many of the poor, agriculture dependent countries. Without some form of water control across the world's river basins, freshwater lakes and associated aquifers, local, regional and global food security would not be possible. The socio-economic and environmental factors will play a dominant role in shaping future water management policies. At the same time, climate change will increase future risk and vulnerability of crop production related to water supply and its availability. The amount of water allocated to agriculture and water management choices will determine, to a large extent, whether societies achieve economic and social development and environmental sustainability. This paper reviews current knowledge about the relationships between climate change, water and food security. Though the availability of food and its utilization are less directly linked to water, income from irrigated cash crops is affected by water availability. The safe utilization of water is interwoven with household hygiene and food preparation which depends upon water supply. Against a background of degraded agricultural land, diminishing water resources and progressively thinner stocks of key food products, the ability to improve agricultural production has become a matter of utmost concern. The rural population is at most risk from anticipated climate change especially those living in semi-arid and arid zones have few options for adapting to water scarcity other than migration. It is suggested that adaptation strategies will be needed in the future to reduce the anticipated impact of climate change on availability of water and food security.

**Keywords:** Water, climate, agriculture, degradation, food security, policies, development.

## **ASSESSMENT OF *TRICHODERMA VIRIDE* AND NEEM CAKE ALONE AND IN COMBINATION ON ROOT- GALL NEMATODE IN OKRA.**

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### **ABSTRACT**

Okra (*Abelmoskuesculentus*) is an important vegetable crop grown in tropical and subtropical regions. Approximately 20–90 percent losses in okra have been reported by root–gall nematode in India. The various tools of management are advocated to manage the losses caused by this pest. The role of organic amendment and biocontrol agent are most conspicuous and effective. So the present study was undertaken. One organic amendment and one biocontrol agent viz. neem cake and *Trichodermaviride* was taken for experimental purpose. Observation on the organic amendment and *T. Viride* showed an increase in the growth of okra over control. The better growth of plant and number of fruits were recorded the plant amended with combination of neem cake + *Trichoderma Viride* followed by neem cake and *T. Viride* alone respectively. Reduction of root–gall was maximum with combination of neem cake + *T. Viride* ( 11.60 ) followed by neem cake ( 16 .50 ) and *T. Viride* ( 20 .00 ) alone respectively.

**DEVELOPMENT OF VEGETABLE PROTEIN-BASED  
BIOPOLYMER FOOD PACKAGING SCHOOL OF  
VOCATIONAL STUDIES AND APPLIED SCIENCES**

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**ABSTRACT**

The objective of this study is biopolymer food packaging films based on vegetable protein. Initially pigeon peas ground for extraction of pigeon pea proteins and soy protein was procured from the market. Protein extraction from pigeon pea powder was accomplished with the help of centrifugation method by three precipitation processes i.e. acid precipitation, ammonium sulphate precipitation and alcohol precipitation. Edible films with soy protein and pigeon pea protein were formulated and their characteristics properties were compared. By alcoholic precipitation highest amount of protein extract (8.77 %) was obtained compared to other protein precipitation processes. Film opacity value increases with increasing the amount of protein content from 0.0397 to 0.1811 and 0.0564 to 0.1903 in both pigeon pea protein extract and soy protein extract packaging films. Film transparency value decreases with increasing the amount of protein content from 0.7057 to 0.0315 and 0.0697 to 0.0241 in both pigeon pea protein extract and soy protein extract packaging films. The solubility of the pigeon pea isolates film varies from 22.77 % to 45.45 % and solubility of soy protein isolates film varies from 31.1 % to 38.29 %. Solubility of the film increases with the protein constituent increases. Hardness of the films increases with the protein constituent increases for pigeon pea protein films and hardness decreases with the protein constituent increases for soy protein films. Adhesiveness increases with the protein constituent increases for pigeon pea protein films and adhesiveness decreases with the protein constituent increases for soy protein films. The percentage elongation break varies from 11.75 % to 13.1% in case of pigeon pea protein packaging film and 10.97 to 11.99 % in case of soy protein films. The different colour values 'L' 'a' and 'b' of films observed by the Hunter colour value. Sample A1 showed the highest value for 'L'. Sample A2 showed the lowest value for 'a'. Sample B3 showed the highest value for 'b'. Chroma and Hue angle calculated with the help of 'L' 'a' and 'b' values which determined the different colour properties. This study showed that pigeon pea protein isolates could be used for development of packaging film and it could be a good substitute of soy protein isolates packaging film.

## **INDIGENOUS CATTLE MUST FOR ZERO BUDGET AGRICULTURE.**

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### **ABSTRACT**

Natural resources, environment and particularly agriculture is under intense pressure due to ever increasing demand for the food grains. The time has come to save our soil and environment and reduce the cost of production, Zero budget agriculture is the one such way. Zero budget agriculture means the production cost for all the crops will be zero. In the zero budget natural farming (ZBNF) nothing has to be purchased from outside, all things required for the growth of plant are available around the root zone of the plants. There is no need to add anything from outside, as our soil is prosperous and full of nutrients. The nutrients in the soil are in the unavailable form, i.e. they are in the form of grains, not chapatti or roti. The roots cannot take it in this form. This non-available form is converted into available form by the millions of micro-organisms. These valuable micro-organisms are destroyed by excessive use of chemicals, fertilizers, insecticides, pesticides, weedicides, etc. To obtain proper availability of micro-organisms we have to re-establish them in the soil and it is possible only by applying the cow dung of Indian cattle. The cow dung is miraculous culture as one gram of cow dung contains about 300 to 500 crore beneficial effective microbes. Thus, once again as mentioned in Vedas importance of Indian Cow with hump/dilla has proved beneficial and worthy for betterment of soil, environment, agriculture and ultimately human health  
Key words: Zero budget, Indian cattle, Cow dung, Micro-organisms .

## ESTIMATION OF INDOOR AIR QUALITY DUE TO INDUSTRIAL EMISSION AT MOHAN NAGAR INDUSTRIAL AREA OF GHAZIABAD CITY, INDIA

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### ABSTRACT

Present study has undertaken at Vashundhra colony, Ghaziabad city, National Capital Region (NCR) of Delhi, India with main objective to determine the estimation of indoor air pollution due to industrial emission at Mohan Nagar industrial area of Ghaziabad city. The concentration level of indoor air pollutants were determined by using Handy Air Sampler with 1 LPM flow rate. A total of 114 houses have studied. 40.40% family members were found to be smokers. 71.9% families were using LP Gas fuel for cooking and 28.1% families mainly from lower class were using biomass fuel (coal, cow dung cakes, kerosene, etc) for cooking. 47.4% family members were aware that indoor air pollution affects human health. The mean level of indoor SO<sub>2</sub>, NO<sub>2</sub> and SPM was 5.614.22 g/m<sup>3</sup>, 36.2718.11 g/m<sup>3</sup> and 700.04363.31 g/m<sup>3</sup>, respectively. The mean concentration of indoor SO<sub>2</sub>, NO<sub>2</sub> and SPM were significantly high in the houses nearby industrial area compared to non industrial area which is considered as control group. The mean concentration of indoor SO<sub>2</sub>, NO<sub>2</sub> and SPM was significantly high in the houses where smoking habit was present in the family and these pollutants concentration was also high in the houses where families were using biomass fuel for cooking compared to families were using LP Gas fuel for cooking. Indoor SO<sub>2</sub>, NO<sub>2</sub> and SPM were also significantly associated with ventilation system in the kitchen. The present study concluded that the industries play an important role to increase the concentration of air pollutants that may affects human health.

**Keywords:** Indoor air pollution, industries, smoking, cooking fuel.

## **AN *IN-VITRO* STUDIES ON THE IMPACT OF *CITRUS LIMON* JUICE ON THE KINETIC CHARACTERISTICS OF ACETYLCHOLINE ESTERASE AGAINST LEAD AND CARTAP INDUCED PERTURBATIONS**

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### **ABSTRACT**

Human exposure to heavy metals and pesticides is a worldwide major health problem. These environmental pollutants considered as most neurotoxic agent and responsible to cause neurological toxicity. Neurotoxicological disorders such as autism, attention deficit disorder, mental retardation, and cerebral palsy are common but dangerous as it can cause lifelong disability. In the present study, we have used heavy metal such as lead and a carbamate pesticide such as cartap. The available literature on the present subject indicates the lack of enough information. Keeping these facts in view, we have endeavored to assess the individual and combined impacts of lead, and cartap on the activity of acetylcholine esterase (AChE) in the brain tissues of rat. The *Cirtus limon* fruit extract has been used to evaluate its ameliorative effect. The homogenate of rat brain tissue (10% w/v) was prepared under ice-cold condition and centrifuged at 10,000xg at 40C for 30 minutes. The protein content and AChE activity were determined by methods of Lowry et al., (1951) and Ellman et al., (1961), respectively. We have also monitored the AChE activity kinetics using varying substrate concentrations, pH, temperature, time, as well as the concentrations of lead, cartap and the combination of lead and cartap. The kinetics parameters such as  $V_{max}$ ,  $K_{cat}$ ,  $K_m$  and  $K_i$  have been calculated. The results indicated that the lead and cartap were able to cause significant alterations in the level and properties of AChE. The significant alterations in the kinetic parameters of AChE were observed in the in vitro studies. However, introduction of lemon juice on the lead and cartap treated AChE indicated protection of its activity from their adverse effects. The results may be useful in prospective therapeutic applications of lemon juice or as a food supplement in order to protect mammalian systems from adverse effects of the toxicants.

**Keywords:** Lead, Cartap, Kinetics, Amelioration, Acetylcholine esterase, *Cirtus limon*.



## GREEN SYNTHESIS OF NEWER HETEROCYCLIC COMPOUNDS AS ANTICONVULSANT AGENTS

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### ABSTRACT

2-Amino-5-(3'-indolomethylene)-1, 3, 4 - oxadiazole (**3**) undergoes facile condensation with various aromatic aldehydes to give 2-substituted arylidenylamino-5-(3'- indolomethylene) – 1, 3, 4 – oxadiazole (**4-8**). Cyclocondensation of (**4-8**) with thioglycolic acid and triethylamine yielded 3-[5'-(3"-indolomethylene)- 1', 3', 4'- oxadiazol-2'-yl]- 2- (substituted aryl)-4- thiazolidinones (**9-13**) and 1-[5'-(3"-indolomethylene) -1', 3', 4'- oxadiazol - 2'- yl ] -4-(substituted aryl) -2- azetidinones (**14-18**). The structure of all the newly synthesised compounds were delineated by elemental ( C, H, N ) and spectral ( IR, proton magnetic resonance and mass) analysis. The homogeneity of all the compounds was checked by using silica gel-G plates. The newly synthesised compounds were evaluated for their anticonvulsant activity and acute toxicity. Compound 9 i.e. 3-[5'-(3"-indolomethylene)-1',3',4'-oxadiazol-2'-yl]-2-(p-methoxyphenyl)-4-thiazolidinone showed most potent activity of 90% more potent than standard drug phenytoin sodium (80%).

**Keywords:** Indolyl oxadiazole, indolyl thiazolidinones, indolyl azetidinones, spectral studies, anticonvulsant activity, acute toxicity.

**INTEGRATED SYSTEM OF VERTICAL GARDEN AND  
AQUAPONICS – A DECOR MODEL TO PROMOTE  
A CLEANER AND A HEALTHY ENVIRONMENT**

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**ABSTRACT**

Since the time of industrialization, green cover has been affected badly and so is our environment. The places meant for plants has been taken over by structures on the name of development. Now in recent years, it has been observed that measures has been taken to bring balance between nature and mankind. The paper portrays an innovative and a decor model comprising the concept of vertical gardening and aquaponics. The light weighted frame comprises of used plastic bottles as a support structure for plantation connected by a water tank below through pipe system. The water tank used can be an aquarium system (including fishes and crabs) or just a water tank in which liquid fertilizer can be added so that it mixes up with water and can be directly circulated to plants along with water with the help of battery operated motor. Previous studies show that the liquid fertilizers are taken up by plants more conveniently than the granular one, hence the model focusses on less input and more output. It emphasises on three key point's i.e. plastic recycling, water conservation and most importantly promotion of home based useful plants that has a role to play in medication, air purification as well as beautification. The plants applied to the present model are of type which occupies less space and demand less care like Spider plant (*Chlorophytum comosum*), Boston fern (*Nephrolepis exaltata*), Snake plant (*Sansevieria trifasciata*), sp. of Aloe vera, medicinal herbs etc.

**Keywords:** Vertical Gardening, Aquaponics, Decor, liquid fertizer.

## HEPATOPROTECTIVE EFFECT OF CINNAMALDEHYDE IN FOOD COLOR INDUCED TOXICITY IN RAT MODEL

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### ABSTRACT

Synthetic food colors are extensively used in the food industry to give attractive color, texture and flavor to different foodstuffs. These artificial food colors may cause side effects like food allergies, decreased absorption of minerals and vitamins, cancer and many more. Metanil yellow is one of the non-permitted azo dyes which is widely used in food industry. Because of its orange-yellow color, metanil yellow is also commonly used in the coating of turmeric, laddu, papadum, spices etc. It is widely used in paper, leather and many textile industries as a dye and colorant for the wool. The present study was planned to assess the toxic effects of metanil yellow on albino wistar rats and hepatoprotective efficacy of cinnamaldehyde against these adverse effects. The effect of food color was studied on several serum enzymatic and biochemical markers. Administration of metanil yellow elevated levels of AST, ALT, total bilirubin, ALP and some other parameters in serum while levels of total protein and albumin decreased. However, co-administration of cinnamaldehyde showed partial restoration of serum markers suggesting hepatoprotective potential of cinnamaldehyde against metanil yellow toxicity.

## LIGNIN DEGRADATION – AN ESSENTIAL REQUISITE OF TODAY 'S ENVIRONMENT

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### ABSTRACT

Lignin is a cross linked polymer of subunits guaiacylporane, syringylporapane, p-hydroxyphenylpropane which are interconnected by ether bonds, carbon –carbon bonds, giving lignin a complicated 3-D structure. It serves as matrix around the polysaccharide components of some plant's cell wall, providing mechanical strength to the plants. In spite of the fact that, lignin is second to cellulose as the most abundant compound it is a vastly underutilized material.

The amount of lignin produced in industries reaches 50 million tons per year, but only a small amount of it i.e. 2% is recovered and used, the rest of the 98% is restricted to serve as fuel or contributes to environmental pollution. Lignified organic carbon accumulates in the soil as lignocellulose, having deleterious effects on soil's fertility.

As lignin resists chemical or enzymatic degradation, it is quite difficult to degrade it. But still various white rot fungi (*Basidiomycetes*, *Xylariaceous ascomycetes*), have been reported to degrade lignin. *Penicillium chrysogenum*, *Fusarium oxysporum*, *Fusarium solani*, *Elfvigia applanate* are some of the strong, lignin degrading microbes. A symbiotic relationship between fungus growing termites and termitomyces fungi was also exploited to degrade lignin. Recently, a number of bacteria which can degrade lignin were also reported, including *Streptomyces viridosporus T7A*, *Nocardia autotrophica*, *Sphingobium sp. SYK-6*, *Pseudomanas putida mt-2*, *Rhodococcus sp.*, *Burkholderia cepacia*, *Microbacterium sp.* and *Citrobacter sp.*

Till date there are no such reported microbes, enzymes or chemicals which can efficiently and effectively degrade lignin. Thus, for an efficient and effective lignin degradation one can shift towards the bioremediation of soil accumulated with lignocellulose. Woods or dead remains of crop plants can be transported to landfills where it can be acted upon by various microbes for degrading lignin. Genetic Alterations can be done in the plant's lignin biosynthesis pathways so as to limit the amount of lignin synthesized by the plants and these modified plants can be used as the raw material by paper making industries.

## EFFECT OF CLIMATE CHANGE ON ISLAND COUNTRIES

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### ABSTRACT

Climate change is one of an existing threat to the survival and sustainability of many island countries by 2100, sea-level rise could submerge some low-lying atoll nations. These island nations are found throughout the world, although most of them are located in the wider Caribbean and South Pacific regions. Ninety per cent of the islands are in the tropics. Many are seasonally affected by extreme weather events – tropical storms, cyclones and hurricanes. Climate variability, droughts and flooding are also features of their weather pattern. El Niño Southern Oscillation events also produce dramatic changes in rainfall, rising sea levels and other weather-related phenomena. Islander communities have been adapting to harsh and changing environmental conditions for centuries, and environmental hazards are generally not the direct cause of conflict. However, climate change is a threat and stress multiplier that can exacerbate existing vulnerabilities and instability. It is not just island people who are at risk from climate change: 60% of humanity live in coastal areas and therefore share vulnerability to climate change and sea level rise. Low lying coastal areas in all countries are threatened, including agriculturally productive river delta's worldwide. The warming of Pacific Ocean water of three degrees has been measured in the Pacific. Plankton – the tiny single cell plants and animals that are the basis of the ocean food web in northern latitudes and the source of at least half the oxygen we breathe – are dying. Zoo plankton in the northeast Pacific have declined by 80% since 1950. In the southern oceans, coral reefs are dying, perhaps because of ocean warming, threatening biological productivity in tropical seas. Climate Change assessed that warming of the climate system is unequivocal and that impacts on natural and human systems globally are already occurring, including sea-level rise and longer and more intense heat waves. In addition to the immediate impacts of disasters and extreme weather events, climate change is likely to affect food security, water scarcity, the frequency of disasters, sea-level rise and energy security.

**Keywords:** Climate change, Rising sea-level, Plankton, Ocean warming, Extreme weather.

## **STUDY OF LEGISLATIVE FRAMEWORK FOR DISASTER MANAGEMENT IN INDIA AND RELATED PUBLIC POLICY & PLANS OF MADHYA PRADESH**

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### **ABSTRACT**

Disasters have been main hurdles in the development of civilization since ages and affect humanity on long term basis. Disaster Management is aimed at reducing potential loss of life and property in disasters as well as ensuring strong preparedness, responses and recovery measures to manage any disaster situation. Disaster Management is regarded important as it is the poor and under privileged who are affected the most from disasters. In light of this, United Nations declared year 1990-2000 as decade for Natural Disaster Reduction. To effectively manage disasters, comprehensive legislative framework have been developed by various governments across the globe. India, also has enacted The Disaster Management Act, in year 2005, which in addition to the legal framework and guidelines also has a set of directions for the State Governments to adhere. The study hence intends to analyze the Legislative Framework and the Policy directions prevailing in India along with the Public Policy and Plans formulated by Government of Madhya Pradesh in consonance to the same.

The study has been done covering the general overview and legislations regarding disaster management in India and specific to Madhya Pradesh. The study then analyses the policy, governance and institutional arrangements of Madhya Pradesh. The analysis has been carried out based on the information available, through secondary sources.

**Keywords:** Disaster Management, Legislative Framework, Public Policy, Plans.

## **EFFECT OF PH, TEMPERATURE AND CONCENTRATION ON THE DEGRADATION OF DDT**

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### **ABSTRACT**

The intensive use of pesticides resulted in dispersal and persistence of pollutants throughout the global environment. Excessive use of pesticides has been known to be hazardous to the environment, affect soil fertility as well may impart toxicity in living beings. Presently there have been physical, chemical, biological and enzymatic approaches implicated to reduce pesticides. Under favourable conditions microbes have been reported to use pesticides as source of carbon, sulphur and electron donor. Bioremediation of pesticides in contaminated soil and water environments has become one of the most sensational issues due to their deleterious effects on public health and environment. In natural habitat, certain microbes are capable of metabolizing those persistent compounds or detoxify them which could be employed for bioremediation. Although aimed to eradicate physical and chemical methods are inefficient Curiously microbial pesticide remediation has been cost effective and thermodynamically more affordable, which may use any physical mater soiled with pesticide. Hence the direct use of such micro organisms capable of degrading xenobiotics is also becoming a popular approach to safeguard the environment. Microbial degradation of DDT and its residues is one mechanism for loss of DDT from the soil. To enhance degradation in situ a number of strategies are proposed. They include the addition of DDT metabolising microbes to the contaminated soil or manipulation of environmental conditions to enhance the activity of these microbes. To enhance biodegradation of DDT it is necessary to consider the factors that affect degradation of pesticides. Of particular relevance to the degradation of DDT in situ are the presence and numbers of microbes with the ability to metabolise DDT, and environmental factors which limit both growth and activity of the DDT-metabolising microbes, and access of the microbes to DDT. This report summaries the effect of pH, inoculum size and temperature on the degradation of DDT by a microbial consortium.

## **BOTTOM-BIOTA OF A MAN-MADE WETLAND ON RIVER CHANDRAP RABHA: A PRELIMINARY SURVEY OF THE RESERVOIR AND DOWNSTREAM SANCTUARY**

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### **ABSTRACT**

Uttar Pradesh has 1.37 lakhs ha of reservoir area of which small reservoirs contribute to a total area of 20845 ha. Chandra Prabha sanctuary is one of those rare eco-regions of the world that is located in Uttar Pradesh, south west of Varanasi. This wildlife sanctuary, which spreads across 78 sq. kms lies on Naugarh and Vijaigarh hillocks in the Vindhya range of dense forests and green grasslands in Varanasi district. It was declared a wildlife sanctuary in 1957 by the Uttar Pradesh Government on account of its rich biodiversity. The climate is usually hot round the year with an average rainfall of 800-1000 mm. Maximum temperatures during the long dry season in summer soars to 44° Celsius while winters are usually mild. Almost 13% of the land is covered by forests, dominated by thorny species such as *Zyzyphus glaberrima*, *Dicrostachys cinerea*, *Randia dumetorum*, and *Carissa spinarum* while other plant species include Bamboo, *Pterocarpus*, *Anogeissus*, and *Buchanania*.

As the region has to its credit waterfalls with fast, as well as slow running, both the types of water the aquatic flora and fauna are also expected to show interesting scenario. In an attempt to study the biotic parameters present investigation has been undertaken. The plankton, periphyton, phytobenthos, benthic invertebrates and associated flora and fauna are being collected in light of above facts. The water samples were collected to determine alkalinity, pH, dissolved oxygen, transparency, TDS, salinity, water temperature, air temperature. Such studies will generate valuable information on aquatic biodiversity of man-made wetlands, especially in the protected areas.



## **PROBLEMS IN RIVERINE CONNECTIVITY THROUGH TRANSPORT INFRASTRUCTURE: CASE STUDY FROM EASTERN INDIA**

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### **ABSTRACT**

Transport infrastructure plays crucial role in the development of human society, although, it becomes a major factor of anthropogenic alternation of fluvial system. The network of roadways (paved and unpaved) and rail lines and numbers of stream crossing (bridges and culverts) adversely affect the riverine connectivity in three different dimensions (longitudinally, laterally and vertically). The Kunur River Basin, a major right bank tributary of Ajay River Basin in the Eastern India, has severely affected by transport networks during last five decades. The road lines are coming closer to the streamlines, especially the unpaved road, which are affected the downstream hydraulics by increasing coarse to suspended sediments and consequently developed permanent to semi-permanent mid-channel bars. Road-stream crossings are disturbing the longitudinal connectivity and channel morphology by creating artificial knick-point at the crossing site and deeps scours, bank erosion in the immediate upstream and downstream of crossings.

## CLIMATE CHANGE INDIAN PERSPECTIVE

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### ABSTRACT

Climate change refers to any significant change in measures of climate (such as temperature, precipitation, or wind) lasting for an extended period. India is both a major greenhouse gas emitter and one of the most vulnerable countries in the world to projected climate change. The country is already experiencing changes in climate and the impacts of climate change, including water stress, heat waves and drought, severe storms and flooding, and associated negative consequences on health and livelihoods. The observed environmental changes in India have been sharper in the past two decades. With every year, India receives more proof that the effects of climate change are already here, and they're deadly. A number of natural and human-made reasons specific to India make it extraordinarily vulnerable to climate change. A hot tropical climate, its geography, a heavy dependence of agriculture on stable monsoon, unplanned "development", deforestation, poverty and illiteracy are some of the important factors adding to India's unique vulnerability. The projected climate change under various scenarios is likely to have implications on food production, water supply, coastal settlements, forest ecosystems, health, energy security, etc in near future. Climate change can be mitigated in many ways, such as reducing the human emission of green house gases, improving the efficiency of energy - intensive devices, vehicles and buildings, all of which involve direct and indirect gas emissions, modifying industrial processes etc. The paper reviews understanding the process of global climate change, its reasons and impact on human health, and how we can lessen those adverse impacts by mitigation and adaptation strategies in national perspectives.

**Keywords:** greenhouse gases, vulnerability, mitigation.

## MANAGEMENT OF MUNICIPAL SOLID WASTE: A BURNING NEED

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### ABSTRACT

The Swachh Bharat Abhiyan was successfully launched by our honourable prime minister in 2014 but has it really been implemented. Many cleanliness campaigns are initiated but the problem of pollution and garbage is taking no good turn. The management of municipal domestic waste is a matter of hot concern in our country. The annual generation of waste production has increased from 48 million tons in 1997 to 90 million tons in 2009 and is expected to reach 300 million tonnes by 2047. The generation of municipal waste has greatly increased in cities and towns due to rise in population, urbanisation and industrialization. It has become a significant subject of interest as mismanagement of solid waste may produce adverse environmental effects and health risks in public. Some of the recognised methods for solid waste disposal include dumping in land and water, ploughing into soil, incineration and recycling. Lack of transportation and collection of waste has led to accumulation of waste in every corner of metropolitan cities hence polluting them. The inhabitants are greatly affected indicating it to be a critical environmental issue in Indian cities. It has been reported that majority of municipal waste is disposed in unscientific manner in open dumps highlighting problems associated with health of the population. The techniques followed for collection, transportation, disposal and treatment of generated domestic wastes call for improvements and must be critically reviewed to ensure cleanliness and encourage researchers and authorities for further improvements in present system making our country clean and green.

## EDIBLE CROCKERY

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### ABSTRACT

Edible crockery is tableware such as plates, drink ware and glasses, utensil and cutlery that is edible. As we know plastic waste covers our ocean and landfills. Plastic crockery is a contributor to enormous problem that is, pollution because plastic is a material made to last forever. Plastic cannot biodegrade. Toxic chemicals leach out of plastic and are found in the blood and tissues of nearly all of us. Exposure to them is linked to cancer, birth defects, impaired immunity, endocrine disruptions and many more. There are thousands of landfills, buried beneath each one of them, toxic chemicals from plastics drain out and seep into ground water flowing downstream into lakes and rivers. Plastic threatens wildlife also. Wildlife becomes entangled in plastic, they eat it or mistake it for food and feed it to their young and it is found littered in even extremely remote areas of the earth. In our ocean alone, plastic debris out weights zooplanktons by a ratio of 36:1. Edible crockery offers an interesting alternative to the non-biodegradable plastic over edible crockery is the only solution that provides the same convenience of disposable folks, spoons, chopsticks says Narayana Pisapati, Managing director of the Hyderabad based start-up BK Environmental Innovations Pvt. Ltd. Most attractive and interesting thing in this concept is it is eco friendly and non harmful to environment in any way. Edible crockery is made with a mixture of sorghum, rice and wheat flour kneaded with hot water and dough is made. No preservatives, chemicals, additives, colouring agents, raising agents, fat, trans fat, artificial chemical nutrition or animal ingredients, milk or milk products are added. These are baked to make them crisp, hard and moisture free. These are 100% natural products, 100% vegan, 100% degradable (if you choose not to eat them). We have the advantages of adding tasters and flavours. Basically there would be three tasters: Plane, sweet and savoury. In sweet version, we have the choice of making vanilla, strawberry and other sweet flavours. In savoury version we have the choice of salt and pepper combination.

## GREEN SYNTHESIS OF QUATERNARY AMMONIUM SALT OF TRIGLYCERIDE AS A POTENTIAL ANTIMICROBIAL AGENT

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### ABSTRACT

Now a day, the growing interest for the synthesis of green bio-renewable compounds from agricultural commodities has been greatly focused. Such materials are alternatives to other petroleum resource based compounds which are costly and depleting every day. On the other hand the agricultural based raw materials are readily available, inexpensive, biodegradable and low toxic with other advantages of their functional attributes.

- Glycene max oil (GMO) is abundantly grown in various part of the world. GMO is a semi drying oil with different saturated and unsaturated fatty acid chains (saturated: 15-16%, oleic: 24%, linolenic: 7 %, linoleic acid 50 %). GMO is used as cooking oils, paints, coatings, printing inks, development of different polymers for various applications and others.
- Here, the present work reports the synthesis of quaternary ammonium salt of triglyceride of GMO as a potential antibacterial agent. The starting material has no antibacterial activity but the formulation of ammonium salt lead to bactericidal activity of the compound. The compound has been synthesized by the amidation reaction of GMO in presence of base followed by neutralization reaction. The reaction has been confirmed by solubility test, Fourier Transform Infrared Spectroscopy (FT-IR), <sup>1</sup>H and <sup>13</sup>C Nuclear Magnetic Resonance Spectroscopy (NMR). The antibacterial activity has been checked by agar diffusion method against different gram positive and gram negative bacteria. The results indicated that antibacterial activity has been improved by modification of GMO. This material can be used in the various fields with primary concern of killing pathogens or prevention of surface colonization.

## STRATEGIES FOR CONSERVATION OF INDIAN BIODIVERSITY

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### ABSTRACT

This Communication deals with the review of major strategies for preservation of Indian biodiversity including the biodiversity “hotspots,” “Wild lands Project,” and the “consensus” strategy in India. The paper includes a review of reasons for protecting biodiversity including the deep ecology, inherent value that place low value on preservation of biodiversity. Local, national and international organizations working for protection of biodiversity are discussed. Near the end of the 20th century and the beginning of the 21st century many types of human activities are creating a cumulative effect that scientists call the “crisis of extinction.” While some commentators conclude that much of the biodiversity of the planet could be lost within the next two decades, there are initiatives underway for the conservation of biodiversity. According to some scientists, Homo sapiens have been causing extinction of other species for at least 50,000 years and probably longer. Small groups of humans armed with groups of humans can make extensive changes in large ecosystems in short periods of time. The focus of this paper is on those positive initiatives. Biodiversity is defined as: all of the hereditary variation in organisms, from differences in ecosystems to the species composing each ecosystem, thence to the genetic variation in each of the species. As a term, biodiversity may be used to refer to the variety of life of all of Earth or to any part of it.

The paper concludes that preservation of significant portions of the Indian biodiversity is cost-effective, reasonable, and prudent. The paper calls for international organizations, national governments, and regional and local communities to focus attention and resources on preservation of biodiversity as a high priority of action because to do otherwise could cause irreversible harm to the diversity of life in India.

**Keywords:** biodiversity, conservation, strategies for change, preservation, organization etc.

## **THERMAL FLY ASH: A NOTABLE IMPACTS AND SIGNIFICANCE IN PARLI-V. DIST. BEED (MS)**

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### **ABSTRACT**

Energy requirements for the developing countries in particular are met from coal-based thermal power plants. The disposal of the increasing amounts of solid waste from coal-fired thermal power plants is becoming a serious concern to the environmentalists. Coal ash, 80% of which is very fine in nature and is thus known as fly ash is collected by electrostatic precipitators in stacks. In India, nearly 90 mt of fly ash is generated per annum at present and is largely responsible for environmental pollution. In developed countries like Germany, 80% of the fly ash generated is being utilized, whereas in India only 3% is being consumed. Fly ash, the after-burnt tiny coal dust is a byproduct from the thermal power plants; it is non-reactive inert particle which may remain suspended in the air from few seconds to several months. Till now, the major source of power in India comes from burning of low-quality coal and the country needs more power every day. In this situation, the evaluation of this ecologically sensitive toxic substance has been assessed in this article in terms of its origin, nature, properties, environmental distribution, impact and possible biological and non-biological significance to draw the deep attention of the environment research explorers in Parli-V. Region, Maharashtra, India. This article attempts to highlight the impacts of fly ash and use of this solid waste, in order to save our environment.

**Keywords:** Fly ash, Environmental impact, Fly ash disposal, Biological reclamation etc.

## PLANT WITHOUT SOIL - HYDROPONICS

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### ABSTRACT

For the commercial production of food the technology naming-HYDROPONICS play a very crucial role. Soil based cultivation is now facing difficulties due to different man made reasons such as deforestation, industrialization and urbanization. That's why scientists developed a new technology where plants grow in soil-less culture. To grow the plants in soil less culture natural media is very important. Plants roots are suspended above a reservoir of nutrient solution or inside a channel connected to reservoir. There are several factors which is required to grow the plants like nutrients, temperature, aeration and pH. This technology is very helpful to grow the plants rapidly without any seasonal restrictions. As we compare this technology with natural soil based cultivation, we observed that the quality of yield of end products is generally higher. So hydroponics would be a better technique to produce different kinds of fruits and vegetables and this cultivation is disease free, eco-friendly with making advance future.

**Keywords:** Hydroponics, soil-less culture, nutrient solution, nutrients, aeroponics.



## DECOLOURIZATION OF BLACK LIQUOR THROUGH PSEUDOMONAS AERUGINOSA AND ASPERGILLUS NIGER AND ENHANCE THE EFFECT OF CARBON AND NITROGEN SOURCE

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### ABSTRACT

There are sufficient studies and data to initiate that a disaster which occur due o disposal of large quantities of biodegradable waste without adequate treatment results in significant environmental pollution. This complicated issue needs an intense and deep attention of environmentalists. By analyzing the situation we utilized the two microbial strain such as bacterial strain i.e. *Pseudomonas aeruginosa* and fungal strain i.e. *Aspergillus Niger*. This paper presents the comparative capacity of these two strains for decolourization of black liquor. Throughout the study, we are optimizing the role of carbon and nitrogen source for decolorization. From the results it was observed that a maximum colour reduction of 64.33% was achieved by *Aspergillus Niger* with 1% glucose.

**Keywords:** Adequate, Black liquor, intense, microbial strain.

## ECOLOGICAL FOOTPRINT AND ITS IMPACT ON THE ENVIRONMENT

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### ABSTRACT

The Ecological Footprint (EF) is an indicator that accounts for human demand on global biological resources. It compares the level of consumption with the available amount of bioproductive land and sea area and has been designed to show a possible exceedance of this "sustainability threshold". Originally developed as an indicator of the environmental impacts of nations, individuals or human populations, the EF is increasingly being tried as an indicator of organizational and corporate environmental performance, or even as an indicator of the sustainability of products. Ecological footprint simply means the impact of human activities on the globe and the amount of resources necessary to produce the goods and services necessary to support a particular lifestyle. Everyone has a footprint on ecology by the way they live. Ecological footprint determines how much natural resources are consumed by an individual, city, region, state or all inhabitants of our planet in order to ensure their requirements and needs. It includes all activities, from food consumption, housing, transport to waste produced and allows us to compare particular activities and their impacts on the environment and natural resources. Ecological footprint is important issue for making sustainable development concept more popular using simplifications, which provide the public with basic information on situation on our planet.

The ecological accounts that measure overall human demand on the biosphere and the ability of the biosphere to meet these demands show quantitatively that human society is currently operating in a state of overshoot, with demand on ecosystems exceeding ecosystem supply. To achieve sustainability before this overshoot causes potentially irreversible declines in the productivity of critical ecosystems, society will need to meet the dual challenges of shrinking global demand and sharing this reduction in a way that is acceptable and viable for the entire global community. As one of the largest-scale human land-use activities impacting ecosystems, agricultural practices will play a particularly critical role in meeting these goals. Ecological Footprint should be part of a basket of indicators. In isolation, its relevance for decision-making is too limited and therefore a more comprehensive approach is needed.

**Keywords:** Ecological Footprint, Environment, Biological Resources, Ecosystems, Sustainability.

## A REVIEW ON REMOVAL OF BPA USING PHYTOMATERIAL BASED ADSORBENTS

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### ABSTRACT

The awful consequence of increasing population along with a rapid increase in the industrial field is a major concern of pollution in the environment. Industrial effluents already pollute most of the Indian rivers. Many industries are playing a crucial role in water pollution such as textile industries, dairy industries and distillery etc. Industrial waste water contains various pollutants which must be treated before discharge to environment. Phenolic compounds such as BPA are one of the major organic pollutants. BPA or 2, 2 bis(4-hydroxyl phenol) has been widely applied in production of polycarbonate plastics, epoxy resins. BPA is reported as endocrine disrupting chemical. It has been found in waste waters, landfill leaches, effluents from waste water treatment plants. It is associated with certain diseases like cancer, kidney brain, and liver disorders. Effective removal of BPA is vital for maintenance of public human health. Technologies employed for treating effluents must be cost effective and highly efficient. Adsorption processes are one of the most widely used physical methods to treat such waste waters. Phytomaterials like banana peel, bone ash, eucalyptus bark, treated coir pith, coconut shell and durian peels have been reported as effective adsorbents for BPA from aqueous solution. These phytomaterials are inexpensive, abundant agricultural waste residue. This study presents a review on the removal of BPA from water by adsorption onto agricultural waste The results have proved that these modified phytowastes are promising materials as alternative adsorbent for the removal of BPA from aqueous solution.

**Keywords:** Industrial waste, BPA, adsorption, phytomaterials.

## CHALLENGES TO HUMAN HEALTH-BENEFITS OF ORGANIC FARMING

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### ABSTRACT

Environment is not perfectly insulated from the surroundings and is a matter of concern of human health hazards many fold. Good quality of environment and robust health are linked covalently to each other. Contrary to it population explosion, deforestation and malnutrition vary in an inverse manner to the challenges to health. Now a days to get rid of malnutrition, the philosophy of Organic farming which is an environmental friendly has received increasing attention in agriculture policy and rural development. It provides organic food which is healthier as it is free from pesticides and insecticide traces. A contemporary agriculture policy destroys complex ecosystem by deforestation and clear cutting of rangelands. Due to much reduced eutrophication of chemical inputs water pollution and Soil structure is much better leading to less pollution from nitrate and is healthier for the crop plant, and that environmentally organic is better than the other forms of farming and a boon to the healthy society of the developing country like India. At present a serious issue of climate change across the globe has also challenged the quality of environment and human health.



## **NATIONAL HORTICULTURE MISSION (NHM) SCHEME IN KARNATAKA - AN ECONOMIC ANALYSIS**

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### **ABSTRACT**

In Karnataka the scheme has been in function successfully from 2005-06 to till. Karnataka is one of the major fruit growing states in the country was selected purposively for the study. The present study was undertaken to economic importance of National Horticulture Mission (NHM) scheme in Karnataka. The study is based on both primary and secondary data source. The analytical techniques like CAGR, CV, Instability index, Herfindahl Index Markov Chain analysis and averages were employed. Out of total physical achievement (2.10 lakh ha) of horticultural crops under NHM, the highest area of about 60.82 per cent has been covered under fruit crops followed by flowers (12.88 %), plantation crops (12.36 %), spices (11.24 %) and least was medicinal and aromatic plants (2.69 %). Based on the analysis it was observed that the instability in area, production and productivity of horticulture crops was reduced after implementation of NHM in the study area which showed positive impact of NHM. During same period crop diversification was significant towards horticultural crops in Karnataka (diversification index decreased from 0.39 to 0.29). The per hectare net returns (without subsidy) from grapes, mango and pomegranate were estimated to be Rs. 9,68,705, Rs. 2,76,275 and Rs. 3,66,533, respectively. Similarly, the net returns (with subsidy) from these crops were Rs. 10,26,039, Rs. 3,03,001 and Rs. 3,98,033, respectively. B: C ratio (without subsidy) was 2.58, 2.66 and 2.41 for grape, mango and pomegranate, respectively and B: C ratio (with subsidy) was estimated to be 3.19, 3.18 and 2.73 for respective crops. Horticultural crops had advantage over conventional food crops not only in terms of total profits but also provided better employment opportunities by increasing labour mandays.

**Keywords:** NHM, Compound annual growth rates, instability index, pre and post NHM.

## HOUSEHOLD PLASTIC WASTE AS A PROMISING FEED STOCK FOR PROCESS HEAT GENERATION

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### ABSTRACT

Waste is an inevitable product of society and one of the greatest challenge for future generation. Plastic waste emerging as a big problem for our society , its proper disposal is essential for all sustainable way of life. On the other hand natural resources are limited and vanishing rapidly because of the high demand for development and for growing population. Its high time to find alternative source of fossil fuel. For this we can use our plastic waste as fuel by converting into waste to energy by many chemical process like pyrolysis method. In this study the calorific value of various household (HH) plastic were compared to calorific value of petroleum products. The major type of plastic waste were HDPE, LDPE, PP and PS material. The petroleum product were coal, kerosene, petrol, diesel oil. The calorific value is determined by using bomb calorimeter device. The result by comparing the plastic waste and fuel calorific value were equivalent. The result indicated that the plastic waste can be used as an alternative energy source for future. The plastic can be used in various form like plastic oil, pellets , in concrete etc. . Recently, various forms of plastics have been incorporated in concrete to prevent the direct contact of plastics with the environment because concrete has a longer service life.

## **AGRARIAN COMMUNITY AND FOOD SECURITY IN INDIA: OPPORTUNITY AND CHALLENGES**

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### **ABSTRACT**

Agrarian community mainly consist cultivator and agriculture labour and these are two active agents of food security of any country. Policy and programme are assisting production factors for availing, accessing and affording food to all people of the nation. India has tremendous opportunities for food security with various existing and upcoming challenges. In one hand, food producers are declining and in other hand food consumers' behaviours are changing due to liberalization, privatization and globalization (LPG) and urbanization processes. In this scenario, food security is affecting from various ways. This paper is focusing on demographic changes in agrarian society and its impact on food security in India; and to analyzed food availability, accessibility and affordability among the mass. Primary and secondary data have been used for this paper. Study have been found that quantitatively food availability is not the problems in India at present, but food accessibility and affordability are the main challenge for the government to fulfilled food security. Food availability might be the main challenge for food security programme in India due to physical, environmental, social, economical and technological factors. Census of India shows that cultivators are turning into agriculture labour, and both are main production factors in agriculture sector. It has been observed that most of the farmers are not interested on agricultural works due to four main reasons. These are agriculture labour, input cost, productivity and marketing mechanism and price of output. Various round of NSSOs, clearly indicate that family labour support is declining in agricultural work and casual labour are costlier than income from the farm. It also has found that cost benefit ratio is negatively related and mechanization is increasing among the large farmers in general and migrant household in particulars. Remittances are influencing household economy positively but agriculture is benefited as expected.

**Keywords:** Food Security, Agriculture Labour Market, Migrant, Costs Of Cultivation, Production and Productivity.

**SACRED GROVES-A PLEA FOR REVIVAL AND RESTORATION  
FOR THE GREEN ECONOMY OF JHARKHAND  
(A CASE STUDY OF SANTHAL TRIBE & THEIR CONTRIBUTION)**

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**ABSTRACT**

The Vegetation patches have been designated as sacred groves in between the bounty of Jharkhand. The study of Jharkhand can be sketched here in the antiquity of sacred groves of ancient people of India which are segments of landscape, containing vegetation and other forms of life and geographical features that are delimited and protected by human society under the belief that to keep them in a relatively undisturbed state is expressive of an important relationship of humans with the divine or with nature. India is a land of diverse natural resources. It is also a country with the strongest tradition of nature conservation anywhere in the world. Since time immemorial, conservation of natural resources has been an integral aspects of many indigenous communities like santal tribe in Jharkhand in general and Santal Pargana in particular. The traditional practices of protection of forest and bio-diversity by these indigenous communities is a reflection of their socio ecological system where they are strongly aware of meeting their basic needs on a sustainable basis without having to destroy the nature around them.

The present study concerns with the cultural heritage of the present status of sacred groves everywhere is the matter of deep concern as they are gradually decline and disappearing from the lap of forest cover in Jharkhand. In view of this, and due to failure of pure legal protective measures in guaranteeing conservation, it has become imperative to search for alternative solution based on indigenous knowledge of people. Therefore, there is an urgent need not only to protect sacred groves but also to revive and re-invent such traditional practice of nature conservation and environmental management.

**Keywords:** Sacred groves, vegetation, ancient people, indigenous community, conservation, traditional practice, environmental management.



## EFFECTS OF INDOOR AIR POLLUTION ON HUMAN HEALTH

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### ABSTRACT

People in modern societies spend about 90% of their time in indoor environment. Main sources of indoor pollution include combustion sources (oil, gas, kerosene, coal, wood and tobacco products), volatile organic compounds, building materials (asbestos), carpets, house cleaning and maintenance, personal care or hobbies, central heating and cooling system and humidification devices, lack of ventilation, too much humidity, water infiltration or leakage, carbon monoxide and other gases, radon and other noxious agents. The effects of indoor air pollutants range from short-term effects – eye and throat irritation – to long-term effects – respiratory disease and cancer. Exposure to high levels of some pollutants, such as carbon monoxide, can even result in immediate death. We review the effects of indoor allergen exposure and sensitization on asthma, focusing on dust mite, fungi, indoor pollutants such as ozone, particulate matter nitrogen dioxide, environmental tobacco smoke, sulfur dioxide, carbon monoxide and dampness of buildings.



## **SUSTAINABLE MANAGEMENT OF CROP WASTE TO PREVENT IN FIELD BURNING**

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### **ABSTRACT**

The intensive farming with mechanized harvesting has significantly enhanced food production and associated crop waste generation. The burning of crop waste in the field is an easy, faster, and cost effective way for farmers to prepare field for the next crop. The burning of crop residue severely impacts the air quality and has serious impacts on human health and the environment. This paper is aimed to discuss the various strategies which may be adopted for sustainable disposal of crop waste to prevent in field burning by farmers. The impacts of crop waste burning on human health and environment, soil quality, and alternative management strategies have been discussed in detail. There is need to provide alternative methods of disposal of crop waste management to the farmers. The mass awareness, incentives, and infrastructure development are important aspects for sustainable crop waste management and prevention of in field burning.

**Keywords:** Crop residue, Stubble burning, Environmental Impacts, Sustainable Management.

## **EFFECT OF ULTRASONIC PRE-TREATMENT ON BIOGAS PRODUCTION BY USING WASTE BIOMASS AS A FEEDSTOCK**

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### **ABSTRACT**

Adequate and continuous supply of energy sources is a primary requirement to eradicate the poverty and to ensure the economic development for any nation. Rapid population growth and economic development in India has resulted in an unprecedented demand for energy resources. Though India has developed variety of energy resources through a series of reforms in energy sector, there is still a need of clean and continuous energy supply at affordable prices. In this context, waste biomass is considered as one of the most significant feedstock for bioenergy generation. Thus the present study was aimed to investigate the potential of waste biomass (Kitchen waste, Cow manure, Fruit waste and Sewage sludge) for biogas production through co-digestion process supplemented with ultrasonic pre-treatment. The co-digestion process was performed in 500 ml of anaerobic digester with different combination of feedstocks (Treatment 1; Treatment 2). The co-digestion process was maintained at room temperature for 16 days and changes in the slurry composition was analysed through measurement of chemical oxygen demand (COD), total suspended solids (TSS), total organic carbon (TOC) and total kjeldhal nitrogen at 5 days of time interval. Results of the present study showed maximum biogas production (3153 ml) in substrate containing Kitchen waste+ Normal Water + Sewage Sludge (1:1:10). Maximum t reduction in COD (82.5%) was achieved at the end of incubation period in substrate combination of KW+CM+SS.

**Keywords:** Anaerobic digestion,; biogas; biomass; co-digestion ; Ultrasonic pre-treatment

## **ECONOMIC GROWTH AND MINERAL DEPLETION IN INDIA: AN EMPIRICAL INVESTIGATION**

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### **ABSTRACT**

The paper investigates the co-integrating relation between Mineral Depletion & Economic Growth of India by taking annual data for the forty one year period 1971-2012. The variables included are Mineral Depletion, GDP Per Capita ( as a proxy for economic growth), Trade as a % of GDP (a proxy for Trade Openness) & Pvt. Sector Credit to GDP (a proxy for the Financial Development Variable). The co-integrating relation has been tested using Autoregressive Distributed Lag (ARDL) Bounds Testing Co-integration Approach which establishes long term co-integrating relation using Partial F Bounds test given by Pesaran, M. H., Shin, Y., & Smith, R. J. (2001)) & also by Narayan(2004) . The ARDL pre-requisites tested in our study include the Stationarity of Variables (using ADF) , Parameter Stability (using CUSUM plots), Heteroscedasticity (using BPG) & Serial Correlation (using BG-LM test). The ARDL test has been applied on Optimal Model which was found to be at lag 1 using AIC & SC Criteria. The ARDL test results showed a significant long term relation as computed 'F' Statistics of 6.261876 was higher than the upper levels as given by both Pesaran et.al(2001) & Narayan (2004) tables. The pre-requisites of stationary test showed that all our variables are stationary at I(1). The Null of BPG test for Heteroscedasticity and BG LM test for serial Correlation was accepted showing no heteroscedasticity & serial correlation respectively for variables under study. The parameter stability results also showed stability using CUSUM Stability plots. The lagged Error term coefficient (ECM) which was obtained from OLS of long term variables had a significant and negative value of -0.568257 showing that 57 % of the disequilibrium correction within one year.

**Keywords:** ARDL, Partial 'F' test, Heteroscedasticity, Serial Correlation, CUSUM.

## HIGH SPENDING ON HOSPITALISATION IN PUBLIC HEALTH CARE FACILITIES MANIPUR: PRIVATE CARE IN PUBLIC HOSPITALS

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### ABSTRACT

The objectives of the study are: (i) to examine the levels of OOPE on hospitalisation in public hospitals and determine the factors associated with it; (ii) to estimate the degree of catastrophic expenditure (CE) and to determine the factors responsible for it in Manipur.

The paper is based on a survey collected for Ph.D undertaken in the state of Manipur during March 2017 to December 2017. The survey used multi stage stratified random sampling design. CE is measure as the share of total health care expenditure in the total household's income with different cut-offs. The differentials in OOPE and CE are analysed with various background factors. Multivariate linear regression model is used to examine the factor associated with OOPE. Probit regression model is employed to see the covariates of the CE by different threshold levels.

The average OOPE on hospitalisation in public hospital in Manipur is high with Rs. 20527. Households (26 percent) pay as much as Rs. 100 to Rs. 6000 in informal payments. OOPE is significantly lower for those hospitalised in secondary level hospitals ( $\beta = -0.579$ ,  $p < 0.001$ ) and having received non-surgical treatment ( $\beta = -0.286$ ,  $p < 0.001$ ) compared to tertiary level hospitals ( $\beta = 0$ ) and surgical treatment ( $\beta = 0$ ) respectively. Moreover, OOPE is significantly higher for those where diagnostic tests were outsourced ( $\beta = 0.367$ ,  $p < 0.001$ ) compared to those where diagnostic test were done in hospitals ( $\beta = 0$ ).

A substantial proportion of the households in the state (37 percent) experienced CE. The probability of CE was highest in the poorest income households with tertiary level care and surgical patients. The state of high OOPE on hospitalisation in public hospital in the state calls for a serious regulation and scrutiny in the health care sector and immediate policy on financial risk protection of households from catastrophic level of health care expenditure.

## SUSTAINABLE AGRICULTURE FOR FOOD AND NUTRITION

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### ABSTRACT

Sustainable agriculture is a kind of agriculture process that focuses on producing long-term crops and livestock. The sustainable agriculture ensures that the economic, social and environmental bases to generate food security and nutrition of future generation are not compromised. And also ensures a life with dignity for every individual. The livestock sector makes a huge positive contribution to livelihoods and nutrition for poor and vulnerable people in the developing world.

As the world population continues to grow, much more effort and innovation will be urgently needed in order to sustainably increase agricultural production, improve the global supply chain and ensures that all who are suffering from hunger and malnutrition have access to nutritious food. Land, healthy soils, water and plant genetic resources are key inputs into food production, and their growing scarcity in many parts of the world makes it imperative to use and manage them sustainably. Boosting yields on existing agricultural lands, including restoration of degraded lands, through sustainable agricultural practices would also relieve pressure to clear forests for agricultural production. Wise management of scarce water through improved irrigation and storage technologies, combined with development of new drought-resistant crop varieties, can contribute to sustaining dry-land's productivity.

Building resilience of local food systems will be critical to averting large-scale future shortages and to ensuring food security and good nutrition for all.

## FUMIGANT EFFICACY OF TAGETES PATULA L. ESSENTIAL OIL IN PRESERVATION OF WHEAT GRAINS

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### ABSTRACT

Mycological analysis of wheat grains through blotter and agar plate method revealed the presence of 14 and 11 species of fungi respectively. In vitro volatile constituents extracted in the form of essential oils from 50 plant species were tested against the dominant fungi, *Aspergillus flavus* and *A. niger*. *A. ochraceous* and *A. terreus*. The two commercial fungicides were assessed for antifungal activity against all isolated fungi. Essential oil of *Tagetes patula* flowers had maximum toxicity and found to be fungicidal. It was thermostable at 100° C for duration 50 min at its minimum inhibitory concentration (MIC) of 400 ppm. In vivo studies depicted the oil as an effective seed dressing and also fumigant was able to preserve the wheat grains completely for 6 months at 1.0 ml(1000ppm) and 1.52 ml (1500ppm) in airtight tin containers of 1000 ml capacity holding 800 g wheat grains. It did not cause any changes in organoleptic test of wheat grains after storage. Also no adverse effect on carbohydrate, protein was seen on seed contents. No phytotoxic effect was found on seed germination, plant growth and foliage morphology. The essential oil contained  $\beta$ -ocimene,  $\alpha$ -terpinolene, trans-caryophyllene, Z-ocimenone, dl-limonene, piperitenone,  $\beta$ -pinene and car-3-en-2-one as determined by GC and GC/MS.

**Keywords:** wheat grains, *Tagetes patula* L, wheat grains, seed- storage, carbohydrate, protein content.

**ISOLATION OF BACTERIOPHAGES AGAINST  
PHYTOPATHOGENIC OF RALSTONIA SOLANACEARUM:  
A NATURAL ANTIMICROBIAL AGENT FOR PLANT PROTECTION**

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**ABSTRACT**

*Ralstonia solanacearum* is a Gram negative bacteria causing devastating lethality in most of the solanaceous plants including potato and ginger, resulted in heavy economic losses world-wide. The chemical method of control of this bacterium is difficult because of its drug resistance. The use of alternative bactericidal agents is now prevalent over antibiotics and synthetic chemicals. This study was aimed to find natural antimicrobial agents specifically kill the bacterial population and results in reduction of pathogenicity. *R. solanacearum* strains were isolated from wilting potato and ginger crops in Hassan district, Karnataka and were characterized by biochemical test and PCR based detection. Further DNA was subjected to 16s ribosomal sequence analysis using 16S rRNA FU8 universal primers (16s rRNA F-5'AGAGTTTGATCCTGGCTCAG 3', 16s rRNA R-5'ACG GCTACCTTGTTA3') and phylogenetic analysis were used molecular relatedness of the isolated animal pathogenic bacteria. 16S rRNA sequences were submitted to GenBank, NCBI and Accession number were allotted. The obtained 16S rRNA sequences were subjected in-silico analysis by genomics workbench software. Pathogenicity test was conducted with tomato and chilli seedlings. Isolates were subjected to antibiotic sensitivity test and all strains were exhibited antibiotic resistance. Bacteriophages  $\delta$ HMPM-2016 series were isolated against *R. solanacearum*. The potency of phage activity was checked in laboratory condition and field conditions. The lytic phage morphology was studied with scanning electron microscopy and partial molecular analysis of isolated phage was done. The results of the study greatly anticipated the use of bacteriophages as potent antimicrobial agents against phytopathogenic *R. solanacearum* and they can be used as natural bio-control agents for plant protection.

**Keywords:** *Ralstonia solanacearum*, Phage, 16s rRNA sequence and bio-control agents.



## **DIVERSITY AND DISTRIBUTION OF SAURIANS (LIZARDS) ALONG ALTITUDINAL GRADIENTS IN MIZORAM, INDIA**

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### **ABSTRACT**

Mizoram being part of Indo-Burma Biodiversity hotspot harbors a good diversity in floral and faunal diversity. Lizards are one of the groups of reptiles undergoing changes and exhibits greater variation in their structural modifications than any other group of reptiles. Most of the threatened fauna in northeast India is facing a serious challenge for various reasons such as habitat degradation, loss of habitat and anthropogenic activities. Mizoram harbours 16.14% lizards of India and 75% of the northeast region, which is evidence that it have a great importance in biodiversity hotspot. 33 species of lizards belonging to 16 genera and 6 families were recorded. Agamidae is represented by 43.75%, Gekkonidae by 25% Scincidae by 18.75%, Varanidae by 6.25% and 3.12% was recorded under the family Anguidae and Lacertidae of the total lizard species collected. This study reveals that the genus *Calotes* dominated the saurian species and contribute 43.75%; *Hemidactylus* with 31.25%; *Draco* and *Eutropis* with 18.25%; *Japalura*, *Sphenomorphus* and *Varanus* with 12.5% each and *Oriocalotes*, *Ptyctolaemus*, *Dopasia*, *Cyrtodactylus*, *Gekko*, *ptychozoon*, *Takydromus*, *Lygosoma* and *Tropidophorus* 1 species each with 6.25% of the total number of genera recorded. The elevation plays an important role in the distribution of species. Four sites with an interval of 500 m each upto 1500m and above were identified. 25 species belonging to 12 genera of 5 families was recorded below 500 m elevation; 22 species belonging to 13 genera of 5 families was recorded between 500 m – 1000 m elevation; 18 species belonging to 10 genera of 4 families was recorded below 1000 m – 1500 m elevation and 11 species belonging to 6 genera of 4 families was recorded above 1500 m elevation.

The species distribution along the elevation gradients shows significant variations on the species richness patterns ( $\chi^2 = 9.59$ ,  $df = 3$ ,  $p < 0.05$ ). The study shows a linear model in the species distribution pattern, where the species diversity decreases with the increase in elevation gradient and regression analysis also showed significant decline in distribution of the species richness with altitude ( $r^2 = 0.962$ ,  $F = 50.381$ ,  $df = 3$ ,  $P < 0.019$ ). The species richness pattern was also correlated with the amount of rainfall along the elevation gradients. The similarity of the species distribution along the elevation reveals that all the species have a specific range of distribution, which is also, govern by many other ecological parameters.

**Keywords:** Saurian, Diversity, Distribution, Altitudinal, Richness, Mizoram.

## IMPACT OF ENVIRONMENT AND GROWTH HORMONES ON SEED GERMINATION AND SEEDLING PERFORMANCE IN *DIANTHUS LATIFOLIUS* WILD

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### ABSTRACT

The present investigate that the effect of environment (Temperature and Light) and hormones like Indole-3 acetic acid (IAA), Gibberellic acid (GA<sub>3</sub>), Kinetin and 2,4D in various concentrations has been studied percentage of seed germination and seedling growth of *Dianthus latifolius* wild. Seed were soaked in different concentration (50, 100, 200 ppm) of different hormones for 24 hours at room temperature (24 ± 20c). There replicate of each treatment with ten seeds per replicate were arranged. Emergence of radical was an indication of germination. In *Dianthus latifolius* the seed germination was started after three days of setting the experiments, Out of four hormones IAA (50ppm) and Ga<sub>3</sub> (50 ppm and 100 ppm) showed promotory effect on seed germination percentage and remaining all concentration of Kinetin and 24D showed inhibitory effect on seed germination. It was observed that length of seedling gradually increased in all 50 ppm and 100 ppm of GA<sub>3</sub>. The average length of radical was reduced in all concentration of different treated hormones (IAA, 2,4D, Kinetin, GA<sub>3</sub>). The length of hypocotyls gradually increased in 50 ppm GA<sub>3</sub>. The average length of cotyledons was decreased in all concentration of all treated hormones. The hormone 2,4D and Kinetin showed highly inhibitory effect on percentage germination and seedling growth in *Dianthus latifolius*. These observations will be useful for further research.

**Keywords:** *Dianthus latifolius*, seed germination, seedling growth, hormones (IAA, GA<sub>3</sub>, 2,4D, Kinetin).

**PUBLIC HEALTH AND TUBERCULOSIS: A DISTRICT LEVEL STUDY  
BASED ON 5 YEARS DATA (2010 TO 2015) OF REVISED NATIONAL  
TUBERCULOSIS CONTROL PROGRAMME IN UTTARAKHAND**

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**ABSTRACT**

Tuberculosis is a serious contagious disease that has become an increasing problem of Uttarakhand. Tuberculosis (TB) is of two types that have active and Latent TB. At present, cases of latent TB are coming up with active TB. Malnutrition is the biggest cause of the TB. The RNTCP ( Revised National Tuberculosis Control Program ) is being run by the WHO through the State Government . The treatment of TB by RNTCP program is being done by DOTS therapy (Directly Observed Treatment, Short-course). In RNTCP objectives, the detection rate of new smear positive cases should be 70 % and its cure rate should be 85 %. BCG vaccine also plays an important role in avoiding TB. It is necessary to prevent the spread of TB from one person to another to control this disease. By looking at the 5 year data (from 2010 to 2015) of the RNTCP program it is being concluded that all the 13 district of Uttarakhand's RNTCP program is going well.

**Keywords:** Census, acute, latent, phlegm, malnutrition, manifestation, escalate.

## CO-INTEGRATION BETWEEN ECONOMIC GROWTH & ENERGY CONSUMPTION: FRESH EVIDENCE FROM INDIA AND CHINA

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### ABSTRACT

The present study empirically investigates the co-integrating relationship between energy consumption & economic growth of two emerging markets of Asia: India & China. The variables included are Energy Consumption Per Capita & Per Capita GDP with two additional regressors; Pvt. Sector Credit as a % of GDP & trade as a % of GDP (proxies for financial development & trade openness respectively). The methodology used has been multivariate ARDL Bounds Testing Co-integration & Error Correction Approach. To test the hypothesis of co-integration between variables, we have analysed two ARDL Model; first as Per Capita Energy Consumption as a function of other variables and second GDP Per Capita as a function of explanatory variables. The yearly data for the thirty eight year period (1977-2014) has been taken for the purpose of the study. All the models have been checked for optimality using Schwartz Criteria & misspecification tests. The empirical results from the study could not provide any evidence of any co-integrating relation between the variables in case of India, however in case of China the results showed positive co-integrating relation when GDP was taken as a function of other variables. The methodology employed was 'F' Joint Null Hypothesis test (called Partial F Bounds test) where the computed 'F' value of 8.418392 exceeded the upper bound limit as given by both Pesaran *et. al* (2001)& Narayan (2004) tables. Further all the variables were Stationary at first difference as given by ADF & KPSS tests. The diagnostics showed that the fitted model was free from serial correlation and heteroscedasticity & correct functional form. Further CUSUM plot was within the limits showing the stability of the model parameters. The lagged Error term (ECM) was also obtained (in case of China) for the model where long run co-integration was established & a new model developed along with short run estimates showed that the coefficient of ECM term was significant and also negative. The ECM coefficient clearly showed that long term equilibrium was achievable if there was short term disequilibrium with a fast pace of adjustment; **20 %** dis-equilibrium being corrected in same year itself.

**Keywords:** Co-integration, Partial 'F' test, ARDL, ECM, Serial Correlation.

## WATER RESOURCES MANAGEMENT IN NUH DISTRICT HARYANA

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### ABSTRACT

Nuh district of Haryana is a semi-arid district heavily reliant on regular rains (generally July to August). Mean annual rainfall is low and no one rivers in the drier parts of the district are not flow. It has made extensive investments in small and medium dams, though current utilization is only about 22 percent of mean annual rain-fall. Nuh district's management of its water resources is critical to its economic growth. Droughts and inability to manage its water resources cost. Water resources management of India manages the national water resources. But the water resource sector has been badly hit by the economic downturn and the lack of investment has nullified many of the reform gains. Government and NGO launched an ambitious program of development of its water supply and sanitation infrastructure; by the later part of the 1983s the levels of service coverage were among the whole district of Haryana. Nuh district was widely seen, within Haryana and other states, as a leader in innovation, policy reform, and service provision in the water sector. However, the fortunes of the sector were reversed in the past decade as a result of very limited new investment in services and inadequate revenues of the institutions responsible for service provision that led to a sustained decline in operations and maintenance of assets. The progressive decline in water and sewerage services culminated in a serious outbreak of cholera in the rainy season. So that we can say that water resource and its management is very poor in this district.

**Keywords:** water resources, rain, rainfall, drought and cholera.

## HEALTH STATUS OF TRIBES OF HIMACHAL PRADESH: A SPECIAL REFERENCE OF GADDI TRIBES

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### ABSTRACT

India has the second largest tribal population in the world, the first being Africa and tribal Communities is the integral segment of Indian society. Tribes of Himachal Pradesh are scattered in different parts of this state and have occupied a considerable percentage of India. The tribes of Himachal Pradesh belong to the famous Indo-Aryan family group. The major tribes of this region include Kinnaura Tribe, Lahaule Tribe, Gaddi Tribe and Gujjar Tribe. The Gaddi are one of the most dominant and popular tribes of Himachal Pradesh. Gaddis are commonly known in Himachal Pradesh as residents of Chamba, but nowadays many of them have moved to the lower hills and have settled down in the Kangra and Mandi districts. The main reasons for this migration are excessive snowfall during winter and snapping of communication facilities, making life difficult; Lack of qualitative healthcare facilities in higher hill, lack of higher education facilities and general hardships on the hill top. However, the majority of Gaddi families have ancestral properties in Chamba, which they usually visit once a year to worship their local god and collect revenue from their leased land. They have a distinct culture, expressed through language, song, dress, food and marriage. An attempt has been made in this paper with the objectives (1) To study the transhumant Gaddi population of Himachal Pradesh that travel from one ecological zone to another in winter and summer. (2) To study the socio-economic and health status of Gaddis. . The results indicates that there are some improvements in the socio-economic and health status of Gaddi due to certain changes in their traditional occupations and also increase in the literacy rate as well as awareness level of people about different Govt policies and programmes to aware Gaddies about their health cleanness and about their rites.

## **ENVIRONMENTAL ECONOMICS AND ADVENTURE TOURISM DEVELOPMENT IN HIMACHAL PRADESH**

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### **ABSTRACT**

Environmental economics and adventure tourism is a broad term which encompasses all types of commercial door tourism and recreation with significant element of excitement and economic activity for people of Himachal Pradesh. Adventure tourism is closely related to nature-based tourism and sustainable development business. Whilst nature-based tourism products focus on seeing, however, adventure tourism products focus on doing. The paper aims to provide a holistic perspective on various dimensions of sustainable adventure tourism in Himachal Pradesh. The paper discusses issues of sustainable adventure tourism, strengths of the adventure industry, challenges faced and policy implications for upliftment of the sustainable adventure tourism by the government of Himachal Pradesh. The paper explores the economic importance of sustainable adventure tourism by outlining the strengths and challenges of the Himachal Pradesh's adventure tourism industry. The paper has implications for the government and firms in terms of investment in sustainable adventure tourism industry, infrastructure and better employment practices for local people of Himachal Pradesh. The paper provides a road map for some of the initiatives that government and adventure tourism industry could adopt for sustainable growth of adventure tourism business. This paper aims to evaluate the potential and challenges for the sustainable adventure tourism industry in Himachal Pradesh and discuss the sustainable adventure tourism industry's contribution to the economy of Himachal Pradesh. The paper also suggests some desirable policy level changes for further development.

**CHALLENGES FOR CROP PATTERN AND SOIL EROSION  
PROCESS IN CHANGING ENVIRONMENT OF DEGRADED  
HABITAT OF CHAMBAL REGION.**

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**ABSTRACT**

Chambal area has semi arid climate with highly undulating surface. This region is severely affected by soil erosion resulted in a badland topography in this region. For controlling the erosion process Juliflora has been grown in this area. But the expansion of Juliflora restricted the growth of natural vegetation. Animals depend on natural vegetation force to move toward crop land for meeting their fodder demand.

Agriculture is the major occupation of the people of Chambal area. This area has a large population of nilgai (*Boselaphus tragocamelus*). There is absence of next level predators and as cow has religious, mythological importance in our society, it is not allowed to hunt or harm these antelope. As a result of that they maintained high population that creating threat to the crops of the region. In my survey it has been observed that 45% farmers are forced to avoid Gram, Pigeon-pea and Moong cropping as these crops are most favored by these antelopes. On other hand these herbivores' are grazing the natural vegetation of this area, as a result of that erosion process get accelerated at many places. Hence Aforestation laid accelerated soil erosion and crop pattern change become the challenge in degraded habitat of this region.

**Keywords:** Chambal ravine, Juliflora, Nilgai, Crop pattern change, Accelerated soil erosion.



## **SOIL EROSION MODELLING USING MMF MODEL & DEGRADATION MITIGATION STRATEGY FOR RURAL DEVELOPMENT OF BADLANDS AREA OF ETAWAH, U.P.**

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### **ABSTRACT**

Yamuna Chambal badlands are located at margin of south-west Gangetic plain in India. It is known for horrible land degradation by water driven erosion. The expansion of gully and ravine networks on arable land is possessing serious socio-economic challenges to the society of this region. In this study an estimation of soil erosion has been made by using Morgan-Morgan Finney Model. It has been found that the average annual soil loss rate is 76.0 tons/ hectare<sup>2</sup>/ year. Due to undulating surface and high intensity of rainfall in a short spell of time, transport capacity of running water is too high in this region. Although seasonal vegetation cover is a dominant protection from erosion still erosive nature of soils and steep slope makes available big amount for erosion material here. The model is used to evaluate and identify the major zone of erosion. Several schemes are applied to counter the land degradation process here. An evaluation of conservation and mitigation schemes has been done.

**Keywords:** Soil Erosion, Chambal, Badlands, Morgan-Morgan-Finney Model.

## GROUNDWATER MANAGEMENT FOR CONFINED AQUIFERS

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### ABSTRACT

A non-linear optimization model has been developed for groundwater management through confined, homogenous, and non-uniform aquifer using the concept of response function with the objective of maximizing the discharge satisfying the constraints related to the maximum allowable drawdown and pump characteristic. The Cooper-Jacob equation is used to develop the unit response function. The non-linear programming model based on unit response function. The model explicitly considers the random nature of transmissivity and storage coefficient, which enables the determination of optimal pumping pattern in a well field subject to a specified system performance reliability requirement. A hypothetical example is utilized to demonstrate applicability of the model. Model results affected by reliability requirement and uncertainty level of aquifer parameters were examined.

## WELL-BEING OF RESIDENTS IN SLUM REHABILITATION HOUSING IN MUMBAI

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### ABSTRACT

Urbanization in Indian cities like Mumbai results into the growth of slums and squatter settlements mainly along the railway tracks, low lying areas, and forest lands. Due to limited land resources providing affordable housing to low-income people is very challenging. However, it is vital to improving the quality of life for everyone. To achieve the sustainable development goals, housing, health, and well-being of the people have been put at the center of national policies. The project affected people because of infrastructure projects like the Mumbai Urban Transport Projects or environment conservation projects like Sanjay Gandhi National Park conservation in Mumbai have been rehabilitated in slum rehabilitation housing under the slum rehabilitation scheme (SRS) across Mumbai. This paper assesses the well-being of the residents in Sangarsh Nagar (a slum rehabilitation colony meant for displaced people mainly from the Sanjay Gandhi National Park). SRS of Mumbai has been adopted in other Indian cities such as Ahmedabad. Moreover the government of India's "Housing for All" is in line with SRS. Four hundred fifty adult respondents' perceived responses on the socio-demographic profile, health, life satisfaction were recorded with the help of trained raters using computer-assisted personal interviewing during October and November 2018. Analysis of the data indicates that the residents are slightly satisfied with their dwelling and their life. We also found that the residents are in good health. The study concludes that the well-being of the residents needs to be further improved through various interventions.

**Keywords:** well-being; health; residential satisfaction; slum rehabilitation, urbanization.

## EFFECT OF FLY ASH AMENDED SOIL ON THE GROWTH PARAMETERS OF CALENDULA OFFICINALIS

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### ABSTRACT

Fly ash is the major environmental waste generated from coal combustion process. Fly ash application in soil is a potential source of nutrient in agriculture. Use of fly ash in agriculture is due to the presence of trace elements which are essential for plant growth, its alkaline nature and high ultimate strength. Thus the effort was made to conduct a pot culture experiment to grow *Calendula officinalis* (a medicinal potent plant) in different treatments of fly ash amended soil. This study is an attempt to know the impact of fly ash on Morphological and biochemical parameters of the plant and to determine its utilization for agricultural purposes. Fly ash also contains heavy metals which may prompt the production of active components and thereby enhance the medicinal potential of the plant. Based on the present findings, it is observed that 40-60% fly ash-soil treatment improves the physical properties of the soil and also contributed to the better growth and yield of Calendula plant when compared to control (100% soil). At high application rate of fly ash, plant show deleterious effect due to high level of heavy metals in coal ash which may be harmful for plants due to their toxic effects. At low concentration of fly ash-soil doses, heavy metals are better for plant growth and yield. Thus the utilization of fly ash in agriculture may provide a practical alternative for its safe disposal without serious lethal effects and may save the fertilizers cost and promotes the economy of farmers if used in proper ratio by mixing. It can be concluded that fly ash, in general is a waste of concern, but now can be a boon for sustainable agriculture.

**Keywords:** Fly ash, Agriculture, *Calendula officinalis*, Plant growth, Heavy metals.

## RHIZOCTONIA SOLANI IN WHEAT-RICE CROPPING SYSTEM

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### ABSTRACT

*Rhizoctonia solani* (*Thanatephorus cucumeris*) is a plant pathogenic fungus with a wide host range and worldwide distribution. *R. solani* frequently exists as thread-like growth on plants or in culture, and is considered a soil-borne pathogen. *R. solani* is best known to cause various plant diseases such as collar rot, root rot, damping off, and wire stem. *R. solani* attacks its hosts when they are in their early stages of development, such as seeds and seedlings, which are typically found in the soil. The pathogen is known to cause serious plant losses by attacking primarily the roots and lower stems of plants. Although it has a wide range of hosts, its main targets are herbaceous plants. *R. solani* would be considered a basidiomycete fungus if the teleomorph stage were more abundant. The pathogen is not currently known to produce any asexual spores (conidia), though it is considered to have an asexual lifecycle. Occasionally, sexual spores (basidiospores) are produced on infected plants. The disease cycle of *R. solani* is important in management and control of the pathogen. Rice and wheat are the two most important cereal grains in the world. Today rice and wheat are cultivated in rotation on nearly 12 million hectares in South Asia, more than 9 million hectares in India, 1.5 million in Pakistan, 0.6 million in Bangladesh and 0.5 million in Nepal (*IRRI, 1998*). *Rhizoctonia solani* Kuhn is one of the fungal pathogen, which is capable of infecting both rice and wheat. In rice it causes one of the most important and destructive disease sheath blight. In wheat *R. solani* is reported to cause *Rhizoctonia* root rot (*Weller et al., 1986*). *R. solani* is considered to be a collective species consisting of a number of loosely related strains. Strains differ in their pathogenicity and specificity. The strains have been grouped principally by anastomosis. The pathogen is a species complex with few distinguishing morphological features.

Based on hyphal anastomosis reaction *R. solani* has been divided into 13 anastomosis groups (AG-1 to AG-11 and AG-BI) and an additional AG probably exists (*Carling, 1995*). Many AGs are subdivided based on cultural, virulence, molecular, biochemical, immunological or other characteristics into intra-specific groups (ISGs) (*Ogoshi, 1987*). There is some degree of relationship between host range and anastomosis behaviour. All the isolates of *R. solani* infecting rice belonged to AG-1 IA (*Singh et al., 2000*).

So far sheath blight of rice has eluded any concrete and inexpensive methods of management under field conditions. Now a day a lot of emphasis is being given to investigate the diseases and pests as a component of cropping system rather than on an individual crop. Because of its wide host range, *R. solani*

## ENVIRONMENTAL POLICIES IN RUSSIA-EU RELATIONS

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### ABSTRACT

Environmental degradation has become a serious global threat to our modern society with the increasing amount of greenhouse gases in the environment. For Russia and the European Union (EU), environmental challenges are not an internal problem, but a phenomenon with global implications. Effects of it have been clearly noticeable in Russia and the EU for many decades now in various sectors like energy, agriculture, and healthcare, sea etc. It has influenced not only human and nature, but also economy of these countries. In this regard, both the actors have made substantial platform for cooperation by launching Russia-EU environmental dialogue in 2006 to Paris Climate Change Agreement, signed in 2015 to replace the out-dated Kyoto Protocol. It would be interesting to know that despite facing serious political chaos in their relations post Ukraine crisis, both have maintained their relationship with regard to environmental concerns. In order to combat it, Russia has agreed to reduce its carbon emission between 15 and 25 % by 2020. On the other hand, the EU has committed to reduce its overall greenhouse gas emissions by 20 % by 2020. This paper tries to look into how Russia and the EU have addressed the issue of environmental challenges via their internal environmental policy mechanism. This paper is analytical and comparative in nature and is primarily based on primary and secondary sources and literature.

**Keywords:** Environmental Challenges, Russian government, The EU government, Environment, Energy, Greenhouse gases.

## **SUSTAINABLE ORGANIC FARMING: A CASE STUDY OF DIMAPUR DISTRICT, NAGALAND**

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### **ABSTRACT**

North East India is endowed with rich flora and fauna. Most of the people residing there are indigenous people and do subsistence kind of farming thereby having less per capita income. Ecosystem services are particularly relevant for the poor and play an important role in poverty alleviation. People living in poverty rely more directly on the provision of ecosystem services for their livelihoods and well-being. Direct consumption of natural resources sustains livelihoods and prevents households from falling further into poverty. However, due to direct dependence on the environment and natural resources, the fragile ecosystem is getting disturbed. If the environment is not stable, so their livelihoods will also be not stable, and there will be risk of falling into extreme poverty and further to displacement particularly in rainfed areas. Organic farming is one such solution which doesn't create environmental degradation. Organic agriculture is "a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adopted to local conditions, rather than the use of inputs with adverse effects." The diverse agro-climatic conditions, suitable soil and abundant rainfall enables the cultivation of various crops such as fruits, vegetables, spices, flowers, medicinal and aromatic plants in Dimapur district of Nagaland. Latest methods of cultivation and processing are being used by farmers particularly women which is also creating women empowerment in the region. After establishing the pineapple processing and canning plant in Medziphema block the farmers are more enthusiastic as the plant is the dedicated consumer for their harvests. The study is based on primary survey and the results were shown through graph, pie chart etc. as how organic farming with the little intervention of horticulture department is changing the life of indigenous people.

**Keywords:** livelihoods, environmental degradation, pineapple cultivation, organic farming, horticulture.

## HAZARDOUS EFFECT OF NI(II) COMPLEXES WITH SCHIFF'S BASE LIGAND ON THE ENVIRONMENT

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### ABSTRACT

Schiff bases are an important class of ligands in coordination chemistry and their complexing ability, containing different donor atoms is widely reported. Two types of complexes of Ni(II) with Schiff bases derived from furfuraldehyde and AMT, AMMT, AEMT and AMPT have been prepared. These complexes have evoked much interest due to their inherent bio potency, sterilizing structural aspects and unique stereo and magneto chemistry. The larger part of all nickel complexes that are released to the environment will absorb to sediment or soil particles and become immobile as a result. We know that high nickel concentration on sandy soils can clearly damage plants, and high nickel concentration in surface water can diminish the growth rates of algae. Micro organisms can also suffer from growth decline due to the presence of Nickel, but they usually develop resistance to nickel after a while.

**Keywords:** Schiff bases, AMT, AMMT, AEMT, AMPT, Nickel.



## THEORETICAL STUDY OF WASTE OF DYE BASED INDUSTRY OF SUBSTITUTED ANILINE IN VIEW OF ENERGY AND STRUCTURE

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### ABSTRACT

The Fourier transform infrared (FTIR) and FT-Raman spectra of 2,5-Dimethoxy-4-nitroaniline have been measured in the range of 4000-400 and 4000-100 cm<sup>-1</sup> respectively. Utilizing the observed FTIR and FT-Raman data, a complete vibrational assignment and analysis of the fundamental modes of the compound was carried out. The vibrational frequency which were determined experimentally are compared with those obtained theoretically from ab initio HF and DFT gradient calculations employing the HF/6-31G (d,p) and B3LYP 6-31G (d,p) methods for optimized geometries. The geometries and normal modes of vibration obtained from the HF and DFT methods are in good agreement with the experimental data. The inclusion of a substituent in aniline leads to the variation of charge distribution in the molecule and consequently affects the electronic vibrational and structural parameters. The electron withdrawing nitro group interacts with nearby systems through hyper conjugation while -NH<sub>2</sub> shares its lone pair electrons with the ring.

**Keywords:** 2,5-Dimethoxy-4-nitroaniline, DFT ab initio, FTIR, FT-Raman.

## CONTRIBUTION OF AGRICULTURE SECTOR IN ATTAINING THE SUSTAINABLE DEVELOPMENT GOALS

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### ABSTRACT

Development is the need of the society. One of the major objectives of development is the satisfaction of human needs and aspirations. Development and economic growth involve changes in the physical eco-system and utilization of resources. They may be renewable or non-renewable. Sustainable development helps to balance the utilization of resources between present and future. This finds better and innovative ways of doing activities for the present and future. Agriculture plays the major role in development of society as a whole. Such sustainability in agriculture will improve the efficiency with which the resource reservoir is used to meet human needs. It is the need of the hour. A new set of global sustainable development goals will be the target of the coming years. More than any other sector agriculture is the common thread which holds many SDGs together. Investing in agriculture sector can address not only hunger and malnutrition but also other challenges including poverty, water and energy use, climate change and unsustainable production and consumption. We must mobilize scientific technology and social movement to address these challenges together. Sustainable development goals call specifically to end hunger, achieve food security and improve nutrition and promote sustainable agriculture. Attaining the sustainable goal targets simply will not be possible without a strong and sustainable agriculture sector.

In this article we will explore the innovations behind the movement towards sustainable development through agriculture for a better future.

**Keywords:** Sustainable development, eco-system, SDGs, resource reservoir, hunger, malnutrition, poverty, unsustainable production, innovations.

## **CSR AND ENVIRONMENTAL INITIATIVES IN INDIA: BENEFITS AND CHALLENGES**

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### **ABSTRACT**

The purpose of the current study is to discuss various benefits and challenges faced by Indian Corporates for their efforts towards environment sustainability since 2015. India Inc. took a great initiative by making CSR mandatory, following an amendment to the Companies Act, 2013 in April 2014. Mandatory CSR spending also include the efforts taken by corporates on reducing negative environmental impact and enforcing positive environmental outcomes. Since then, many companies have realized their responsibilities and thus have embarked on innovative initiatives to impact climate change, effective resource management with special focus on energy & water use effectiveness. It resulted in various benefits to the corporates such as revenue generation, strengthening customer loyalty and better brand visibility. Corporates also face challenges in the form of securing environment friendly raw materials, framing strategies for efficient resource management, regulatory hurdles, technological up gradation, cost containment and market mechanisms to gain competitive advantage in green markets.

## HINDUISM AND ENVIRONMENT

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### ABSTRACT

Hinduism is not only one of the major religions of the world but also a way of life. It is not an eye brow raising event to see the Hare Krishna converts dancing in the twenty first century New York streets. However, like any other religion, Hinduism is complex if not obfuscating, to the extent that Hinduism is akin to a Venn diagram where there are a plethora of intersecting circles of concepts, beliefs and practices, some of which are held and done by some Hindus, and others by other Hindus. The disparate shade of Hinduism as a way of life has been manifested in the environmental horizons too. Nature has been intrinsically an important part of the Hindu belief system. Belief in the Vedas, karma, the ritual offering of fruits and flowers to a deity, vegetarianism as an ideal, if not necessarily a practice, yoga, offerings to snake, etc are some of the practices which one identifies with Hinduism. This paper is primarily an attempt of exploration and not verification of the practices followed in Hinduism and their association with the environment - be it in the form of deities who are prayed, practices associated with Hindu festivals, belief systems and faith. While there are a plethora of ancient scripts dealing with Hinduism, the purpose of this paper will be restricted to the exploration of those aspects of Hinduism that are enmeshed with the environment. Finally, this paper also explores how some of the ancient practices have created a place for themselves in contemporary times and how they are affecting lives of the people at large, making them more closer to the environment.

**Keywords:** Hinduism, festivals, Vedas, vegetarianism, ayurveda.

## DEVELOPMENT OF VERMICELLI CONTAINING NATURAL SUGAR WITH MAHUA AND ITS BLEND WITH DIFFERENT FLOUR FRACTIONS

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### ABSTRACT

Vermicelli from mahua flour of powdered form using distilled water for dough preparation show change in natural sugar value. The water absorption for the composite dough containing mahua flour, wheat flour, and water chestnut flour increases respectively. Moisture content is very high in mahua as it contains high sugar content in it. The present study sheds light on the nutrient contents of the water chestnuts and suggests that water chestnuts may play a crucial role in human nutrition. Wheat flour is sieved to make very refined flour to establish a uniform texture of the vermicelli.

**Keywords:** vermicelli, mahua flour, natural sugar, water chestnut, nutrition

## **A STUDY OF GLYCOSIDES OF NATURAL SWEETENER “STEVIA” IN DIFFERENT PLANT PARTS**

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### **ABSTRACT**

Stevia is a perennial shrub belongs to family Compositae. It is also known as, honey leaf, candy leaf and sweet leaf. In India it is well known by “Metthi Patti” & “CheeniTulsi”. Leaves of stevia plant are used as a natural sweetener for centuries; it is also known to have various medicinal applications. Different varieties of stevia are cultivated in many countries including Japan, Taiwan, Philippines, Hawaii, Malaysia and South America. It is also successively cultivated in warm regions of India majorly in Orissa, Rajasthan, Kerala and Maharashtra. In the present study, the compound responsible for Stevia sweetness was analyzed. Different tests like Keller Killani's Test, Libermann's Test, Borntrager's Test and Modified Borntrager's Test were done to analyze glycoside content of Stevia leaves, stem & root. Our result indicates highest level of glycosides in leaves followed by stem. However, no glycosides were detected in stem.

**MANAGING HARVESTS OF FUELWOOD AND FODDER:  
MAJOR DRIVERS OF FOREST DEGRADATION IN  
SARISKA TIGER RESERVE, RAJASTHAN**

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**ABSTRACT**

More than 350 million of rural population in India is fully or partially dependent on forests for their livelihood. Forests are gradually degrading over the years due to unsustainable harvest of fuelwood and fodder, which is being considered as the major drivers of deforestation. This paper aims to identify the major drivers of degradation in the dry deciduous forest of Sariska Tiger Reserve of Rajasthan. The study also quantifies the extent of unsustainable harvest of fuelwood and fodder in the study area. The research study further estimates the potential forest biomass projection owing to substitution of unsustainable harvest with alternative sources of livelihood. The result states that among the various forest products harvested from the core area of Sariska Tiger Reserve, the maximum dependence of households is on self consumption of fuelwood followed by fodder and sale of fuelwood. It also includes suggesting policy interventions to overcome the unsustainable harvest of the forest produce.

**Keywords:** Drivers of forest degradation, Unsustainable harvest, Sustainable limit, Sariska Tiger Reserve, livelihood.

## **ASSESSMENT OF CHROMIUM ENVIRONMENT POLLUTION IN WATER OF HINDON RIVER, INDIA: IMPACT OF INDUSTRIAL EFFLUENTS DISCHARGES.**

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### **ABSTRACT**

The aim of this study was to reveal the seasonal variations in the Hindon River water pollution with respect to chromium contamination. The study was carried out from December 2014 to January 2017 by selecting twelve sampling stations of River Hindon. To get the extend of trace and chromium contamination, water samples were collected from twelve different sites along the course of the River and its tributaries for Summer and Winter seasons. Higher concentrations of chromium (0.096mg/L) in Summer and (0.088) in Winter at Mohannagar (Ghaziabad) were recorded, thus indicating very high pollution of chromium at this sampling station. The concentration of chromium was determined using (AAS). In the past decades the increased use of chromium in several anthropogenic activities and consequent contamination of soil and water have become an increasing concern. Cr exists in several oxidation states but the most stable and common forms are Cr(0), Cr(III) and Cr(VI) species. Cr (VI) is a notorious environmental pollutant because it is a strong oxidant and much more toxic than Cr (III) and also carcinogenic. Environment risk of Cr evaluated using risk –assessment and mobility factor showed low to high risk for Cr6+. The results of the present study also hint at notable enrichment of Cr in the certain pockets of Hindon river.

**Keywords-** Chromium, Hindon River (India), assessment, water pollution



## URBAN ENVIRONMENT AND LAND USE CHANGE DETECTION IN VARANASI CITY USING REMOTE SENSING AND GIS

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### ABSTRACT

Urban growth identification, quantification, and the knowledge of rate and trends of growth helps in determining the changes associated with land use and land cover properties and in regional planning with better infrastructure in environmentally sound way. Spatial and temporal technologies such as Remote Sensing, Geographic Information System (GIS) and Global Positioning System (GPS) are very helpful in such type of studies. This paper focuses on urban growth pattern analyses being carried out for urban sprawl in Varanasi city. Various GIS layers such as built-up area; agricultural land; vegetation/forest land; water bodies/wet land; brick kiln; rivers; DLW (industrial area); BHU (educational area), road network, city boundary etc. were generated using data such as the Survey of India toposheet and Remote sensing imagery. Spatial changes in built-up area and the pattern of sprawl were studied using GIS. This study revealed that in Varanasi there is remarkable decrease in agricultural areas and tremendous growth in Built up Area. About 37.57% of agricultural land is transformed to other land use features. Rate of change agricultural land to other land use is observed 210.80 ha/yr. There is no brick kiln in city area during the 2010 while in 1976; it covered the total area of 143.14ha. Built-ups increased by 7325.72ha, with change rate of 215.46 ha/yr. Study showed decreased in water bodies by 15.13 ha. There is no change in the area of BHU, DLW, River Ganga and Varuna.

**Keywords:** urban growth, change detection, sprawl, GIS, GPS, remote sensing.

## DISAPPEARING WETLANDS

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### ABSTRACT

Cities are one of the most important milestones of the journey called human civilization. It's not a mere coincidence that as our religious text declares, God created mankind in his own image; we humans develop cities in our own image. Rather we can say that cities are the extension of ourselves. Like any healthy body our cities needs functional lungs, kidneys, transportation (circulation) to name a few. It was only few days' back when one of our close friends lost both his kidneys; we realized the importance of kidneys in our life. A kidney flushes out the waste and toxic materials from our body. On its failure the body need machine dependent detoxification also know as Dialysis. For our cities it's the wetlands which carries out the function of a kidney naturally. But it's sad to note that the wetlands are being destroyed and filled with dump for 'developmental' purposes. This constantly growing anthropogenic encroachment into wetlands all over the country is leading to a series of crisis. East Kolkata wetlands (EKW) is one of them. Importance of wetlands was felt strongly and eventually leads to the Ramsar Convention in Iran in the year 1971 also known as Convention of Wetlands later joined by India in 1982. Nationwide some 26 wetlands were Identified, EKW was one of them. Though EKW was designated as a "wetland of international importance" under the Ramsar Convention on August 19, 2002.it is facing challenges in form of rapid urbanization and lopsided development model. In last couple of decades a big portion of the wetland has been disappeared for ever and what is remaining is also in verge of destruction.

This study is an effort to do a comparative analysis in between the sustainability of the zero cost naturalwaste management system provided by the wetlands with the capital intensive and high budget Sewage treatment plants, along with the reference of EKW communities as role models in enhancing and sustaining these natural process through their traditional practices and hardships down the years.

**Keywords:** urbanization, wetlands, sewage treatment plants, development.

## **SUSTAINABLE DEVELOPMENT AND IT'S IMPORTANCE IN THE FIELD OF EDUCATION**

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### **ABSTRACT**

The concept of sustainable development is an important milestone in the environmental theory because it posits how society itself should be organized, and not simply why certain environmental protections should be adopted or how they can be best implemented. This ambitious interpretation is widely shared by business leaders, policy activists, and academics alike. In order to achieve the aim of providing sustainable development, both nationwide studies by governments, and international studies by political and social organizations are being conducted. It is being found out that it is possible to achieve sustainable development by causing individuals to gain knowledge, talent, attitude and values that they will be aware of. Hence, the aim of education for sustainable development is to make individuals think about not just the society they live in now but also the sustainability of the planet they live on. Therefore, education for sustainable development develops and strengthens the capacity of individuals, groups, communities, organizations and countries to make judgments and choices in favour of sustainable development (UN, 2005).

**Keywords:** Sustainable Development, Growth, Education, Business Environment, Public Policy.

## **SOUND POLLUTION – EFFECT, CAUSES AND SOLUTIONS**

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### **ABSTRACT**

Noise may not seem as harmful as the contamination of air or water, but it is a pollution problem that affects human health and can contribute to a general deterioration of environmental quality. Noise is an undesirable and unwanted sound. All sound is not noise. What is sound for one could be noise for another person and vice versa. As Robert Orben said noise pollution is a relative thing. In a city it's a jet plane taking off. In a monastery it's a pen that scratches. Noise pollution or sound pollution refers to the presence of excessive and disturbing noise (from machines, transportation systems, aircrafts, trains, etc) in the environment that is very harmful to the physical and mental health of the living beings on earth. During the last twenty years there has been increasing concern with the quality of the environment. Along with air and water contaminants, noise pollution has been recognized as a serious pollutant. As noise levels have risen, the effects of noise have become more apparent. Poor urban planning may give rise to noise pollution, side-by-side industrial and residential buildings can result in noise pollution in the residential areas. Some of the main sources of noise in residential areas include loud music, transportation noise, lawn care maintenance, nearby construction, or young people yelling (sports games). Physical and psychological behaviors are negatively impacted by noise in several ways. Noise is linked to: Increased Aggression, Decreased Motivation, Worse Task Performance and Lack of Sleep. It subsequently causes a number of diseases, illnesses and disorders without us knowing what is causing it. Noise pollution in India has increasingly come to become one of the biggest problems in India also causing the most number of laws revolving around it being broken. A report conducted by WHO reveals that the national capital, Delhi is the seventh most noisy country in the world. Studies reveal that eighteen percent of disabled people in India are deaf out of which sixty percent turn deaf due to noise pollution which is completely avoidable. The acceptable noise pollution level in a residential area in India is 55 dB at day time and 45 dB at night time. The Noise Act 1996 states that night time is between 11 pm to 7 am which means that any source of noise should be turned off or turned down to very low after 11 pm. Reducing levels of sound pollution in our day-to-day lives can actually prove to very easy. Simply using earphones, shutting the door when using a loud machine, using noise absorbers at noisy machineries, not honking the car horn unnecessarily are some ways by which the generation of sound pollution can be dramatically lowered. Also avoiding firecrackers tackles the problem of causing various kinds of pollution at the same time. What is true of all other kinds of pollution also stands true here- if you don't kill it, it will kill you.

## **BIOETHANOL PRODUCTION: A COMPARATIVE STUDY BETWEEN FIRST AND SECOND GENERATION ETHANOL SUBSTRATES**

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### **ABSTRACT**

One of the greatest challenges of twenty-first century is to meet the growing demand of energy for transportation, heating and industrial processes, and to provide raw materials for chemical industries in sustainable ways. Biofuels have emerged as an ideal option to meet these requirements in a sustainable manner. Bioethanol is presently the most abundant biofuel for automobile transportation. Ethanol in recent years has emerged as one of the alternative liquid fuel and has generated immense activities of research in the production of ethanol and its environmental impact Bioethanol is widely recognized as a unique transportation fuel with powerful economic, environmental and strategic attributes. Ethanol derived from biomass is the only liquid transportation fuel that does not contribute to the green house gas effect Ethanol production process only uses energy from renewable energy sources; no net carbon dioxide is added to the atmosphere, making ethanol an environmentally beneficial energy source. Ethanol contains 35 % oxygen that helps complete combustion of fuel and thus reduces particulate emission that poses health hazard to living beings. The toxicity of the exhaust emissions from ethanol is lower than that of petroleum sources. In India, ethanol is mainly produced from sugarcane bagasse but the substrate has to compete with the food demand and therefore cannot supply the required amount of ethanol. Therefore, the nation needs to develop bioethanol technologies, which use biomass feedstock that does not have food or feed value. The most appropriate bioethanol technology for the nation would be to produce it from lignocellulosic biomass such as rice straw, rice husk, wheat straw, municipal waste and forest waste. Lignocellulosic biomass-derived second-generation biofuels are promising alternatives to petroleum-based fossil fuels. The utilization of agricultural residues and wastes for bioethanol production is a cost-effective and environmental-friendly approach for sustainable development. Considering the recent research progress in the fields of enzyme production, pretreatment, as well as metabolic engineering of yeasts, production of bioethanol from lignocellulosic agricultural wastes will certainly prove to be a feasible technology to achieve energy security in very near future.

**'ENVIRONMENTAL ENTEROPATHY' (EE):  
A CRITICAL CHALLENGE IN INDIAN PUBLIC HEALTH**

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**ABSTRACT**

India has the highest incidence of stunting in the world and recent studies have shown causal relationship between stunting and Environmental Enteropathy (EE), a subclinical condition of the small intestines. EE may explain the fact that sanitation and water have greater association with child growth than with reductions in diarrhoea and biological plausibility for this causal pathway is high. Uttar Pradesh has the highest incidence (65%) of stunting children below 5 years followed by Jharkhand (59%), Bihar (57.3%) and Assam (40.6%). All these states had low coverage of access to toilets till 2014 and although IHHL coverage has improved recently but use of toilets and cutting the oral-faecal route through hygienic practices are far below expectation. At the same time, these states have low coverage of piped water supply and there is little surveillance of bacteriological quality of water. Only 3% drinking water samples have been tested to know its quality in Uttar Pradesh, 17% in Jharkhand, 24% in Bihar and 29% in Assam. Sanitary Survey of the water sources also have been very poor. Unsafe water and lack of sanitation are known to contribute to the diarrhoeal diseases. However, EE being asymptotic there is little knowledge of the incidence of children going through such conditions. Improving status of sanitation as well as water quality and its monitoring in an integrated manner is the need of the hour. There is also need to mobilize the people which requires empowered Panchayats, which are weak institution in these states. This paper analyses the status of all these factors which hang together and suggest a convergent approach for improvement for wellbeing of the children of these states.

**Key words:** Environmental Enteropathy, Panchayat, Stunting, Sanitation, Water Quality.

## MULTI-TEMPORAL REMOTE SENSING DATA ANALYSIS FOR URBAN CHANGE MONITORING OF AHMEDABAD CITY, GUJARAT, INDIA

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### ABSTRACT

Urban areas like cities, throughout the globe, show a tremendous built-up expansion, commercial development as well as burgeoning population growth in an unparalleled manner. This unprecedented urban sprawl results in loss of productive agricultural lands, open green spaces, loss of surface water bodies and degradation of environmental quality. Therefore, it can be said urban sprawl is one of the potential threats to sustainable development. The present study was carried out in Ahmedabad Municipal Corporation (AMC) area with a major objective of monitoring urban sprawl from 1976 to 2017. Ahmedabad, India's first World Heritage City declared by UNESCO, has been also selected as one of the hundred Indian cities to be developed as a smart city under Government of India's flagship Smart Cities Mission. Therefore, sustainability of area in and around the city should be secured. To study the urban sprawl monitoring and change detection of the study area, multi-temporal satellite data has been used for landuse/landcover mapping to assess the urban sprawl change. Various multi-spectral indices like Normalized Difference Vegetation Index (NDVI), Built-Up Index (BUI), Normalized Difference Impervious Surface Index (NDISI), Normalized Difference Built-Up Index (NDBI) and Normalized Difference Impervious Index (NDII) were generated for mapping different land use classes and monitoring the changes in urban growth over the 42 year's time span from 1976 to 2017. The results of urban-sprawl monitoring indicate that, total built-up area (urban Dense & Urban Sparse) in AMC during has increased by 156.93 km<sup>2</sup> during the period of 42 years from 1976 to 2017 with the annual growth rate of 3.74 km<sup>2</sup>. The decadal growth rate (%) during the period from 1976 to 1989 was highest (36.9%) as compared to other decades. Decadal growth rate reduced during 1989 to 1997 and 1997 to 2007 period. However, during decade of 2007 to 2017 the decadal growth rate increased significantly and reached to 25.2 %. It was observed that various built-up indices were very useful for mapping different urban land use/land cover classes in AMC area. For monitoring the urban land use change, map indicating changes in urban land use classes was also prepared. The detailed transport network in AMC was also mapped using Normalized Difference Impervious Surface Index (NDISI). Specifically, NDISI spectral index was very useful for detailed delineation of transport network. The study suggests updated information on the rate and pattern of urban sprawl of the AMC area which will be helpful for local urban planners to develop appropriate management plans for sustainable development of the area.

**Keywords:** Urban Sprawl Monitoring, Landsat TM, LULC, Built-up Indices, NDBI, NDISI, Sustainable development

## **ASSESSMENT OF WATER YIELD IN THE BANAS RIVER BASIN USING SWAT MODEL**

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### **ABSTRACT**

The Soil and Water Assessment Tool (SWAT) is a watershed-based, hydrologic model for simulating hydrological processes at different spatial scales. The SWAT model used a Digital Elevation Model (DEM) to delineate the watersheds and create the HRUs in the different sub-basin and gives the water balance of the basin. The bias-corrected ensemble mean of three CORDEX-SA driving GCM experiments, i.e. CCAM (CNRM), CCAM (CCSM), and CCAM (MPI) are used in the SWAT to predict water yield for the future periods under different climatic scenarios (RCP4.5 and RCP8.5) in the Banas River Basin. The basin is divided into the four zones on the basis of the agro-climatic zone because the Rajasthan state divided into the 10 agro-climatic zones and the Banas basin covers the five agro-climatic zones. Results of the SWAT are used to develop water security indicators like per capita water availability, variation in precipitation and drought occurrence frequency. It is observed that there may be a decrease in the per capita water availability and an increase in drought frequency in the future periods. It may result in overall water scarcity in the basin which needs more attention to take measures to improve water security issues.

**Keywords:** SWAT, Hydrological model, Water security, Water yield, Indicators



## ENERGY DISPERSIVE X-RAY FLUORESCENCE ANALYSIS TO DETERMINE TRACE METAL CONCENTRATION IN SOILS AND CULTIVATED PIPER BETLE L. LEAVES OF COASTAL ODISHA

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### ABSTRACT

The energy dispersive X-ray fluorescence analysis is a popular non-destructive analytical method of multi-elemental analysis of different types of materials. The method provides reliable results for both major and trace elements when matrix effects are considered properly. In the present study, multi-elemental analysis of soil samples with this technique has been done to find the profile of agricultural soils. Clay and sandy soil samples from different coastal districts (Balasore, Puri and Ganjam) of Odisha were investigated. The study showed that EDXRF is a useful tool for elements detection. Total 33 numbers of elements were detected in different soils and 32, 22, 30, 23 numbers of elements were found in four varieties of Piper betle L. leaves of coastal Odisha respectively.

**Keywords:** Elements, Soil, Piper betle, Odisha.

## INDOOR AIR QUALITY WITHIN OFFICE COMPLEXES AND CLOSED PARKING AREAS

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### ABSTRACT

The Air quality inside buildings or offices is represented by concentrations of pollutants and thermal conditions like temperature and relative humidity conditions that affect the health, comfort, and performance of people. Indoor Air Quality (IAQ) is an important concern for both rural and urban areas. Some factors like inadequate ventilation, air tightness, poorly designed ventilation system, high humidity and temperature levels, combustion activities, infiltration of outdoor air contaminants, use of cleaning products, paints, printers, pesticides and VOCs generating products affect indoor air quality. Indoor air pollution poses a greater risk than outdoor air pollution as people spend 80-90% of their time indoor and mostly in office complexes and kitchen areas. Carbon-based gaseous pollutants (VOCs) can be 2 to 5 times greater than the outdoor primary pollutants, like PM2.5, CO, NOx, HC and additional pollutants like SO2, VOCs, PAHs, benzene, ozone formation and particulate bioaerosols emitted, due to vehicular movements in closed parking areas. Within office complexes, carpets on floors, broken CFLs, plastics, adhesives and glues can release a variety of volatile organic compounds (VOCs). Heating equipment like gas stoves, can produce carbon monoxide, which can cause headaches, dizziness, fatigue, and even death if ventilation is not proper. Paints and strippers release VOCs, which can cause headaches, dizziness etc. Many furniture and wooden materials can emit formaldehyde, a probable carcinogen that can also cause eye, nose, and throat irritation and severe allergic reactions. Smoking activities release nicotine. Indoor air quality is a topic of major concern as it causes serious health impacts to the occupants and India should take its step forward for making the standards of indoor air quality.

**Keywords:** Indoor air quality, Offices Complexes, Parking areas, VOCs, Ozone, PM2.5

**GLOBAL ENVIRONMENTAL, HEALTH CHALLENGES AND SESAME  
PRODUCTION: BIOLOGY OF ANTIGASTRA CATALAUNALIS  
DUPONCHEL, A MAJOR INSECT PEST OF SESAME CROP**

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**ABSTRACT**

Due to unmindful activities of human beings, we are facing so many problems in our life. Climate change and environmental degradation are alarming existence of organisms on this planet earth. In the present scenario, water crisis is global problem. Food safety and food security are a big challenge to fulfil need of growing population of the world. So, farmers have to pay attention on organic farming that is most important for sustainable agriculture and healthy life and those varieties of crops which are draught resistant and demands less water in its production. Sesame or gingelly crop is one of them which are draught resistant and heat tolerant crop. Sesame crop grow in tropical and sub-tropical regions of the world. This crop requires hot conditions in its growth for higher yield. Sesame crop uses less water than cotton, corn, peanuts, sorghum and soybeans. Heavy rains are unfavourable for its cultivation. This crop is grown in about 53 countries of the world. India, Myanmar and China are counted in chief producer of sesame. The sesame yield is greatly affected by the attack of insect pests. In India, the crop is reported to damage by more than 30 species of pests. Shoot Webber and capsule borer, *Antigastra catalaunalis* Duponchel (Lepidoptera: Pyralidae) is the most serious pest causing 25.00 – 90.00 per cent yield loss. . Therefore, it is most important to know biology of this insect pest for its management. In my present work, biology of major insect pest of sesame crop leaf webber/capsule borer, *Antigastra catalaunalis* Duponchel was studied in field and laboratory condition to manage this insect pest through integrated pest management for higher yield and healthy food for healthy life. Leaf webber/ capsule borer have complete metamorphosis. Its lifecycle complete in Eggs, Larva, Pupa and adult.

**Keywords:** food safety, Water crisis, Sesame crop, *Antigastra catalaunalis*

## ROLE OF TECHNOLOGY IN SAFEGUARDING THE ENVIRONMENT

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### ABSTRACT

We are living in the world of constantly deteriorating condition of environment, which is very detrimental to humanity and the whole planet as well. We need urgent corrective measures to safeguard our environment otherwise it will be too late. There are many conferences and summits organized and their outcomes should be documented well and implemented strictly by making stringent laws. The global warming, environmental pollutions, threats to biodiversity, acid rains, climatic changes and onset of different fatal diseases are the just some repercussions of being not serious about the protection of our environment. The possible cause may be increasing population, extensive use of natural resources, urbanization and reckless industrialization etc. There is an urgent need to develop some innovative technology useful to safeguard our environment that may include technologies which reduce the emission of green house gases, recycle the bio waste, fly ash and plastics etc. The production and use of bio fuels will certainly reduce pollution on the roads. The new technology electric cars and hybrid cars can also be used to reduce pollution. The renewable energy sources like PV solar cells, fuel cells, wind mills, tidal energy, geo thermal energy can also contribute well in safeguarding our planet. The agriculture technology can be very useful in controlling the deteriorating condition of environment like using technology to convert agriculture waste into useful products.

**Keywords:** Environment, technology, Climate change, Global warming

## **NATURAL HAZARD AND DISASTER MANAGEMENT AS TRANS DISCIPLINARY APPROACH**

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### **ABSTRACT**

Natural hazards is a major adverse event results from natural processes of the Earth caused either by rapid or slow onset events which can be geophysical, hydrological, climate logical and meteorological etc. Natural hazards turning into disasters increased in terms of frequency, complexity, scope and destructive capacity. The majority of the 20 most devastating natural disasters have occurred during the last 10 years. Natural disasters are estimated to have claimed about 3 million lives around the world and severely affecting the livelihood of about 1 billion people. Disasters are destructive problem that gives idea about the ability to protect their populations and infrastructure and their recovery..



## **A NEXUS APPROACH TO WATER-ENERGY-FOOD SECURITY: AN ASSESSMENT OF SECURITY TRADE-OFFS**

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### **ABSTRACT**

Security of energy, water, and food – three most basic human requirements – is a major global challenge. The explicit inclusion of security concerns in the SDG's (Energy – SDG 7; Food – SDG 2; Water – SDG 6) is a testimony to the increasing recognition of this challenge. While this challenge is global, its seriousness is particularly acute for developing countries like India where future economic prosperity is critically dependent on the provision of adequate quantities of energy, food and water at affordable prices and through sustainable means. The task of redressing the security challenge is difficult, as it needs to consider a myriad of factors, for example, inter-linkages ('nexus') between energy, food and water, and the narrowness of prevailing policy discourses. Using an Energy-Water-Food extended Input-Output model with modified production functions, this paper provides insights into the nature of the nexus between energy, water, food and the consequent policy trade-offs. Further, these insights and trade-offs are developed in this research for five alternative scenarios namely Business-as-usual (BAU) or current policies scenario, Energy security, Food security, Water security, and Nexus oriented scenario. These scenarios reflect contrasting sets of assumptions based around alternative economic and technological developmental pathways. The results demonstrate that while overall, all scenarios yield better security outcomes than the current policies scenario, the Nexus oriented scenarios suggests considerably improved individual and aggregated EWF security outcomes. The improvement in aggregated EWF outcomes over BAU in Nexus scenario is of the order of 15, 39 and 52 percent in short, medium and long run respectively. Some significant trade-offs are also observed. For example, while the Energy security scenario shows a marked improvement in energy security, water security declines noticeably under that scenario.

Overall, the nexus scenario seems to be the most desirable one to improve energy, water, food security outcomes in India. These insights and trade-offs should provide Indian policymakers and planners more informed, integrated, and comprehensive bases for policy development to redress the energy, water, and food security challenge.

**Keywords:** Water, Energy, Food, Nexus, Policy, India

## A STUDY ON FLOODS AND DEPLETION OF SAHIBI RIVER DURING INDIAN SUMMER MONSOON: A PRELIMINARY ANALYSIS

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### ABSTRACT

The River systems of arid and semi-arid are under stress in era of climate change. River Sahibi, a tributary of River Yamuna, is one of very such river which is depleted at critical level. It originates from the the eastern slopes of the Saiwar Protected Forest hills in Aravalli Range near Jitgarh and Manoharpur in Sikar district close to Jaipur in Rajasthan state and flows northward through Kotputli Rajasthan, Rewari in Haryana and finally meet to River Yamuna through Najafgarh drain after flowing 157 Km in one of the waters stressed areas of Rajasthan and Haryana. The lower catchment of river is historically known for inland salt production center as river annually brought substantial amount of dissolved minerals and spread across areas, upstream to confluence point with Yamuna. It used to be medianephemeral water source for this area and key geomorphological agent, that traditionally recharge groundwater, surface water reservoirs and provide soil moisture during summer Monsoon, which support livelihood of people since historical times.

In recent past, several high regime flooding events has been occurred at lower as well as upper catchment areas. Now due to rapid economical and developmental changes, entire river basin suffered depletion at critical level. There is no trace of river even in during month of heavy rain fall June, July, August and September (JJAS). The present investigation highlights the current status of rivers along with possible causes of its depletion and flood events. In this study, we analyze the rainfall pattern during JJAS months across its catchment area for the period of 144 years from 1871 – 2014. The long term homogeneous monthly rainfall data provided by Indian Institute of Tropical Meteorology, Pune is used. The preliminary results suggest possible correlation of rainfall with river dynamics i.e. extreme rainfall events caused by floods in Sahibi. A deceasing trend in summer monsoonal rainfall across area may also indicate possible role of depletion of river basin along with change in land use in recent past to meet economic and developmental need.

**Key Words:** Sahibi, Ephemeral, Summer Monsoon, Inland salt production, Flood

**SALICYLIC ACID INDUCED ANTIOXIDANT CAPACITY HELPS  
PROTECT PHOTOSYNTHETIC MACHINERY OF *VIGNA RADIATA*  
UNDER NaCl STRESS**

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**ABSTRACT**

This study aimed to assess the response of two mungbean (*Vigna radiata*) cultivars (salt-tolerant Punt Mung; salt-sensitive Samrat) to 50mM NaCl stress in terms of changes in the traits of damage (H<sub>2</sub>O<sub>2</sub>, membrane lipid peroxidation), defence (ascorbate peroxidase, APX; superoxide dismutase, SOD; glutathione reductase, GR; reduced glutathione, GSH; osmolytes: proline and glycine betaine, GB), photosynthesis and growth. It was also aimed to evaluate the significance of salicylic acid (SA; 0.5mM) and sulphur (2.0mM SO<sub>4</sub>) alone and in combination, in the modulation of the traits damage, defence, photosynthesis and growth and in the minimization of NaCl-impacts in both Punt Mung and Samrat cultivars. Irrespective of cultivars, individual application of SA and SO<sub>4</sub> to 50mM NaCl almost equally enhanced the antioxidant machinery and diminished NaCl-accrued damage. However, the combined application of SA and SO<sub>4</sub> to NaCl-exposed cultivars led to the hyper accumulation of cysteine, GSH, proline, GB; enhanced activity of APX, SOD and GR; and decreased damage to a higher extent in Punt Mung. Thus, SA and SO<sub>4</sub>-induced tuned modulation of the defence traits decreased damage traits and thereby improved both photosynthesis and growth traits.

**Keywords:** Salinity, salicylic acid; cysteine, glutathione, proline, photosynthesis, mungbean.



## IMPACTS OF URBAN FORM ON HEAT-RELATED HEALTH RISK: A GEO-STATISTICAL STUDY IN DENSE URBAN LANDSCAPE OF DELHI, INDIA

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### ABSTRACT

Urbanization induced rapid land use land cover change causes changes of thermal profile and intensification of heat in a city. It magnifies the risk of urban dwellers regarding various health issues and sometimes causes the death of people. In this regards, planning of urban landscape plays a crucial role. Hence, an attempt has been made to analyse the impact of urban form or morphology on health risk in a dense urban landscape -Delhi, India. This study can be divided into four sections. In the first section, the heat-related health risk is calculated by using various biophysical and socio-economic variables. Then, different urban morphological parameters are obtained from the class level landscape metrics. Thirdly, both, health risk and urban morphology linked with bi-variate Moran's I and impacts of morphology were assessed using ordinary least square (OLS) and spatial error (SE) regression model. Finally, a field survey has been conducted to obtain public awareness using five scale Likert Scale. The result shows dense urban areas are more heat prone to heat-related health risk than medium urban landscape. The abundance of green vegetation significantly reduces risk. Public awareness shows a dissimilarity with health risk, means people are more aware in the low-risk region than high-risk zone, due to the socio-economic status of the respondent. Finally, this study can help to sustainable urban planning for reduction of health-related health risk and other health impacts.

**Keywords:** Urban Heat Island; Health Risk; Urban Morphology; LISA; Spatial Error Regression; Delhi.

## **BACTERIAL AND ENZYMATIC ASSAYS FOR TOXICITY TESTING IN WASTE WATER TREATMENT PLANTS**

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### **ABSTRACT**

Treatment plants may be exposed to a whole range of toxic organic and inorganic compounds that may inhibit the removal of organic matter and nitrogen. In order to secure maximum treatment efficiency, the plant manager has to monitor the toxicity of the influent sewage. With regard to the receiving water the manager also has to make sure that toxicity in the influent is significantly reduced during treatment. Because a whole range of chemicals may be present, chemical analysis may be insufficient and expensive as a control instrument. Instead, direct toxicity measurements are preferable to capture the complexity of the wastewater. The monitoring methods have to be relevant and sensitive for the processes in the treatment plant, i.e. removal of organic matter and nutrients. The methods also have to be simple and inexpensive. The impact on aquatic environment, including wastewater, generally determined by acute and chronic toxicity tests, consisting mostly of fish and invertebrates bioassays. However, because of the large inventory of chemicals, short term bioassay are now being considering for handling this task. These tests are mostly based on inhibition of the activity of enzymes, bacteria, fungi, algae and protozoa. These enzymatic and microbial assays, also called microbiotests, are simple, rapid and cost-effective, and they can be miniaturized.

## RENEWABLE ENERGY SOURCES :A STEP TOWARDS SUSTAINABILITY

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### ABSTRACT

This review stems from fact that sum total of all energies in Universe being constant hence the need arises to channelize the energy into more productive & sustainable forms from a future perspective. Earth being constant & the world expanding globally there is increasing daily requirement of energy by all population across the world. Due to ever increasing population pressure on earth the need for energy and its related services to satisfy human social and economic development, welfare and health is increasing hence there is vast requirement of having focus on Renewable energy source. Renewable energy sources have potential to provide solutions to the ever challenging energy problems being faced now. The renewable energy sources like wind energy, solar energy, geothermal energy, ocean energy, biomass energy and fuel cell technology can be used to overcome energy shortages. In this paper, efforts have been made to summarize the availability, current status, major achievements and future potentials of renewable energy options alongwith opportunities associated with Social and Economic development, Climate Change Mitigation, and reduction of environmental and health impacts. This paper also assesses specific policy interventions for overcoming the challenges such as Market failures, lack of information, access to raw materials for future renewable resource deployment. and enhancing deployment of renewables for the future. The study also suggests some measures and policy recommendations which when would help achieve the goal of renewable energy thus to reduce emissions, mitigate climate change and provide a clean environment as well as clean energy for all and future generations.

**Keywords:** Renewable Energy, Climate Change Mitigation

## DRUG DELIVERY THROUGH NANOPARTICLES

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### ABSTRACT

Continuous improvement in pharmacological and therapeutic properties of drugs is given birth to the novel drug delivery system. Nanotechnology is very important to the drug delivery because of properties of nanoparticles such as its high specificity towards target sites. As we know nanoparticles are subnanosized colloidal structure with a size of 10-100nm and it can easily overcome the challenges with the use of large size materials in drug delivery. The NP can conjugate with various drugs by different method to deliver drug to target sites. The NP surface is designed with ligands to get affinity towards specific cells and co-polymer to get protection from immune cell. Currently many substances are under investigation for drug delivery mainly for cancer therapy. For many diseases treatment take lots of time but through nanotechnology we can improve it to much quicker and cheaper. Nanoparticle maintains drug concentration at specific sites or in target tissues hence lower doses of drug required. However, despite all these potential advantages, only a few nanoparticles based drug have been approved for clinical use, with many challenges and hurdles at different stages of development because it require careful design and engineering of nanoparticles.

## ENVIRONMENTAL DEGRADATION AND HEALTH ISSUES

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### ABSTRACT

Nature provides all kinds of facilities and resources to live in the planet. Nations are exploiting the environment (resources) as much as for comfort and luxury life in terms of development. The so called developments create negative impact in the planet and make the people keep away from nature. The environmental degradation is caused by combustion of fossil fuel, agricultural activities, industries, households, nuclear plants and other sources. These are polluting air, water and soil. As a result climate is changed and it leads global warming, flood, Hurricane, and other natural calamities. These incidences are led to threat to human health. The climate change leads to health problems such as malaria, dengue, yellow fever, diarrhoea, measles and other vector borne diseases, cancer, cardio vascular and respiratory diseases. The environmental degradation affects the food chain and it affects the health of the human beings. The climate change affects four grain production and it creates food insecurity. The poor people are forced to fall under malnutrition and it affects the health of the people. There is an urgent need to protect the environment and save the planet and protect the human beings from ill health.

**Keywords:**-health, pollution, need, climate change and urgent.

**COMPARATIVE SHOTGUN PROTEOMIC STUDY OF COTYLEDONARY AND MATURATION STAGES OF SOMATIC EMBRYOGENESIS (A TOOL FOR RAPID PLANT DEVELOPMENT AND PROPAGATION) IN CATHARANTHUS ROSEUS (L.) G. DON.**

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**ABSTRACT**

Somatic embryogenesis, an important and wonderful biotechnological tool used to develop whole plant from single or group of somatic cells. The differentiated somatic cells become totipotent stem cells by drastic reprogramming of all cellular activities, leading to the acquisition of embryogenic competence. This includes changes in gene expression and hence appearance of different sets of proteins, in order to make transition from embryogenic to non embryogenic cells. Our work was aimed to study the protein profiles of the two important stages, cotyledonary and maturation stage of somatic embryogenesis in *Catharanthus roseus*. Different proteins related to energy metabolism, protein synthesis and most importantly the stress related proteins show differential expression, higher abundance in maturation stage as compared to the cotyledonary stage. A total of 60 differentially abundant proteins were observed which show high abundance in the mature embryos and the most of such proteins are related to the stress and hence showed that stress is the main driver towards the attainment of the embryo maturation. 435 proteins were found exclusively in the mature embryos in which proteins related to the chlorophyll synthesis were also present which synthesize and accumulate chlorophyll, hence green embryos.

## CHARACTERIZING THE PROFILE OF REACTIVE NITROGEN CHEMISTRY IN THE URBAN ATMOSPHERE OF NCR, INDIA

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### ABSTRACT

Reactive nitrogen (Nr) has long been recognized as the key trace species of atmospheric photochemistry that are becoming increasingly evident in the cascade of air pollution, acidification and eutrophication of the ecosystem. However, their estimates in N budget remain limited by the highly uncertain phase conversion processes of their precursor gases (NO<sub>x</sub>, NH<sub>3</sub>) and secondary transformation products (HNO<sub>3</sub>, NO<sub>3</sub><sup>-</sup>, NH<sub>4</sub><sup>+</sup>). The present study aims to quantify such interactions over the urban region where reactivity of their homogenous phases becomes detrimental to the differential residence time of Nr species during atmospheric transport. For this purpose, diurnal samples of gaseous and particulate Nr species were collected simultaneously for understanding the molar ratios, equilibrium between different Nr species and photochemical control of their spatio temporal variability. The results showed dominance of Nr precursor gases over their corresponding particulates where the % fractions of different Nr species were characterized by the free availability of NH<sub>3</sub> over the study region. Such observations were confirmed for their limited photochemical conversions where less than 1 ratios of day and night measurements (D/N) for the different Nr fractions suggested an influence of boundary layer dynamics at the background site. These phase conversion processes were further corroborated with the molar ratios of NO<sub>x</sub>/NO<sub>y</sub> and NH<sub>3</sub>/NH<sub>x</sub> where incomplete titrations of NO<sub>x</sub> and NH<sub>3</sub> emissions were observed irrespective of their diurnal phases along the sampling transect. Such study would be helpful in building a comprehensive understanding of Nr mixing ratios during trans boundary transport as well as their interaction with local meteorological conditions via equilibrium based approaches.

**Keywords:** Nr precursor gases, Nr particulates, diurnal ratios, gas – aerosol interactions.

## OPTIMAL UTILIZATION OF LAND AND WATER RESOURCES FOR CROP PLANNING IN DHORA COMMAND

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### ABSTRACT

The objective of this study is to develop an optimization model for crop planning using land and water resources in Dhora Canal Command of Udham Singh Nagar district of Uttarakhand and Bareilly district of Uttar Pradesh. A linear programming model, using LINGO-14 with an objective to maximize the net return from the cropped area was developed to allocate the land and water resources constraints in the command. The optimal crop plans were analysed, by considering different crops grown in *Rabi*, *Kharif* and *Zaid* seasons. Ten crops grown in the command were considered for the linear programming model. The available irrigation water supplies during the period were taken based on the canal flow released during the period and the groundwater draft from minor irrigation structures corresponding to the development stage of groundwater utilization in the command. Five different percentages viz 20, 40, 60, 80 and 100 of available water for irrigation only and the value of average of last five years net draft from minor irrigation structures was used for optimization. The variation in net return with different availability levels of groundwater is being observed in the plans. The annual net return from plans increased with the increase in the percentage use of additional available groundwater for irrigation. The Plan-1 (without Summer Rice) was found optimum on monthly and weekly analysis. In optimal Plan-1 (without summer rice), on monthly basis: the crop area was allocated by the optimization model as per the minimum and maximum area restrictions imposed for different crops. Maximum net return of Rs.19.82 crore was observed in Plan-1, without considering summer rice with 100% utilization of additional groundwater for irrigation.



## **EFFECT OF WATER POLLUTION ON PHARMACOGNOSTIC PROPERTIES OF HYDRILLA VERTICILLATA(L.F.) ROYLE.**

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### **ABSTRACT**

Nature is the life line of our health as it provides all necessary things for our survival. It has been pointed out that more than 80 % of the population in the world depends on plants and traditional medicines to meet their primary health needs. Environment exerts tremendous influences on growth of morphological and structural changes underlying plant tissues. Adverse environmental conditions can cause plants structural damage and dysfunction in plants. Historically plants have provided sources of inspiration for novel drug compounds and made large contributions to human health and wellbeing. The present investigation attempts to record the pharmacognostic properties of *H. verticillata* grown in polluted and unpolluted water sources. *Hydrilla verticillata* belongs to Hydrocharitaceae family which is a noxious weed. The majority of plants used in the Indian traditional system of medicine have not yet been screened for their pharmacological activities related to their growth condition. The literature survey shows scanty information available on the pharmacognostic and phytochemical properties of *H. verticillata* weed grow in unpolluted and polluted areas. This promoted the present investigation to study the impact of environmental pollution on their pharmacognostic, phytochemical and bioactive properties. The selected plants (*H. verticillata*) showed variations in tissue architecture to adapt to the polluted environment. Besides, these structural aspects are sufficient signs of eco-physiological plasticity under unstable environmental type and confirm healthier adaptableness of these plants. This study serves as a standard reference for identification, authentication and distinguishing the plant from its adulterants.

**Keywords:** Adulterants, Morphological, Identification, Pharmacognosy and traditional system.

## MICROBIAL EXOPOLYSACCHARIDE MEDIATED APPROACHES FOR HEAVY METAL REMEDIATION: A COMPARATIVE ANALYSIS

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### ABSTRACT

Increasing industrialization and mining accelerate the heavy metal contamination in developing countries. A heavy metal contamination not only pollutes the ecosystem but also cause serious public health risk because of its persistence and accumulations in the food chain. Although conventional methods are there for the treatment of heavy metals but they are expensive and generates toxic byproduct. EPS are complex higher molecular weight microbial biopolymers, commonly made up of polysaccharides, proteins, lipids and uronic acids etc. The physiological property of EPS allows sequestering heavy metal ions. In this article we have studied the various strategies of microbial exopolysaccharide mediated heavy metal remediation such as homogeneous consortia of EPS, heterogeneous consortia of EPS, dead biomass of EPS, immobilized EPS, biogenic polysaccharide nanomaterial and altered EPS based remediation. This article also compared and summarized the EPS based heavy metal remediation.

**Keywords:** Heavy metal, Contaminations, Exopolysaccharide.

## GREEN BANKING: A COMMITMENT FOR THE FUTURE

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### ABSTRACT

Green has always been a colour of growth, development and prosperity. However, sustainable development has become a challenge as mankind moves on the road of development. Understanding the changes in the environment and addressing to those changes is the only solution for sustainable development. Financial sector being a facilitator in the process of development, undertakes a crucial role in the course of sustainable development. This, more specifically defines the role of banking industry and its contribution for a green economy. Green banking promotes perseverance of natural resources through its product, process and application of technology. This paper explores the green aspects of banks in India, their green initiatives and the issues and challenges.

**Keywords:** Sustainable development, Green banking, financial Sector, Green initiatives.



## **IMPACT OF CLEAN DEVELOPMENT MECHANISM (CDM) PROJECTS ON SUSTAINABLE DEVELOPMENT: A CASE STUDY OF CHAMBA DISTRICT (HIMACHAL PRADESH)**

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### **ABSTRACT**

The clean development mechanism (CDM) is part of global carbon market developing rapidly as a part of Kyoto response towards mitigation to global warming. One of the aims of CDM is to achieve sustainable development in developing countries, but uncertainty prevails as to whether CDM is doing what it promises to do. In Himachal Pradesh Chamba District have more than 20 hydropower projects out of which 12 are CDM projects. These CDM projects have dual objective of providing green energy and sustainable development of the local area. These CDM projects have both positive as well as negative impacts. Positive impacts are reduced use of thermal power, low carbon emission etc. Some of the negative impacts of hydroelectric projects include loss of vegetations, topographical disturbances, changes in rivers flow patterns, involuntary resettlement, health problems, loss of cultural values and marginalization of local people. Hydropower development adversely affects the productivity of agriculture. This study examines the impacts of these projects in rural areas and considers implications for sustainable livelihoods. The study is based on the random sampling of 200 respondents at various locations. A semi-structured questionnaire was prepared and interviews from different sections of the community were taken. It was found that many short term benefits have accrued to the rural community from these CDM projects but at the same time changes in land use have adverse impacts on agriculture. It is argued that there is a need to support new types of land based economic activities on abandoned agricultural lands, reclaim degraded lands, and introduce new products and production methods, and suggest the local people better investment options for their sustainable future livelihood.

**Keywords:** Livelihoods; hydroelectricity; land use; agriculture, clean development mechanism

## **ROLE OF ARBUSCULAR MYCORRHIZAL FUNGI (AMF) IN ALLEVIATION OF SALT STRESS IN CHICK PEA (*CICER ARIETINUM* L.)**

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### **ABSTRACT**

Salinity is considered as one of the most important abiotic factors limiting plant growth, yield and threatening the global food production potentials of crop plants in many areas on earth especially in the arid and semi-arid regions. Several eco-physiological studies have revealed that the Arbuscular Mycorrhizal (AM) symbiosis has capability to progress plant growth under salt stress. Hence the performance of chick pea (*Cicer arietinum*) variety BGD 72 obtained from IARI New Delhi under salt stress inoculated with Arbuscular Mycorrhizal Fungi (AMF) was evaluated. Pot experiment was conducted to evaluate the negative effects of salinity on *Cicer arietinum* plants in the presence and absence of Arbuscular Mycorrhizal Fungi (AMF). The selected morphological, physiological and biochemical parameters of chickpea were measured. Salt stress given in the form of 0 (control), 50mM and 150 mM caused a remarkable decrease in the plant growth traits, decreased the chlorophyll content and activities of nitrate reductase and carbonic anhydrase, reduced growth and chlorophyll content drastically. A decrease in the number of nodules, was also evident due to salinity stress causing reduction in nitrogen fixation and assimilation potential. Antioxidant enzymes like superoxide dismutase (SOD), catalase (CAT), ascorbate peroxidase (APX) also exhibited great variation with salinity treatment. However, both control as well as salt treated chickpea plants inoculated with (AMF) showed a marked increase in the aforesaid parameters and also enhanced the tolerance of plants to salt stress. Therefore, increase in the tolerance to the salt stress with the help of Arbuscular Mycorrhizal Fungimay constitute an important approach for the enhancement of plant productivity.

**Keywords:** Arbuscular Mycorrhizal Fungi, Chickpea, chlorophyll content, salinity.

## **STATUS OF PHYSICO-CHEMICAL PARAMETERS WATER QUALITY OF SAPRAR DAM, MAURANIPUR (JHANSI ) UTTARPRADESH, INDIA**

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### **ABSTRACT**

Water is the most important part of the natural heritage. It is one of the abundantly most available in nature. It is an essential constituent of all animal and vegetable matter and forms about 75% of the matter of Earth. It is most important ecological systems, human health, food production, and economic development. Dam and their accompanying reservoirs generally are designed to be multi functional structures. By definition, a dam is created due to depression on land in which water accumulates from all around. The saprar dam is situated at Kuraicha goan of Mauranipur, Jhansi district of Uttar Pradesh. The dam is constructed on Saprar & Gargoru River. This is the main tributary of Dhasan river. The dam is located at latitude 25° 14' 23" N and longitude 79° 11' 47" E. It is multipurpose type of project like irrigation, water supply and fish production. In 1947 saprar dam construction started and it completed in the year 1952. The catchment area is 363.52 sq. mile. The total length of dam 3900m and maximum height above foundation is 16.76m. Total spillway capacity is 1143.23 (cum). The main aim of the present study was to estimate information physico-chemical parameters of saprar dam to check the dam suitability drinking, irrigation, and aquatic life. The various physico-chemical parameters such as water temperature, PH, EC, DO, COD, BOD, Alkalinity, NO<sub>3</sub>-N, NH<sub>4</sub>-N, Total Nitrogen, PO<sub>4</sub>-P, Total Phosphorous, Total Hardness are discussed and studied in this paper. The physico-chemical parameters analysis of the dam was carried out on seasonal basis for period of one year from March 2017 to February 2018 at three different sites of the dam. Result revealed that there was significant seasonal variation in the analyzed indicated better quality of dam water.

**Keywords-** physico-chemical parameters, saprar dam, water quality

**POPULAR CULTURE AND ECOCRITICISM:  
RAISING ENVIRONMENTAL CONCERNS THROUGH COMICS**

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**ABSTRACT**

Comics, the very word usually brings to mind something entertaining but ephemeral, something which once read can be put away. It is not mostly conceived as worthy of much critical deliberation. But such an approach to comics has long been proved faulty by many of its worldwide practitioners, like Pulitzer Prize winning Art Spiegelman and his *Maus*. Even in India the *Amar Chitra Katha* series right from its inception declared its purpose to fuse entertainment with pedagogy. In recent times the term graphic narrative is used for 'mature' comics. But that need not be done to draw academic attention towards it. Comics by itself is a form which can be seen as much more than just comical. Comics can become a potent tool for raising social awareness because of its being part of a popular and mass culture. Its technique of narration does not have a drab tutoring effect to it. Rather it uses, in most cases, humour to critique. The wit and humour of comics, I shall argue, can be used to raise ecological concerns in an effective way. Comics can be ecocritical. Because it uses both images and words, it has a symbolic potential which can rivet the attention of the reader to be able to comprehend even complex environmental issues. When it comes to eco-awareness and sustainable development, the idea is not just to record facts and figures, it is to disseminate it in a way that will maximize its reach. To argue in favour of this proposition I will use Sarnath Banerjee's comic/graphic novel *All Quiet in Vikaspuri* dealing with the water crisis in Delhi as a case study.

## ALLELOPATHIC IMPACT OF LEAF AQUEOUS EXTRACT (LAE) OF *UTRICA DIOICA* L. ON GERMINATION, GROWTH AND PHYSIOLOGICAL PARAMETERS OF SOME WEEDS AND CROPS.

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### ABSTRACT

An in-vitro investigation was conducted to determine the allelopathic potential of leaf aqueous extract (LAE) of *Utrica dioica* L on germination, growth and physiological parameters of *Cassia sophera*, *Cassia tora*, *Pisum sativum* and *Triticum aestivum*. The effect of the Leaf Aqueous Extract was examined at different concentrations (0.5, 1, 2, and 4%) and it significantly reduced the root length, shoot length and dry biomass of test species as compared to the control. Obtained results showed that effect of aqueous extract of *Utrica* on seed germination, root and hypocotyl length and the dry weight of the plants were concentration dependent and type of the plant. Germination of test species (crops) was enhanced at lower (0.5%) and inhibited at higher concentration (4%) of the extract. Greatest inhibitory effect was noticed in *C. sophera* and *C. tora* at 4% LAE. The morphological characters were affected to a great extent. The seedlings showed the abnormal features like chlorosis, stunted growth and were rotten at 4% LAE. The stomata were deformed and the structural morphology was altered at different concentrations of LAE. Upon examining the mitosis in *Aliumcepa*, the different stages were abnormal, as chromosomal aberrations were found. The results suggest that the *U. dioica*. might possess the phytochemicals which suppressed the germination and growth parameters of weed species and can be used as a natural herbicide, thus increasing the scope of green biosphere.

**Keywords:**-Phytochemicals, leaf aqueous extract, herbicides, weeds, green biosphere.



**CONSERVATIONAL ASPECT AND PROTECTION OF  
TRADITIONAL ECOLOGICAL KNOWLEDGE OF INDIGENOUS  
INDIAN COMMUNITIES-A REVIEW.**

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**ABSTRACT**

Man and nature have been known to be living in harmony since time immemorial. However, rapid industrialization and urbanization has driven humans astray from their roots. Still, there are some communities who till date, wish to maintain this harmonious relationship and continue to live in accordance with nature. India alone is home to 2753 such indigenous communities. Through their diet, lifestyle practices, religious beliefs and traditions they have helped in the conservation of their local nature and its resources. This is termed as Traditional Knowledge and is passed on from one generation to another orally or in practice. These efforts have not only helped in taking a step towards sustainable development but also empowered the local communities. These practices are however losing recognition due to absence of written records and migration of communities to urban areas in search of better options. The need of the hour is to inventorize these practices systematically with authorization in the form of patent, fair benefit sharing of ecosystem services by the government and the communities and proper support and encouragement to the communities by including their interest in mainstream policy making. The Government of India has taken steps based on guidelines formed in the Convention on Biological Diversity (CBD), Rio de Janeiro, 1992 which deals with the communities' interests, the setting up of Traditional Knowledge Digital Library and legislations in support of communities. However, there is a long way to traverse to meet community needs and sustainable development through traditional knowledge. This document is an account of examples from different communities in India, conservational aspect of traditional knowledge, their success stories and the government's role in their protection for equitable use of resources and sustainable development.

## **ORGANIC FARMING IN INDIA: WAY TOWARDS SUSTAINABLE AGRICULTURE**

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### **ABSTRACT**

After the introduction of green revolution technologies in the country, farming practices changed very rapidly. Heavy use of artificial fertilizers and pesticides created environmental and human health related concerns like soil salinity, depletion in groundwater quality, water logging, cancer etc. Currently, organic farming is one of the fastest growing sector of agricultural production in the country. India is showing paradox in terms of increasing area under organic farming on one hand and increasing consumption of artificial fertilizers and pesticides on the other hand. Use of fertilizers and pesticides varies spatially over the country. Organic farming is providing an alternative to the environmental challenges created by conventional farming. Organic farming products have higher nutritional values as compared to conventional farming products. And because of higher nutritional content demand for organic products is increasing globally. India is having the highest number of organic producers in the world. Although organic agriculture has an untapped role to play when it comes to the establishment of sustainable farming systems but no single approach will safely feed the increasing population. This paper tries to find out the potential areas where organic farming can play a vital role in environmental sustainability, generating employment, and a rise in the income of farmers.

## LAND COVER CHANGE OF NOIDA

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### ABSTRACT

The high rate of urbanization is observed in the last three decades due to increased demand of urban land for increasing population. This result in environmental degradation as green cover is reduced in metropolitan cities. Remote sensing and GIS techniques have been used to study the land use and land cover pattern. This paper emphasizes on change and growth of residential, commercial, and industrial structure on green land and also include the factors affecting land cover. This paper deals with spatiotemporal analysis of land cover of Noida using satellite Landsat and technique of NDVI (normalised difference vegetation index). It is also assessed as to how much change is observed in the land cover pattern of Noida in the last three decades.

## **AN INNOVATION OF ARTIFICIAL GLACIER AND ICE STUPA TO MITIGATE WATER CRISIS IN DESERT HIMALAYAS LADAKH**

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### **ABSTRACT**

Ladakh is situated in the trans Himalayas and monsoon shadow area where the annual precipitation is very low, it's also known cold desert. The main source of water is glacier based as all stream and rivers are depend on glacier. However, there use to be water scarcity for agriculture purpose but now it's also alarming for domestic purpose also. Following factors could be the major contribution for water crisis in Ladakh which we can broadly classified I) climate change: Varied in snowfall and also change in its cycle, depletion of glacier. II) development of tourism: tourist explosion in fragile eco system as per as report of Leh tourist department in 2016, Leh received 235698, which is double its district population. III) Mismanagement of watershed development: lack of proper policy analysis and unscientific management towards watershed management. In response to water crisis, number of local and scientific innovation have been initiated, which used to mitigate water shortage in Ladakh. This include innovations and locally sustainable knowledge and practice like Artificial Glacier and Ice Stupa. Here one technique is at the base of glacier (artificial glacier) and other one is at the ground level near village (Ice Stupa). Which prime purpose is for agriculture purposes.

The present research proposal is in response to the analysis of the successful use of such local form of innovation for solving problem of agriculture based water shortage. At the same time, it can be effective to use the local innovations and practices like ice stupa and artificial glacier with cemented water reservoirs for domestic purpose, therefore its relevance become more important and we can use water when it is melting or not. Which I can say as 'snow water harvesting'.

## ECOTOXICOLOGICAL STUDIES OF CEFOTAXIME ANTIBIOTIC ON DAPHNIA MAGNA

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### ABSTRACT

The detection of antibiotics in the environment and their unfavorable impacts on non-target species has raised the concern. The present research was outlined to survey the intense and incessant poisonous quality of cefotaxime antibiotic on *Daphnia magna*, a key species in fresh water ecosystem. The 48 h toxicity test with *Daphnia magna* was conducted in accordance with the recommended procedure outlined in U.S. EPA (2002) and the chronic toxicity tests were performed following the OECD test guideline 211(OECD, 2012). The EC50 obtained for cefotaxime antibiotic tested was cefotaxime was EC50 25.82 mg/l. The existence of reproductive adverse effects of cefotaxime during the 21-day exposure of the daphnids was observed. The mortality rate enhanced and average number of neonates diminished as exposure to cefotaxime antibiotic was increased. The antibiotic treatment containing high (16.2 mg/l) concentration induced 50% of mortality, respectively.

**Keywords:** *Daphnia magna*, Toxicity, Non target organisms, Cephalosporin, Reproduction.

## **PATTERNS OF CONSUMPTION OF TRIBAL HOUSEHOLDS: A STUDY OF SANTALS**

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### **ABSTRACT**

The Constitution of India recognizes the indigenous tribal groups or *Adivasis* or *Janjatis* as a special category and has designated them as the Scheduled Tribes. The Indian constitution has recognized nearly 700 types of tribal population groups as Schedule Tribes. The total ST population of India stands at 104,281,034 as per 2011 census and accounts for 8.6% of the total population of the country (Census of India, 2011). The decadal population growth between census years 1981 to 1991 in respect of tribal population has been higher (31.64%) than that of entire population (23.51%). Similarly during census years 1991 to 2001 it has been 24.45% against the growth rate of 22.66% for the entire population (Census of India, 1991, 2001). The Santal tribe is the third largest tribal community in India after the Gond and the Bhil tribes (Basu et al. 2004). This community extends through the states of Bihar, West- Bengal, and Northern Orissa. In West Bengal, districts of Bankura, Birbhum, Midnapore and Purulia; have major number of tribal population. The Santals are the major tribal group in Birbhum District are locally known as 'Majhi'. In origin they belong to Austro-Asiatic Kol group branched from the Austric family (Bodding, 2001). They are concentrated in the western part and gradually decrease towards east. This paper examines the consumption patterns of tribes in Sarpalehena-Albandha, Illambazar and Labpur -I Gram Panchayets of Bolpur Sub-Division. The findings of the exercise reveals that the proportion of total expenditure incurred on rice was found to be very high followed by puffed rice (Mury) and meat. Further the proportion of total expenditure allotted to tea was found negligible showing aversion behaviour of tribal in consuming tea.

**Key words:** tribal groups, *Adivasis*, consumption patterns, dietary habits, poverty, nutritional status

## ENVIRONMENTAL CHALLENGES- HUMAN HEALTH LINKAGES AND ALTERNATIVE SOLUTIONS PULMONARY DISEASES

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### ABSTRACT

Pulmonary diseases especially COPD (Chronic Obstructive Pulmonary Disease) is caused by long term exposure to irritating gases or particulate matter, most often from cigarette smoke, air pollution, workplace exposure to dust, etc. COPD can be diagnosed by various techniques like ELISA, PFT (Pulmonary Function Test), RT-PCR, etc. Patient first will be diagnosed with which allergen is responsible for COPD. COPD can also be treated by using specific vaccine like a particular molecular marker is responsible for this occurrence. So, its expression is mainly responsible for this, to increase or decrease its expression accordingly using target specific vaccine. Allergen specific polymers or fibres should be used in designing masks. These masks can have some specific filters which will resist the entry of all the possible particulate matter, dust, pollutant, etc. It will help to reduce the possibility of entry of pollutants and prevent the inflammation and breathlessness in patients and those who are at primary level of COPD. These specific masks will be specific to every individual according to their allergy to specific allergen. Treatment of COPD is very difficult. So, we can make our environment free from school pollutants like harmful gases and industrial pollutants can be minimised by using air filters or purifiers. So, more clean environment lesser will be the chances of occurrence of respiratory disease.

## OPTIMIZATION OF ZERO CALORIE SWEETENER-GLYCYRRHIZIN EXTRACTION CONDITIONS FROM *GLYCYRRHIZA GLABRA* LIN. STOLONS BY RESPONSE SURFACE METHODOLOGY

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### ABSTRACT

With increasing demand for the active ingredient glycyrrhizin as well as zero calorie sweetener, this study has been focussed on extraction of glycyrrhizin or glycyrrhizic acid from dry stolons of *Glycyrrhiza glabra* and its quantification by HPTLC analysis. The present study is centred on optimization of extraction process by response surface methodology (RSM). Herein, central composite design (CCD) has been performed to demonstrate the optimal levels of those factors screened from preliminary studies. The effects of four factors including extraction temperature, extraction time, ethanol concentration and solvent to solute ratio were investigated for total yield of glycyrrhizin. The contributions of the quadratic model was observed to be significant for the responses as predicted by analysis of variance. Multiple regression analysis verified that R<sup>2</sup> and R<sup>2</sup> (Adj) values of the model were 98.06% and 96.37% respectively for glycyrrhizin yield (0.76%). The optimum extraction conditions were 55°C (extraction temperature), 45 min (extraction time), 60% (v/v) (ethanol concentration) and 30 mL/g (solvent to solute ratio).

**Keywords:** *Glycyrrhiza glabra*; Extraction; Glycyrrhizic acid; HPTLC; Response Surface Methodology



## USE OF PARAQUAT AS A DESICCANT FOR EARLY MATURITY OF CHICKPEA AND RESIDUES DYNAMICS

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### ABSTRACT

Herbicides also commonly known as weed killers are chemical substances used to control unwanted plants. Paraquat is a quaternary nitrogen herbicide widely used for broadleaf weed control. It is a quick acting, non-selective herbicide, that destroys green plant tissue on contact and by translocation within the plant. It is also used as a crop desiccant and defoliant, and as an aquatic herbicide. Paraquat is a Restricted Use Pesticide (RUP) and is banned for use in several countries. The herbicide paraquat has assumed to be responsible of many fatalities due to accidental or deliberate ingestion of the concentrated form of the substance. Unlike most other poisons, the clinical course of paraquat intoxication is often protracted, and there is no known antidote for it. Treatment is often unsatisfactory. Recent research indicates that superoxide dismutase may be more successful as an antidote. The studies of interaction among herbicides and crop plants have been done for many years. Several herbicides have been used in the agricultural fields to increase the crop productivity and grain yield through weed management. Chickpea (*Cicerarietinum L.*) is an important food legume crop. As chickpea is a slow growing crop and may take approximately 5-6 months and this may further delay sowing of next crops which can be taken in the same field in summer season such as moongbean. Hence in order to reduce days of crop maturity and to study fate of paraquat residues in soil and chickpea grains that may exist as a result of use of this herbicide on chickpea, a broad leaf herbicide, paraquat was chosen to use as a desiccant to facilitate early maturity of chickpea. Paraquat application at 750 to 1.0 kg/ha as desiccant enhanced the process of maturity of chickpea and 10 to 16 days can be saved by this application. However paraquat application at 750g/ha and 1.0 kg/ha resulted in residues in chickpea grains and straw and restrict its application as a desiccant in chickpea crop.

## **WATER SCARCITY AND CONFLICT: A CASE STUDY OF JORDAN RIVER**

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### **ABSTRACT**

The greatest and most valuable resource in the West Asia is water and not oil as one expect due to acute water scarcity in the region. Water is the blue oil or new gold of the 21st century for the West Asian Region. Due to scarcity of water supplies, countries like Israel use their economic, political, and military power to seize other neighbouring lands of Jordan through which Jordan River flows. Trans-national Jordan River flows through an area called Bilad al-Sham, which includes Syria, Palestine, Israel, Jordan and Lebanon. Conflict on the Jordan River have arisen just after the formation of Israel in 1948. Israel completed its National Water Carrier in 1964 that siphoned water from Jordan River. This has led to the Arab Summit of 1964 by riparian countries of Jordan River for planning to divert water from Jordan River. This plan if implemented successfully would have created water scarcity for Israel. This led to military skirmishes by Israel as part of counter strategy. Thus, multiple conflict have occurred between Israel and neighbouring riparian countries which further have taken shape of bigger conflict in from of Six Day War of 1967 where Israel completely destroyed the Syrian diversion project and took control of the Golan Heights, the West Bank and the Gaza Strip. The major reason for taking the Golan Heights was to control sources of fresh water that has also serve the purpose of strategic military site. After that, multiple attempts have been made to resolve the crisis of Jordan River but till now it has not reached a significant stage. This study is an inquiry into the conduct of riparian states in transnational Jordan River, based on the actual needs of the countries. This study tries to find out the obstacles which have prevented the countries of the region from reaching a cooperative basin-wide arrangement which is the optimal method for development and utilization of their common water resources. This will also focus on the concept of 'Hydro-Hegemony' and 'Water Rationality' in the context of Jordan River.

## THE COMING AGE OF BIO-CUTLERY

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### ABSTRACT

Disposable cutlery and plates are a major issue of an environment which is ending up landfills, ocean or worse. This article focuses on tackling the issue of plastic or Thermacol sheets disposable cutlery by the use of biodegradable cutlery and tableware. Basically, Disposable cutlery can be contaminated and causing health-related problems in human and when these disposable products choked sewage and drain. These disposable products do not decompose even after a decade and can damage the ozone layer because of chemicals emitted from the material during the burning of these products. As a solution to this Compostable, tableware, biodegradable kitchen goods such as bowls, chopsticks, coffee cups, straws, spoons, and plates has created that should be used instead of plastic disposable cutlery. This cutlery is made out from plant-based materials, dough, orange peels, and even food scraps. This can tackle the issue of food waste and disposable problem simultaneously. To use orange peel as a locally- available, cheap and lightweight source for cheerfully colored kitchen tableware that is created to biodegradable over time rather than adding to the waste stream. Carrot peels and peanut shells are alternative food-based material to use biodegradable cutlery. Edible cutlery is made from millet especially, sorghum which can use as cutlery and eat it too. Mostly these edible spoons available in different flavors such as sugar, salt, and in a combination of Indian spices flavor. These products are 100% vegan, degradable and made up from natural products.

## NEW APPROACHES FOR SUSTAINABLE DEVELOPMENT

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### ABSTRACT

Development which deals with the sustainability by acting as a safe guard for the environment. So there is a need of innovation to bring the foreground of development projects, new social practice and organization, new improved technological products and processes as well as sustainable industrialization and foster innovation. Because this science, technology and innovations will play an important role to promote the 2030 Agenda for Sustainable Development. Some of the approaches for SD like Mission-oriented innovation by organizing research programmes at national and international level. These will definitely lead to achieve some specific technological, environmental or social goals. Social innovation which will bring the new social practices in improving the human well-being status. Digitally enabled open and collaborative einnovation will also come out with the Multiple sources and new forms of knowledge and skills, especially through the Digitally enabled open collaboration by developing the new online infrastructure, Building tools for open and collaborative practices etc. In the context of sustainability, it involves three main pillar socio-economic sustainability, environmental sustainability and social sustainability. Social sustainability also acts as the casual mechanism for change in other sustainability pillars (economic and environmental sustainability).

**Keywords:**SustainableDevelopment,Sustainability,Sustainabilitypillars

## INDIAN ENVIRONMENTAL LAWS AND POLICIES

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### ABSTRACT

Time and again there has been many constitutional changes made by Indian Judiciary to protect humans against the excruciating blows of evil caused by humans themselves. The Indian Constitution is amongst the few in the world that contains specific provisions on environment protection which began back from 1860s through IPC. It provides the basic human right of every individual to live in pollution free environment under Article 21. It has now become the duty of states as well as individual to ensure environmental preservation and conservation (Article 51-A-g and Article 48A). The main objective behind this review paper is to identify and study the nature and extent of till date developments in environmental statuses through various laws, policies, conventions, protocols, drafts and cases regarding judicial processes and court decisions. This paper commences with an analyses of the environmental laws implemented at national level to combat environmental crisis. It further imparts light on two significant cases: Bhopal gas tragedy and Oleum gas leak. Though there is no dearth of legislation for environmental protection in India, the dramatically increasing evidences of the deterioration and degradation of limited natural resources increases our concern. The absence of political will and public awareness has made it more difficult to deal with the emerging threat which needs to be tackled effectively. Therefore it is necessary to understand that environmental problem is a social evil which can be prevented only by proper implementation of laws and large public participation.

**Keywords:** Article 21, IPC, Bhopal gas leak, Indian Judiciary, Oleum gas leak, laws and policies

## INDIAN TRADITIONAL KNOWLEDGE: ROLE IN MANAGEMENT OF HEALTH CARE CHALLENGES AND CONSERVATION OF BIODIVERSITY

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### ABSTRACT

Traditional knowledge is a valuable knowledge continuously developed over generation by tribal and rural communities in different parts of world and transmitted from one generation to another in oral form. Tribal population who had historically relied on their forest environment for health care has made valuable contribution to traditional medicine. Here traditional knowledge of plant in health care and their conservation by different tribes has been studied which includes Bhadra wildlife sanctuary in karnataka, Tribes of Gandhamardan hill range, Use of some medicinal plants from North Sikkim, practices of the anamalai hills of coimbatore district in Tamil nadu, Treatment of different types of fevers by Bhils tribe in Madhya Pradesh, Gujarat, Rajasthan and Maharashtra and medicinal plants protected by tribal people in central Himalayan region of North India. It has been estimated that 70% to 80% of population in developing countries depend on Traditional health care systems for Primary health care. These Traditional knowledge also forms an integral part of ayurveda, unani, Siddha and yoga. Therefore, approaches for cultivation, sustainable harvesting and protection against existing threat should be developed for protection of traditional knowledge. Supporting medicinal Plants cultivation may help generate additional support to people as well as conserve species in wild.

**Keywords:** Traditional Knowledge; Health care; Conservation; Challenges Biodiversity;

## REMOVAL OF MALACHITE GREEN DYE FROM WATER USING ALKALI ACTIVATED COCONUT FIBER

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### ABSTRACT

Indiscriminate use of dyes in various industrial sectors pollutes water and poses threat to mankind. Since dyes are non bio-degradable under ambient condition, various scavenging technologies were employed from time to time. In this study malachite green was removed from contaminated water by sodium hydroxide treated coconut fiber as adsorbent. Batch experiment were carried out to observe the effect of various experimental parameters such as contact time, temperature, pH, initial concentration of malachite green, adsorbent dose and the optimum conditions for these parameters were evaluated. Optimum conditions were found to be initial pH= 6.9, contact time= 2 h and adsorbent dose= 4g/l. Maximum adsorption coefficient was found to be 45 mg/g. The kinetic experimental data was analyzed using four kinetic models such as pseudo-first order, second order, pseudo-second order, and intra particle diffusion. It was observed that it followed the pseudo-second order having correlation coefficient value is  $R^2=0.999$ . The Langmuir and Freundlich isotherms were used to fit the equilibrium data and the results showed Langmuir isotherm model is best fit model with  $R^2$  value 0.999. Thermodynamic study revealed the process to be spontaneous and feasible with large negative free energy and entropy. The results indicate that sodium hydroxide treated coconut fiber can be used as a good low cost adsorbent for treatment of effluents containing malachite green in water.

**Keywords:** adsorption, malachite green, treated coconut fiber, kinetics

## **FLOODS AS A HINDRANCE TO REGIONAL DEVELOPMENT ALONG THE NORTHERN BANK OF THE UPPER BRAHMAPUTRA RIVER**

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### **ABSTRACT**

The northern bank of upper Brahmaputra River includes the Dhemaji, Lakhimpur and Majuli District of Assam. Geomorphologically, the area bounded by the foothills of eastern Himalaya in the north, by the Subansiri River in the west and by the mighty Brahmaputra in the south, and east. The whole area is a chronically flood affected. Channel dynamics is very distinct in this region as it is dissected by many small tributaries of Brahmaputra and by the two major anabranches of the Brahmaputra called Kharkutia Xuti and Charikoria Noi. These small tributaries bring large volumes of sediment from the hilly upper catchment and as they debouche into the plains causes severe sedimentation leading to extensive loss of fertile agricultural land. This area is among the most backward area of India. Prior to 1987, there was no road and rail network available beyond Subansiri. The Chauwulduwa Ghat, Komolabari Ghat, Tekeliphuta Ghat were some of the Ghats catering the boat and ferry service in the region through Subansiri river and Brahmaputra river. This paper has the basic endeavor to understand the pattern of regional development in the study area in the relationship with the natural challenges of channel dynamics and floods. Based on the data available from the disaster management cell the region is divided into severely flood affected area, moderately flood affected area and least flood affected area. Thirty villages are considered in each of these three categories and field survey was conducted to understand the channel dynamics in the region. Then a questionnaire-based survey was also conducted to understand the socio-economic condition of these villages. Based on the information collected by the field surveys a negative effect of channel dynamics and floods on the development of the selected severely affected area has been found.



## **ECO-CONCIOUSNESS AMONG CONSUMERS TOWARDS ENVIRONMENTAL SUSTAINABLE APPARELS: A CASE STUDY IN INDIAN CONTEXT**

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### **ABSTRACT**

**Purpose** - The purpose of the paper is to contribute to a better understanding of impact of textile industry on the environment and examine the environmental concern of the consumers in general as well as investigating the relation if any with the attitude of the consumers towards Environmental Sustainable Apparels.

**Design/methodology/approach** - This research is quantitative in nature utilizing established scale to measure environmental concern in general and consumers' attitude. Data was collected in northern region of India using survey instrument in the form of questionnaire through snow ball sampling. Reliability and validity of the scale is checked in Indian context and the data is analyzed through descriptive statistics and regression using SPSS v.21.

**Findings** – Results showed that overall consumers were concerned about environment however there was diversity in their responses to various constructs based on their demographic profiles. It was found that correlation between environmental concern and the consumers' attitude is significant.

**Research Limitation** - The preliminary study used a sample size of 108 respondents and only one aspect i.e environmental concern in general is examined with consumers' attitude towards environment sustainable apparels, the results of which presently cannot be generalized.

**Practical and Social Implication** - The study will help the researchers and apparel brands to understand the relationship between the antecedent to consumption of environmental friendly apparels and the environmental concern of the consumers.

**Originality/value** – The paper provides an insight into the attitude of the consumers towards environmental friendly apparels and their concern for the environment in Indian context.

**Keywords:** Sustainable, apparels, Consumers' attitude, textile.

## A STUDY ON RELATIONSHIP BETWEEN RURAL LIVELIHOOD AND BIODIVERSITY CONSERVATION

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### ABSTRACT

Biodiversity refers to the diversity in the biological organisms i.e. at species level, genetic level and at ecosystem level. These are one of the major sources to ours, and especially to rural population's demand for food, medicines, fibres, fuels, industrial products, etc. It also acts as an income generator for the local and remote area population.

There are so many essential components of biodiversity that are linked directly or indirectly with the rural livelihood. Humankind derives the utmost benefits from the products of biodiversity as these services are provided freely by natural system. We only become concerned of the values and importance of the biodiversity once they start depleting or gets vanished. The Biological Diversity Act 2002 was enacted by the Parliament of India for the preservation of biological diversities in India and for equitable sharing of benefits, arising from the use of traditional biological resources and knowledge with the local habitants. But this equitable sharing has now turned into overuse of biological resources which is imposing a number of negative impacts on biological diversities. However, there are number of strategies out there for conservation of biological diversities i.e. In-situ conservation and Ex-situ conservation techniques, but there is also a need for the improvisation of these techniques with addition of innovative approaches with the passage of time.

The study was conducted in the small village near Amarkantak Biosphere Reserve, Madhya Pradesh. It is home for 1527 plant species dominated by *Shorea rubusta*. It also has habitat for 335 wild animal species such as leopard, wild pig, wild dog, hyena, fox, etc. The area is blessed with such a good natural climatic condition and receives high rainfall and hence supports good vegetation but a population rise in the area has put an alarming threat to the biodiversity around and requires an immediate attention.

**Keywords:** Biodiversity, Conservation, Biosphere reserves, Rural Livelihood.

## **EFFECTS OF ORGANOCHLORINE COMPOUNDS ON ENVIRONMENT DUE TO BLEACHING AND MODIFICATIONS MADE IN PAPER TECHNOLOGY TO OVERCOME THEM**

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### **ABSTRACT**

The Indian pulp and paper industry comprise of mostly small and medium scale industries (per day capacity ranges from 5 to 800 ton). Main source of raw material for these industries is wood and agricultural residue. The primary chemical components of the raw material include cellulose, hemicellulose, lignin and other components in trivial amounts. These raw materials are processed by a mechanism called pulping, to free the cellulose from other wood components. The process is also called delignification as during this process maximum lignin is dissolved but not completely and thus being a chromophore, it gives the end product(pulp) a characteristic brown colour. Bleaching is one of the crucial steps in the paper industry and is used to remove the residual lignin from the pulp. This study reviews one of the major challenges of the industry that is to produce bleached paper with reduced or minimum discharge of organochlorine compounds and its environmental impact. Conventionally elemental chlorine was used as bleaching agent which released huge amounts of chlorinated organic compounds, including chlorinated dioxins. Although released in low quantities by the industry, dioxin is highly toxic and gets accumulated in the food chain, mainly in the fatty tissues of animals. The main objective of this study is to analyse subsequent techniques that were devised to meet up these environmental challenges. Elemental chlorine bleaching processes were replaced by ECF (Elemental Chlorine Free) and TCF (Total Chlorine Free) bleaching processes after the 1990s whose economic and environmental effects have been analysed in this review. This study will also lead to a more descriptive and comprehensive understanding of alternative bleaching processes, including the use of oxygen, ozone, hydrogen peroxide, chelating agents, sodium dithionite, enzymes like xylanase as bleaching agents in the paper industry.

**Keywords:** Bleaching, lignin, organochlorine compounds, dioxin, ECF, TCF.

**LARVICIDAL EFFICIENCY OF DIATOM BIOACTIVE COMPOUNDS  
AGAINST THE ZIKA AND DENGUE VECTOR Aedes Aegypti :  
A NOVEL STRATEGY FOR PUBLIC HEALTH**

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**ABSTRACT**

Mosquito larvae feed on algae in their natural habitats. At the same time, algal bioactive compounds provide important chemical defenses against predators, competitors, and pathogens. The yellow fever mosquito, *Aedes aegypti* is the agent of many fetal diseases such as Dengue fever, Zika fever, Chikungunya and Yellow fever. Here, we investigated the susceptibility of this mosquito larvae to three most commonly studied diatom aldehydes-2-trans,4-trans heptadienal (HD), 2-trans,4-trans octadienal (OD), and 2-trans,4-trans-decadienal (DD). The examination was done on I and IV instars of *Ae. aegypti* by considering different time intervals. Both mosquito instars were susceptible to all tested PUAs. However, instar-I larvae were found to be more susceptible compared to instar-IV. The percentage of mortality of both instar larvae was higher with greater concentrations of each tested PUAs. Furthermore, mosquito larvae, tested on DD applied medium was estimated higher susceptible followed by OD and then HD. India has been highlighted as the highly risk prone dengue fever area by WHO. Therefore, in current scenarios, our results suggest that to apply natural aldehydes from diatoms could provide a promising approach for public health benefits by controlling the mosquito population. Further, an in-depth study into the interaction between primary producers and mosquito immatures in nature could explain several as yet unexplained phenomena in vector control research and management.

**Keywords:** Mosquito larvicidal compounds, Mosquito control, Diatom aldehydes, Public health management

## INFLUENCE OF DOMESTIC PRODUCTS ON CRUSTACEAN-DAPHNIA: A BIOINDICATOR OF HEALTH EFFECTS

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### ABSTRACT

*Daphnia* commonly known as water flea are planktonic crustacean of very small size and play an important key role in the aquatic food chain. They are the carbon link between the primary and secondary productivity in the aquatic food web. The quality of water has a significant impact on the survival and growth of this organism that why this freshwater crustaceans play a major role as a bioindicator of aquatic pollution. *Daphnia* is highly sensitive to the pollutants which make it model organism in ecotoxicology. Further, they have short generation time and large-sized brood which make its easy culturing. *Daphnia* is also acting as filter feeder by feeding on suspended particles. Environmental changes can change the reproductive cycle of this organism. Now a day, the increasing environmental pollution is a major concern and due to the discharge of domestic effluent directly into the water bodies, leads to rise in pollution that ultimately affects the aquatic ecosystem mainly the population of *Daphnia*. In this study we have investigated the effect of various household products on the survival of *Daphnia* in the laboratory. Our results showed the toxic influence of different tested domestic products on this organism. Further, it was identified that toxicity is caused by these products as a dose dependant manner in *Daphnia*. The purpose of our study is to find out mortality causative agents of this organism in its surroundings. In the future, our results could help to monitor the environment as well as public health.

**Keywords:** Crustacean, *Daphnia*, Bioindicator, Aquatic pollution, Environment and public health

## LUNG CANCER

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### ABSTRACT

The objective of this study is Lung cancer which is the leading cause of death worldwide. The most common type is Non-small cell lung cancer, (NSCLC) which accounts for about 80% of all lung cancer. Although recent advances have been made in diagnosis and treatment strategies, the prognosis of NSCLC patient is poor and it is basically due to lack of early diagnostic tool. 30% of these starts in the cells that form the lining of the body and cavities and is usually formed in the outer parts of the lungs (Adenocarcinoma). Another 30% begins in the cells that line the passage of respiratory tract (Squamous cell carcinoma). Environmental pollution and cigarette smoke exposure have been shown to cause pulmonary carcinoma. DNA adducts, the metabolites of smoke carcinogens bound covalently with the DNA are regarded as an indicator of cancer risk in smokers. There were an estimated 221,130 new cases and 156,940 deaths in 2011.<sup>1</sup> The overall survival rate of lung cancer patients remains poor despite available standard treatments. Recent advances in the fields of mutational analysis and molecularly targeted therapy made it possible to develop new receptor kinase inhibitors such as erlotinib and gefitinib (against epidermal growth factor receptor [EGFR]) and most recently crizotinib (against rearranged anaplastic lymphoma kinase [ALK]) and antibodies such as cetuximab (against EGFR) and bevacizumab (against vascular endothelial growth factor [VEGF]). Commonly identified genetic alterations such as nonsense mutations, small insertions or deletions, alternative splicing, and chromosomal fusion rearrangements etc. There are some genetic and epigenetic factors that play a crucial role in malignant cell proliferation. There cure and prevention and how helpful they are in diagnosis and targeted therapy

## IMPACTS OF INTERNATIONAL TRADE ON NATURAL ENVIRONMENTAL CONDITION - A CONCEPTUAL REPORT

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### ABSTRACT

Globalization is the new concept of interconnection between the nations, it allows the countries to trade freely at global level. In present scenario development of nation depends on International trade, all nation are in the race of development, it doesn't matter whether it is a developed nation, developing nation or under developing nation. And for this development natural resources were depleted, to maintain a balance of natural resource and environment protection laws were made for Sustainable development. Sustainable development means using the available resources for fulfilling present demand without compromising the future generation's needs. Trade plays a significant role in economic growth of any nation along with direct and indirect effects on environment. Environment is the first victim of it, which effect at low levels of income increases pollution, but at high levels reduces it. . Economist argued that trading globally not only promotes growth but also motivate the nations to improve efficiency of utilizing scarce resources. And there is little evidence that trade has a detrimental effect on the environment. On the other hand environmental economist opposed it and claiming trade among nation is depleting the natural resources and harming environmental quality. So question is that so far how trade impact environment? Or whether trade is good or bad? The present study is focus on positive and negative impacts of trade on environment by reviewing some of the past reports findings. As per study the negative impacts are more serious than positive impacts on environment. Overall whether it is the pollution haven hypothesis or race-to-bottom hypothesis or cap and trade, it is harming environment. The present Study suggests, there is a need to change in trade policies and environmental policies to protect environment without sacrificing economic growth and preserving resources for future generations by switching to alternative resources.

## **SUSTAINABLE APPROACH TOWARDS SANITATION IN INDIA: CHALLENGES IN ACCESSIBILITY, ECONOMY AND DESIGN**

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### **ABSTRACT**

Billions of people worldwide do not have access to toilets. In India, more people have access to mobile phones than toilets. Our sanitation alliance believes in the philosophy of safe and sustainable sanitation for every human being by building enough toilets to eliminate open defecation. On September, 2018 the country reached a household toilet coverage of almost 92% (144 million HHs) under Swachh Bharat Mission (SBM). However, it still leaves a gap of 13 million HHs. Presently, India faces a two-pronged problem – management of fecal waste, and lack of access to a basic sanitation facility. India produces around 54 million tons of solid waste every year and 564 million people (nearly half the population of India), defecate in the open. Refuse from the toilets as well as the open fecal matter add up to the problem of waste management. This problem is exacerbated due to incompatible single-pit designs or faulty septic tanks, evidenced in various studies.

Swachh Survekshan (Gramin) ignores toilet technology, solid and liquid waste management and the adaptability and acceptance of methodology by villages. Closing the sanitation gap through pit latrines would be expected to cause large increases of India's annual greenhouse gas (GHG) emissions, equivalent to 7% of current levels. Sanitation, as a challenge, is bigger than just the construction of toilets. Sustainability of technology and the proper management of the generated fecal waste, must be a part of its solution. In this study attempts have been made to briefly discuss factors determining the accessibility of water, hygiene and sanitation in India while putting light on the economic and technical sides of a sustainable sanitation management. The environmental impacts of alternative approaches of fecal waste management and sanitation will be evaluated and a sustainable approach will be recommended.

**Keywords:** Sustainable Sanitation, Access to Toilets, Fecal Management.



## COMPARATIVE STUDY OF BIOCHEMICAL MEASURES BETWEEN BASELINE AND POSTPRANDIAL NON-DISEASED VOLUNTEERS WITH RESPECT TO CARBOHYDRATE DIET.

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### ABSTRACT

**Objective:** In the present study we attempted to modify the role of fasting blood glucose as an early indicator for generating oxidative stress and reduction of Oxidative stress and enhancing internal antioxidant level by providing dietary carbohydrates.

**Design:** A research study of 24 healthy volunteers was performed, blood sample were taken in two shifts (morning and afternoon). Fasting blood samples were collected then after providing carbohydrate diet at a time interval of six hours postprandial (pp) blood samples were withdrawn. After the formation of baseline (bl) and postprandial (pp) samples, were assayed for glucose, cholesterol, HDL-c, LDL-c, Triglycerides, Malondialdehyde, Super oxide dismutase (SOD), Ferric reducing ability of plasma (FRAP) and Glutathione peroxidase (GPx). The results are presented as mean and standard deviation.

**Results:** In this study data analysis present no changes were observe in lipid profile between baseline and postprandial, whereas glucose baseline to postprandial increased from (93.2±5.55 to 102.6±5.61) mmol/l ( $p < 0.0001$ ) after six hours of time interval. Oxidative stress marker MDA decrease significantly in postprandial volunteers from (0.57 ± 0.10 to 0.39 ± 0.11) nmol/gm/ Hb ( $p < 0.0001$ ). Furthermore accumulation of enzymatic and non-enzymatic antioxidants increased significantly such as GPx from (0.32 ± 0.04 to 0.36 ± 0.04) ( $p < 0.002$ ), FRAP from 0.27±0.05 to 0.34 ± 0.07 ( $p < 0.0006$ ) and an increase also seen in the SOD from (0.24 ± 0.03 to 0.33± 0.03) ( $p < 0.01$ ) after intake carbohydrate meal which also leads to the depletion of MDA. A positive correlation were observed among Fasting blood Glucose and MDA indicating fasting glucose as an early risk factor for generating oxidative stress after overnight fasting.

**Conclusion:** These data indicate that the intake of antioxidant rich carbohydrate meal (consumed in isocaloric amount) minimizes the effect of oxidative stress. Based on these data we can also conclude that fasting blood glucose can act as an indicator for assessing as an early risk factor which leads to oxidative stress. These studies is relevant for uptake of carbohydrate sources for reduction of oxidative stress in living system.

**Keywords:** Lipid Peroxidation, Fasting Blood Glucose, SOD, GPx, FRAP

## ORGANIC FARMING – A STEP TOWARDS HEALTHIER ENVIRONMENT

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### ABSTRACT

Agriculture, it plays a conspicuous part in the economy of developing countries like India. So as to fulfil the demands of agricultural goods competently and to feed the expanding population, the phenomenon of Green Revolution came into existence. Green Revolution allowed developing countries to overcome the continual food scarcity by producing more food and other agricultural products by using high-yielding varieties of seeds, modifying farm equipments and substantially increased use of chemical fertilizers. For an optimum production of agricultural products and to feed the growing population, application of chemical fertilizers and pesticides has become necessary. Such type of agricultural practices allowed growth and sustainability of food grains but at the same time have the major impacts on the environment as well as human health, which can be abstained by moving back to our ancestor's course by performing organic farming, an environmentally friendly agricultural approach which ultimately leads to proper environment and human health. Organic farming is a holistic production and management system which is supportive to the environment, health and sustainability. Previous studies show that organic farming provide a variety of benefits, such as, reduced exposure to pesticides and chemicals, builds healthy soil, helps in combating erosion, fighting the effects of global warming, supports water conservation and water health, supports animal health and welfare, encourages biodiversity, etc. However, this type of farming holds such importance and is being susceptible to provide a quality food, but it was not practiced within our country due to the lack of awareness among the farmers. So, it is important to shift our focus onto the organic mode of farming rather than the farming with the chemical fertilizers and pesticides.

**Keywords:** Green revolution, chemical fertilizers, pesticides, environment, human health, organic farming.

## ISOLATION AND SCREENING FOR LACCASE PRODUCTION BY DIVERSIFIED SPECIES OF BASIDIOMYCETES FROM IN AND AROUND PUNJAB AND HIMACHAL PRADESH

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### ABSTRACT

Basidiomycetes, an extremely important, robust group of eukaryotic organisms which can accustom itself also to an extreme environmental condition, still retaining the property of production of extracellular enzymatic complexes has proven to be quite an essential group of organism in several industrial and biotechnological processes. In this present study a minor approach has been taken to isolate and screen some of such basidiomycetes species from in and around Punjab and Himachal Pradesh for checking out their ability to produce ligninolytic enzymes, which has shown immense application in the field of environmental remediation processes. In this study one hundred and eighteen samples of fruiting bodies of macrofungus grown on rotten wood or bark of the tree or dead wood were collected from the above mentioned zones of North India. Out of the total number of samples three isolates had exhibited promiscuous results in the production of ligninolytic enzymes of which one of the organism had been identified after the molecular analysis to be belonging to *Coprinus* spp. The study was continuously compared with the standard strain of *Tremetes lactinea* NCIM 1144 obtained from National Collection of Industrial Microorganisms, Pune, India. Thereby this study endeavoured to pave a way to explore the rich enzymatic system of the eukaryotic species which could be utilized and explored for the purpose of various remediation purposes.

**Keywords:** Basidiomycetes, ligninolytic enzymes, remediation

## **ANALYSIS OF THE IMPACT OF LAND USE/COVER CHANGE ON THE ENVIRONMENT**

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### **ABSTRACT**

At present time land use/cover change has become a very important and growing issue. Land use involves the management and moderation of natural environment into built environment according to the way of human being such as settlements and semi natural habitats. Natural resources including water, soil, plants, animals etc are majorly affected by land use. Those issues are closely linked to natural and human processes that they have direct affected on sustainable development. The present study explains land use change pattern and help to understand environmental issues of land use/cover change of district Champawat, Uttarakhand, India. Study area Champawat is a hilly area where sustainable development is very essential. The study area categorized into some different classes of land use as like a built up area, forest, agriculture land, wastelands, water bodies etc.

**Keywords:** Land use, Land cover, Resources, Environment, Sustainable.

## COMPARATIVE STUDY OF BIOCHEMICAL MARKERS IN OBESE SUBJECTS WITH AND WITHOUT METABOLIC SYNDROME

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### ABSTRACT

**Background:** The present study was conducted to compare biochemical measures in severely obese respondents with and without metabolic syndrome.

**Methods:** This study was carried out on respondents they were matched for age  $58 \pm 7.90$ ,  $57.87 \pm 5.29$ ,  $60.6 \pm 7.48$  respectively for Controls, obese without metabolic syndrome (OB) and obese with metabolic syndrome (OBMetS). OB and OBMetS were matched for body mass index ( $32.33 \pm 1.04$  and  $32.2 \pm 1.17$  respectively) while the BMI of the Control group was  $23.3 \pm 1.81$ . Blood samples were collected from all the respondents after overnight fasting to analyze oxidative stress markers and antioxidant enzymes.

**Result:** All biochemical markers were significantly different at  $p < 0.0001$  between OB and in OBMetS as compared to Controls. All biochemical markers were also significantly different at  $p < 0.0001$  between OB and OBMetS. Oxidative damage to erythrocytic membrane by lipid peroxidation and protein carbonylation was evident in both OB and OBMetS groups, as indicated by the significantly higher levels of MDA and PCO as compared to Controls. ObMetS had significantly higher ( $p < 0.0001$ ) levels of both as compared to OB. Erythrocytic antioxidant enzyme SOD, and plasma antioxidant enzymes, GPx and Catalase were significantly lower in OB as compared to Controls and in OBMetS as compared to OB. FRAP which is an index of non-enzymatic total antioxidant capacity in plasma was also significantly lower in OB as compared to Controls and in OBMetS as compared to OB. Conclusion: This study demonstrated that OBMetS group in contrast to OB group, have a redox imbalance characterized by increased lipid peroxidation, protein carbonylation and reduced antioxidant capacity.

**Keywords:** Obesity, Metabolic Syndrome, Oxidative Stress.

## CAN IDENTIFICATION OF NITROGEN EFFICIENT CULTIVARS HELP IN ADDRESSING THE PRESSING CHALLENGE OF SUSTAINABLE AGRICULTURE?

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### ABSTRACT

A marked increase in food production has occurred over the past half-century to feed the growing population, which is mainly attributed to application of chemical fertilizers. However, excess inputs of synthetic N fertilizers also results in severe environmental pollution, climate change and biodiversity loss, which are enormous environmental challenges of the 21st century. Moreover, the application of N fertilizers will keep on increasing with growing demand for food production, therefore identifying crop varieties with improved NUE is crucial for sustainable development. One of the ideal ways to tackle this crisis is to improve NUE of crops and identification of new cultivars that utilize N more efficiently. In our study, variations in Nitrogen Use Efficiency (NUE) of cabbage cultivars were evaluated and accessions were screened out on the basis of genotypic differences in NUE. The 12 accessions of *Brassica oleracea* L. var. *capitata* were procured from NBPGR, New Delhi. The plants were grown under following fertilizer treatments: 120 kg ha<sup>-1</sup> of N or no N. Various morpho-physiological parameters like plant height, head size, head weight, fresh and dry weights were recorded at marketable yield stage. The plants were also analyzed for various biochemical characteristics, mainly associated with N metabolism, like NR activity, NiR activity and GS-GOGAT activity. The marketable head yield and N content were measured using CHNS analyser and NUE was calculated. Based on the N metabolism, N utilization and N content accessions were screened out as High NUE and Low NUE varieties.

**Keywords:** NUE, cabbage, Nitrogen, NR activity, Screening, Genotypic variability.

**ALTERATIONS IN GROWTH, PHOTOSYNTHETIC PIGMENTS,  
ANTIOXIDANT MACHINERY AND ESSENTIAL OIL CONTENT OF  
MENTHOL MINT (*MENTHA ARVENSIS L.*) UNDER NICKEL EXPOSURE**

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**ABSTRACT**

The present inquest was undertaken in view of the alarming increase in the concentration of various heavy metals such as nickel, copper, lead, cadmium and arsenic etc., in the soils of Uttar Pradesh, India. The minuscule attention paid to the effect of these heavy metals on the performance of pharmaceutically exigent essential oil-bearing crops like Mint. Nickel (Ni) is an essential nutrient for plants. However, the amount of Ni required for normal growth of plants is very low. Hence, with the increasing level of Ni caused pollution in the environment, it is indispensable to understand the functional roles and toxic effects of Ni in plants. A simple pot experiment was designed to study the effects of Ni treatment on the growth, photosynthetic pigments and physiological and biochemical parameters as well as the activities of different antioxidants namely superoxide dismutase (SOD), catalase (CAT) and peroxidase (POD) of the crop. The experiment was conducted in plastic pots (40 cm diameter × 45 cm height) in the natural conditions of the net house at the Department of Botany, Aligarh Muslim University, Aligarh. Nickel was applied in the form of NiCl<sub>2</sub> to the soil with 20, 40, 60, 80, and 100 mg Ni kg<sup>-1</sup> soil and one was kept as control.

Nickel resulted in a significant reduction in all studied parameters with increasing concentrations of Ni application. Similar decreasing trend was also observed for herbage yield and content of essential oil (EO) of the plants which may be attributed to decreased photosynthetic activity of the plant. However, the activities of antioxidant enzymes were increased at higher concentration of Ni. Although, Ni at 20 mg kg<sup>-1</sup> soil (lowest concentration) significantly enhanced most of the parameters including EO. Thus, the present study exhibits that Ni at 100 mg g<sup>-1</sup> soil proved very toxic for the growth and development of Mint plants.

**Keywords:** Nickel, growth, physio-biochemical parameters, antioxidant enzymes, *Mentha arvensis*.

## EFFECT OF NICOTINE ABUSE ON PERCEIVED STRESS, COPING EFFICACY AND OXIDATIVE STRESS INDICES

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### ABSTRACT

Stress has been found to be an important factor in nicotine abuse. We studied the two distinct yet important variants of stress including oxidative stress at biochemical level and perceived stress at psychological level. Tobacco (nicotine) use (via smoking and chewing) impacts differently on the person's oxidative stress and perceived stress status based on the individual differences predominantly as a factor of gender and coping efficiency. The study was aimed to research the relationship of nicotine consumption with perceived stress, oxidative stress and coping efficiency. Biochemical markers of oxidative stress were measured in nicotine addicted adults (n=56) and compared with non-addicted controls (n=70). Plasma and erythrocytic Malondialdehyde (MDA) was higher in nicotine addicted volunteers. The study also reported significantly higher plasma catalase activity in nicotine addicted volunteers whereas no significant differences were found for erythrocytic superoxide dismutase (SOD). The 10-item Perceived Stress Scale (PSS) was used to assess perceived stress and showed only slightly higher perceived stress in nicotine addicted volunteers whereas the coping efficiency assessed by 26-item Coping Self Efficacy (CSE) Scale was significantly lower in nicotine addicts. The results suggest that chronic nicotine addiction leads to oxidative stress via affecting the oxidant-antioxidant system and lipid peroxidation. The inverse relationship between coping efficacy and perceived stress provides preliminary evidence of strong negative correlation between perceived stress and coping efficacy among nicotine addicts. A positive correlation between perceived stress and anti-oxidant enzymes-SOD and Catalase was also found. The study underlines the relationships between nicotine abuse, psychological stress, coping efficacy and biochemical indicators of oxidative stress.

**Keywords:** Addiction, Perceived Stress, Coping Efficacy, Oxidative Stress.



## CHANGING PATTERN OF LAND USE AND LAND COVER AND IT'S IMPACT ON ENVIORNAMENT IN URBAN AREA OFPATNA DISTRICT

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### ABSTRACT

Changing pattern of Land use and land cover is very important to know about population pressure and dynamic demography of a study area. According to census 2011 bihar is the least urbanized state of India but as a capital and largest city of Bihar Patna is facing population pressure. Due to demographic changes and unorganized urbanization makes changes the land use and cover in this area. Urban agglomeration shows pressure on natural resources which affected by land use and land cover. Because of all these things bad impact on enviornament ecological balance. This study is aimed at understanding the land use, land cover change and environmental problems in recent years. For this study land use, land cover data uses from gov. Site and government offices.

**Keywords:** population pressure, Resources, Enviornament, Land use Land cover.

## **CLIMATE CHANGE AND INTERNATIONAL LAW: A HUMAN RIGHTS DIMENSION**

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### **ABSTRACT**

The environment in which we live in impacts all life and effects everything that we do. It is therefore essential to ensure a good and sustainable environment. Today, environment related challenges like Climate Change has become an issue of global significance and import. This is due to the fact that the impact of climate change is already being felt in the nature of freak weather events, rising temperatures and sea-levels, water scarcity, etc. The gravity of the effects of climate change has even come to be recognized at the international arena like the United Nations. The numerous global conferences held under the framework of the United Nations Framework Convention on Climate Change is testament to the progress already achieved in dealing with climate related issues. The effects of climate change have far reaching human consequences and impact livelihoods of people and result in displacement and a myriad of health hazards. The most vulnerable people are those whose economic resources are scarce to help them adapt, communities whose culture and livelihood depend on the environment itself, people living in coastal regions and island nations. The human consequences of climate change is not limited to only social and economic concerns but also extends to legal ones. This paper is an attempt at conceptualizing climate change and its human dimension. It will look into the international legal framework on climate change and will as such examine the recent developments in this area like the 2015 Paris Agreement. The paper will also examine the interaction between climate change and its related Human Rights concerns.

## THE CASPIAN SEA: ENVIRONMENTAL CHALLENGES FOR THE LITTORAL STATES

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### ABSTRACT

The Caspian Sea is the world's largest enclosed inland water body in terms of its location as well as its vast energy resources. The sea contains 50 billion barrels of oil and 9 trillion cubic meters of natural gas in proven or probable reserves, significant from global energy security and economic perspective. National and international 'Oil and Gas corporations' are commercially active for exploration and exploitation of available resources, identified as the major cause for contamination and irreversible damage of aquatic and surrounding habitat. Among the littoral states, Kazakhstan and Azerbaijan have been conducting extensive oil and gas drilling activities that releases the maximum of hazardous petrochemical waste and spills in the Caspian Sea. Other major environmental challenges are; fluctuating sea water levels, declining sturgeon fisheries, imbalances in biodiversity, desertification, urbanization of coastal areas, and degradation of ecosystem. These factors are polluting soil, air and water of the region, which is leading to deteriorating living standards of the people in this vicinity. Considering the commercial and economic interests, the littoral states are not much concern for the environmental laws, so they are very weak and largely unenforced. Another problem is the lack of defining legal status of the Sea. This paper's objective is to identify the key causes for the environmental degradation and their impact on the health of human, Aquatic and wildlife population. Further, it would discuss how "competition over the energy resources" among the great powers in the Caspian region is threatening the ecological system and balance. The study will also evaluate the key initiatives taken by the Caspian states to monitor and control environmental pollution.

**Keywords:** Caspian Sea, transport network, Caspian pollution, Tehran Convention, sturgeon

## **EFFECT OF GRASS AND LEGUMES AS PIONEER SPECIES IN RECLAMATION OF COAL MINE DUMP**

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### **ABSTRACT**

Establishing vegetation cover is an important activity which encourages mine soil development during reclamation and simultaneously creating a productive post-mining land use. The objective of this research study was to investigate the influence of two different pioneer plant species, grass (*Cenchrus ciliaris*) family Poaceae and legume (*Stylosanthes hamata*) family Fabaceae used during reclamation of degraded mine spoils. Investigation plots were chosen as topsoil without vegetation cover, topsoil revegetated with legume species and topsoil revegetated with grass species. Litter biomass and biomass carbon (C) and nitrogen (N) accumulation rate was higher in above and belowground plant parts of the legume species studied. Soil samples were collected from the uppermost soil horizon (0-15 cm) depth and analysed for physical, chemical and biological soil parameters. Topsoil with legume vegetation compared to topsoil without any vegetation cover showed higher Soil Organic Carbon (SOC) (54%), Soil Organic Matter (SOM) (73%), Available N (84%) and Total N (72%) in the upper soil profile than the increment shown by topsoil revegetated with grass species. Legumes sites indicate greater enrichment due to higher organic (C) and total (N) stocks which showed legumes are better in developing a self sustaining ecosystem. Soil CO<sub>2</sub> flux was also greater under legume cover indicating higher belowground rooting and microbial activity. In this study we have discussed the potential of both grass and legume species under similar environmental conditions and time period. Our overall results suggest that legumes outcompetes grasses in augmenting the topsoil condition of deteriorated lands by adding higher biomass, enhancing the soil C and N pool, and nutrient accretion.

**ROLE OF ENVIRONMENT IN ACCESSIBILITY OF PUBLIC  
HEALTHCARE FACILITIES IN THE HILL AND VALLEY  
DISTRICTS OF NORTHEASTERN REGION OF INDIA**

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**ABSTRACT**

Environment plays a critical role in almost every sphere of life in the Northeastern region of India. Influence of environment can be spatial as well non-spatial. This paper tries to study the role of spatial factor as a part of the physical environment in the accessibility of public healthcare facilities in the Northeastern region of India. The objectives of the present study are to find the level of accessibility of public healthcare facilities and to analyze the role of physical environment on the accessibility of the healthcare facilities at district level. Accessibility has been analyzed at the sub-centre, primary health centre and community health centre in Northeastern Region of India as per the distance norm given by IPHS (2007). District level household (DLHS-4) data (2012-13) has been taken and analyzed using STATA and mapped using GIS software. Result shows that the level of accessibility in the hill districts is low as compared to the valley districts and is largely influenced by the physical environment. The findings of the study will help in pointing out to the policy makers of the need to improve accessibility to diffuse the extreme influence of environmental factors in accessing the public health care facilities in the Northeastern region of India

**Keywords:** Northeastern Region, Accessibility, Sub-Centre, Primary Health Centre, Community Health Centre

## EXPLORATION OF THE APPLICATIONS OF LIGNINOLYTIC ENZYMES PRODUCED BY *BASIDIOMYCETES SPECIESAS* A BIOREMEDIATING AGENT

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### ABSTRACT

The biodegradation of lignocellulosic biomass has been generally examined in wood spoiling basidiomycetes microorganisms. White-rot fungi are the best bio-degraders of lignocellulosic biomass (e.g. *Phanerochaete chrysosporium*) and can degrade lignin speedier than different microorganism. Lignin-degrading fungi and microorganisms can deliver fundamentally four noteworthy extracellular heme peroxidases, including lignin peroxidase (LiP), manganese-subordinate peroxidase (MnP), versatile peroxidase (VP), and laccase (Lac). These enzymes can specifically degrade lignin, cellulose, and hemicellulose of the plant cell wall to disrupt it. These ligninolytic enzymes produced by white-rot fungi are applicable in various industries at a commercial scale including the chemical, fuel, food, agricultural, paper, textile, cosmetic industrial sectors and more. The ligninolytic enzyme system of white-rot fungi is also directly involved in the degradation of various xenobiotic compounds as they also have capacities to remove xenobiotic substances and produce polymeric product which makes them a useful tool for various bioremediation purposes. More notable is the fact that they provide excellent results in dye degradation purposes. Of course, this exceptional intrigue has brought about voluminous writing. In this present investigation the applications of ligninolytic enzymes of basidiomycetes within different industrial and biotechnological area has been taken into consideration. The configuration of this content is sorted out around lignin degradation by the enzymes and their latest advancements are featured.

**Keywords:**Basidiomycetes, bioremediation, xenobiotic

## **EICHHORNIA CRASSIPES : A SOURCE OF PHYTOREMEDIATION, COMPOST AND PHARMACOLOGICAL SECONDARY METABOLITES**

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### **ABSTRACT**

Recent reports of Union government of India (2017) have highlighted pollution of 275 rivers out of 445 rivers. India generates 38 billion liters of sewage per day, but 78% of it remains untreated. Industrial effluents are the major source of water pollution; mining, detergent and textile, and dairy industry contribute 70%, 16%, and 24%, respectively to the overall water pollution. Industrial effluents contain heavy metals, dyes, and several other organic pollutants which cause water toxicity. Water pollution results in increased Biological Oxygen Demand (BOD) as well the Chemical Oxygen Demand (COD) to the toxic levels and imbalance of pH. Heavy metals and other ions causes various genetic disorders and diseases.

*Eichhornia crassipes*, commonly known as water hyacinth, is an aquatic, free floating and fastest growing plant found in tropical and sub-tropical areas. Water hyacinth has high reproduction rate, which makes it a water weed, and therefore, it is generally considered as an ecological threat.

On the contrary, the water hyacinth can also act as a bio-indicator for pollution as well as the most efficient absorber for heavy metals like Fe, Zn, Cu, Cr, Cd, Hg, As and textile effluents. The root is the hyper accumulator of all types of effluents including the organic pollutants of dairy industry, dyes and inorganic metallic wastes of other industries can be treated appreciably till 10th day of exposure. Among organic wastes, Nitrogen and Phosphorous can be absorbed upto 70-80%. Water hyacinth can be used to prepare compost which is rich in nitrogen, phosphorus and other nutrients. This plant has also shown anti-microbial, anti-oxidant, anti-tumor, larvicidal and wound healing activity. Therefore, after water pollutant absorption and degradation, water hyacinth plants can be removed from the water, dried and crushed to prepare compost as well as secondary metabolites like glycosides, steroids, methanol, phenols and terpenoids can be extracted for human benefit. The most economic biotechnological approach to treat water pollution and using various parts for compost and pharmacological uses has been characterized in *Eichhornia crassipes*.

**Keywords:** *Eichhornia crassipes*, bio-indicator, phytoremediation, compost, pharmacological secondary metabolites

## MATHEMATICAL MODELLING IN FORESTRY: AN OVERVIEW

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### ABSTRACT

Forest are renewable natural resource contributing significantly for climate, human beings and wildlife. Over the decade forest degradation has increased alarmingly due to fast changing economic needs and economic development. Modelling has been growing subject in forestry and forest conservation. Non-linear mathematical models are set-up for conservation of biomass, wildlife population and fires. Numerical simulation are carried out to verify analytical finding and explore the effects of human activities on different parameters concerning forest conservation. This contribution is an attempt to evidence how mathematics plays an important role in forestry and forest conservation. This illustrate some mathematical models which are currently in practice across the globe.





## **WHEAT BRAN AS AN EFFICIENT LIGNOCELLULOSIC AGRO-WASTE FOR THE REMOVAL OF DYE FROM THE TEXTILE INDUSTRY WASTE WATER**

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### **ABSTRACT**

Textile industry waste water is one of the major source of water pollution and is recognised as one of the root cause of environment pollution due to its low biodegradability and toxic properties. Dye molecules even in trace amounts can produce high coloration, these molecules are highly resistant to the various conventional physical and chemical treatment methods. Adsorption is a highly efficient method for removal of synthetic dye from the wastewater because of its low cost, high efficiency, technological simplicity, specifically for biomass sorbent derived from agricultural waste. In this review, wheat bran, an agro-industrial waste has been highlighted as an efficient cost effective biosorbent for the remediation of textile dyes from textile industry effluent. A comparison of batch and column adsorption study on the basis of various parameters along with their kinetic study is explored to provide evidence of usage of such a lignocellulosic waste as an efficient adsorbent. The dye removal percentage by them from the effluent may serve as an evidence of the usage of bran as an efficient and economic adsorbent.

**Keywords:** Biosorbent, wheat bran, adsorption

## ASSESSMENT OF TOXIC METAL POLLUTANT IN YAMUNA ECOSYSTEM

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### ABSTRACT

The present study comprises assessment of toxic metal pollutants in Yamuna ecosystem from Mathura region. To estimate health of river five metals (Co, Cr, Ni, Pb and Cd) were examined from water, sediments and plant samples. After collection of samples from Vrindavan site, Bihar ghat (27°35'04.7"N, 77°41'28.8"E) they were aseptically transferred to laboratory for further processing. The plant was identified as *Eichhornia crassipes* (PHRD/29/06/2018/2228) by Patanjali Research Foundation Herbarium, Haridwar. The collected samples were prepared for Atomic absorption spectrophotometer by double and triple acid digestion procedure. The study revealed a serious threat of metal contamination in Yamuna ecosystem for human health perspectives. The obtained data determined higher level of Cr, Ni, and Pb in all the three type of samples than their maximum permissible concentrations. In addition present study also show bioaccumulation and biomagnification phenomenon in Yamuna ecosystem, as the concentration of metal pollutants were significantly higher in water, sediments and finally plant samples.

**Keywords:** Metal pollutants, Bioaccumulation, Biomagnification, River ecosystem.

## SCREENING OF ISOLATED BACTERIAL STRAINS FORM REFINERY EFFLUENT FOR OIL DEGRADATION

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### ABSTRACT

In today's world of industrial evolution spills of petroleum products and oil are one of the major sources of the contamination in the ecosystem. Removal of such pollutants is very essential as they are causing serious health problems in living beings. Applications of new techniques including bioremediation and biodegradation over conventional methods are much more promising for safe and sustainable environment. The aim of present study was to isolate oil- degrading bacterial strains from oil refinery effluent and to perform comparative study for degradation of used engine oil. Refinery effluent was collected from outlet of Mathura refinery and transferred aseptically to laboratory for further processing. Oil degrading capacity was confirmed by using Bushnell Hass media method. Six morphologically different bacterial strains were procured initially after primary screening followed by detecting oil degrading ability of axenic strains. Present investigation observed that all the isolated strains were potent for oil degradation but the obtained data revealed three bacterial strains which were proficient of degrading oil.

**Keywords:** Petroleum products, Bioremediation, Biodegradation, Safe and sustainable environment.

## A REVIEW ON CURRENT TREATMENT TECHNOLOGIES OF TEXTILE WASTE WATER FOR REMEDIATION OF DYES AND REDUCTION OF TOTAL DISSOLVED SOLIDS

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### ABSTRACT

The textile industry holds a vital position in the global industrial arena due to their obvious commitments to essential human needs satisfaction and to the world economy. These industries are however major consumer of water, dyes and other toxic chemicals. The waste water procured from the textile industry is usually rich in water soluble unfixed dye, color, chemical oxygen demand, organic and inorganic salts, acids, heavy metals, total dissolved salts, pH, temperature, turbidity and salinity. The inadequate treatment of textile dyeing waste water is a noteworthy concern when effluent is directly discharged into nearby environment. The existing physico-chemical and biological treatments fail to degrade water soluble reactive textile dyes because of their complex structure and have constraints as well. Prompt desire of the current research is the development of eco-friendly and efficient technologies for treating textile dyeing waste water efficiently and economically. This article audits current technologies being used in the remediation of textile dye and expulsion of total dissolved solids such as electrochemical oxidation, membrane technique, microaerophilic fixed film bioreactor, phytoremediation, combination of electrochemical and bio-oxidation technique and adsorption. Finally, the efficiency of technology for dye remediation and TDS removal along with its future applications have been provided.

**Keywords:** Textile waste water, remediation of dyes

## MOROCCAN DIASPORA AND CLIMATE CHANGE: THE WAY FORWARD

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### ABSTRACT

Morocco has a significant number of Diaspora throughout the world. Moroccans have migrated to various parts of the World after the World Wars. This led to the formation of Moroccan Diaspora in various parts of the world. Moroccan basically migrated as laborers during the World Wars and after that migrated for forming families. This and various other factors led to the formation of Moroccan Diaspora. Climate change refers to seasonal changes over a long period with respect to the growing accumulation of greenhouse gases in the atmosphere. Tackling this phenomenon is of utmost importance given the pivotal role that climate plays in the formation of natural ecosystems and the human economies and civilizations on which they are based. As climate change is taking place throughout the world it is also taking place in Morocco. Morocco geographical climate location has a considerable impact on water resources, agricultural production and the whole vegetation of the country.

This paper represents an input to sensitize Moroccan Diaspora and mark their roles around issues of climate change and development. Diaspora communities can instigate policy change both in their old and new homelands. This paper will represent what role does the Diaspora community play in mitigating the effects of climate change. This paper will focus on what is the way forward for mitigating the effects of climate change at the hands of the Moroccan Diaspora community and how? Various factors will be used to explain this like a change in policy, raising awareness, bridging the transnational space and facilitating transnational co-operation.

## A STUDY ON THE CORPORATE SOCIAL RESPONSIBILITY SPENDING OF INDIAN COMPANIES

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### ABSTRACT

Globally, there is growing concern about the impact of business on environment and society. It is not enough for businesses to get financial returns only; they need to get social returns also. The people, companies, governments are all recognizing this fact and looking at the social performance of entities. Financial performance alone is not the indicator of success for a business today. Important indicator of sustainable development of economy is measuring the performance of businesses in terms of what impact their operations have had on environment, society and government. In India, entities have always been involved in social initiatives. In the corporate world, earlier corporate social responsibility (CSR) was basically a conceptual requirement. There was no compulsion to contribute for the social initiatives. The new Companies Act 2013, has made it mandatory for corporates to contribute for a better society and cleaner environment. The authors have tried to gauge the contribution of the corporates in the context of Companies Act, 2013. The paper is an attempt to study the spending of Indian companies for the CSR. The study is based on the articles, studies, reports and news in relation to CSR. The study also assesses the patterns of the spending to understand the ecosystem. The study can be used as an instrument to understand the ground reality of the implementation of the provisions of Companies Act, 2013 and the receptiveness of India incorporation. Also, to identify the companies which are leading and can be the role model for the followers.

**KeyWords:** Corporate Social Responsibility, Companies Act 2013, Human Health, Environmental Challenges, Social concern

## A STUDY OF ATTITUDE OF SENIOR SECONDARY STUDENTS TOWARDS ENVIRONMENTAL POLLUTION

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### ABSTRACT

Environment is a global concept today. Environment destruction and pollution has seriously threatened the human life, health and livelihood. Now a days environment is a highly concerned area in terms of environmental pollution and sustainable development. Due to population explosion as well as industrialization, the environmental problems like pollution, global warming, acid rain etc. have been increasing day by day. That is why protection of environment has now become a challenging problem in front of the modern citizen. In order to protect the environment, Pupil has to aware about the environment and this is possible only through proper education. In the present study importance has been given to locality of the school, type of management and gender of the student. A sample of 200 students were taken from senior secondary schools of Delhi. Tool used to collect data for the study was responsible environment behaviour measure of Dr. Anuradha Sindwani which was consisting of 25 questions. The findings concluded that the level of attitude towards environmental pollution among senior secondary students is quite high. Gender has no effect on the level of attitude towards environmental pollution. Also the location of senior secondary students is not influencing the attitude towards environmental pollution. Role of management is also not hindering the attitude of senior secondary students. The study is supported to emphasize the need of the attitude towards environmental awareness among the senior secondary school students and to solve the problem of environmental pollution. The findings of the study shows that non-government and government senior secondary school students are equally aware of the environment.

**Keywords:** Environmental awareness, attitude, environmental pollution, senior secondary students.

**INFORMATION AND COMMUNICATION TECHNOLOGIES, AND  
KNOWLEDGE MANAGEMENT TO TRANSFORM THE HIGHER  
EDUCATION IN INDIA**

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**ABSTRACT**

The Education in its new avatar is subject to the enormous pressure of the marketplace to improve customer services, address the challenges of innovation or achieve operational excellence. According to Brown and Duguid (1996), profound changes in competition have made universities and higher education institutions think like business. In the recent past, with the advent of institutes of excellence, universities have the burden to adjust themselves and develop strategies to respond rapidly to the changes in technologies and increasing demands of stakeholders. The education landscape is changing very rapidly and is becoming equivalent to the corporate world as far as the demand of its customers (students) is concerned. The new age educational institutions are being managed like companies and have been embracing knowledge management (KM) and, information and communication technologies (ICT) to have the competitive edge over their counterparts. This paper is also an attempt to review the role of KM and ICT in Indian Higher Education.



## **SOCIO-ECONOMIC STATUS OF FARMERS IN THE CONTEXT OF WATER RESOURCE- KANCHEEPURAM DISTRICT OF TAMIL NADU**

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### **ABSTRACT**

Water is very essential to keep our environment healthy. It is also important to improve the livelihood of people. Agriculture is the backbone of our country. Now, 65 % of the total population is depend upon agriculture and this is the only source of income generation activity for these people. The availability of water determines the crop production and income generation of farmers. The main objective of this study is to find how availability of water determines the socio-economic status of farmers and makes impact on agriculture. This study was conducted in Kancheepuram district of Tamil Nadu. Primary data was collected from 376 respondents through interview.

**Keywords:** Water, Environment, Agriculture, Farmers, Livelihood.



## ASSIMILATING BIOINFORMATICS KNOWLEDGE TO BIOREMEDIATION

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### ABSTRACT

Bioremediation comes out to be the best waste management method which uses eco-friendly techniques to convert waste into useful resources. It is an integration of techniques which employs organisms that can degrade or neutralise the pollutants. Bioinformatics in area of environmental studies provides various tools for finding effective bioremediation technique using biodegradative databases containing information of RNA/protein expression, organic compound, chemical structure, catalytic enzymes, microbial degradation pathways, degradation pathways of toxic chemicals etc. Researchers can curate data from bioinformatics resources or database that are publicly available for a specific organisms which may have the potential to degrade or to neutralise specific pollutants. Using bioinformatics method, microorganisms can be profiled according to their mineralisation pathway mechanism which may then give insights about this organism if it can help in bioremediation. Information regarding toxicity, assessment of risk and properties of chemicals related to environment can be retrieved using bioinformatics tools that can be used to predict chemical toxicity and to identify genes or enzymes involved in degradation pathways. With the advent of NGS technology, several xenobiotics-degrading microorganisms have been sequenced, moreover several genes and enzymes are also identified that are effective in bioremediation process and are thoroughly annotated in Gene ontology. In the coming time, bioinformatics along with molecular biology techniques will lead to new innovations and discoveries in the field of bioremediation and will help many environmentalist to reduce pollutants from the surroundings.

## MOLECULAR DOCKING, ANTIBACTERIAL AND ANTIOXIDANT ACTIVITY

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### ABSTRACT

Schiff base ligands of ciprofloxacin and Ofloxacin was synthesized by the condensation of 2-aminothiazole. The goal of this study was to investigate the % yields and time required for the completion of reaction for Schiff bases by microwave and conventional conditions. The reaction time for conventional method and microwave method is in the range of 7- 8 hr. and 3-5 min. respectively. The % yield for conventional method and microwave method is in the range of 55-77%. and 76-85% respectively. The simple microwave assisted method for the synthesis of Schiff bases led to improvement in the yield of all the target compounds & substantially reduced the overall process time as expected as compare to traditional method. These ligands were characterized by IR and NMR, Mass Spectral techniques and investigated for in vitro antibacterial and antioxidant activity. Ligand has shown remarkable antibacterial activity (Minimum inhibitory concentration 8–16 lg/ml) comparable to commercial antibiotic against B. subtilis and E. coli bacteria evaluated by agar well diffusion method. The DPPH method was used to check antioxidant activity and results reveal that compounds have antioxidant activity. Molecular docking studies were carried out to find the binding mode of the synthesized macrocyclic schiff base ligand to Epidermal Growth Factor Receptor (EGFR) Kinase (PDB ID: 1M17).

**Keywords:** Ciprofloxacin, Ofloxacin , 2-Aminothiazole, Molecular Docking, Antibacterial ,Antioxidant activity

## INDIA AND SUSTAINABLE DEVELOPMENT GOAL FIVE (GENDER EQUALITY)

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### ABSTRACT

Gender based power relations are all pervasive in India. Women in every aspect of life are lagging behind the men. Therefore, Indian state has been actively trying to implement the policies favourable for women in India. In the beginning the welfare policies were not gender sensitive, however, later on gender sensitive policies and budgeting were introduced. Now a days, direct benefit transfer scheme, right to food etc are focussing solely on women empowerment. India has been the founding member of sustainable development goals. Gender equality i.e. goal five, is not only a fundamental human right, but a necessary condition for a sustainable world. The exclusion of women places almost half of the world's population outside the realm of opportunity which builds egalitarian societies. Equal access to education, decent work, and representation in political and economic decision making processes are the rights women should have. By investing in the empowerment of women, Goal Five of the Sustainable Development Goals, make gains on the alleviation of poverty and can promote sustainable economic development. Goal 5 aims to eliminate all forms of discrimination and violence against women in the public and private spheres and to undertake reforms to give women equal rights to economic resources and access to ownership of property. As per data almost 65 percent of women are literate in India whereas the percentage is almost 80 percent for men. Similarly, women hold only 12 percent seats in Lok Sabha and in Panchayats the participation of women goes up to 46 percent but the irony is that in Panchayats they are more often dummy candidates and de facto ruler are either husbands or sons. The health status of women is also not very praiseworthy and violence against women is also at high level.

This paper is an attempt to comprehend the status of women in India in terms of SDG Goal Five. The central argument of this paper is that education and proper implementation of welfare policies can be helpful in bringing gender equality in India. Education, health, presence of women in power corridors, and violence against women are the indicators that will be used to assess the status on gender equality in India. Data from Human development reports, National Crime Record Bureau and Government of India will be used to support the analysis. Quantitative and qualitative methods will be used to develop this analysis.

**Keywords:** *Gender Equality, SDGs, Welfare Policies.*

## BIO-SORPTION OF HEAVY METALS FROM AQUEOUS SOLUTIONS USING VEGETABLE PULP AS LOW COST ADSORBENTS

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### ABSTRACT

Application of low cost adsorbents obtained from kitchen waste, Juice vendors was found to be efficient for removal of heavy metals has been studied. We investigated removal of heavy metal such as chromium (Cr+6) and Mercury (Hg+2) releasing from electroplating industries of Faridabad in batch studies. For kinetic studies solutions were taken in time interval studies by varying other parameters like pH, concentration of metal solution, isotherm parameters Langmuir, Freundlich were studied were tested to correlate the experimental data. Results revealed that adsorption capacities by monolayer studies were found to be 95% removal for chromium and 93.5% for mercury by low cost adsorbents is green method, efficient and practical method.

**Keywords:** Bio-sorption, Low cost adsorbents, pH, Isotherms, Kinetic studies.

## **SORPTION OF HEAVY METALS FROM AQUEOUS SOLUTIONS USING PEANUT SKINS AS LOW COST ADSORBENTS**

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### **ABSTRACT**

Remediation of contaminated water containing heavy metals is a challenging task nowadays. Enormous methods with advanced scientific technologies were developed to eliminate, nevertheless bio-sorption of low cost adsorbents generated from household wastages, residues from kitchen waste was found to be clean and efficient method for their removal. We investigated removal of heavy metal such as cadmium (Cd<sup>+2</sup>) and lead (Pb<sup>+2</sup>) releasing from electroplating industries of Faridabad in batch studies. Various parameters like pH, concentration of metal solution, isotherm parameters Langmuir, Freundlich were studied and kinetic studies i.e., Pseudo second order kinetics, were tested to correlate the experimental data. Results revealed that adsorption capacities by monolayer studies were found to be 98% removal for cadmium and 97% for lead by low cost adsorbents is efficient and practical method.

**Keywords:** Bio-sorption, Low cost adsorbents, Isotherms, Kinetic studies.

## TOXICOLOGICAL EVALUATION OF DOMESTIC EFFLUENT TREATED BY STRATEGICALLY DESIGNED AND ELECTROCHEMICALLY EVALUATED ABORIGINAL BACTERIAL CONSORTIUM

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### ABSTRACT

The pivotal aim of bioremediation is reduction in the concentration of environmental pollutants. Microbial degradation of sustained organic pollutants is a beneficial way of removing the contaminants in a cost-effective manner. Biological treatment acquires importance due to its green and sustainable nature. Biodegradation efficiency of the domestic effluent can be enhanced significantly by the supplementation of consortium comprising of aboriginal bacterial species with high degradation rates. The present study was aimed to investigate the bioremediation of domestic wastewater using a bacterial consortium comprising of five indigenous bacterial strains having the potential of reduction in biochemical oxygen demand (BOD), chemical oxygen demand (COD) and protein content to 84%, 81% and 87%, respectively. Electrochemical evaluation of the consortium indicated the presence of synergism amongst the individual bacterial strains leading to its selection over pure individual bacterial species for the treatment process. High performance liquid chromatography (HPLC) and Gas chromatographic-Mass spectrometry (GC-MS) studies revealed that the chosen consortium had removed wide-ranging complex organic compounds, which is crucial in the bioremediation of the wastewater. Phytotoxicity assay of the effluent exhibited that the seeds of *Vigna radiata* showed better growth and germination rate when being subjected to the wastewater treated by consortium as compared to seeds exposed to untreated wastewater. Moreover, genotoxicity analysis, done by comet assay, displayed the intensity of DNA damage in *Allium cepa* root tip cells post exposure to treated and untreated domestic effluent. All these support the practical utility of using the consortium over the individual strains for treating the domestic wastewater.

**Keywords:** Bacterial consortium; domestic effluent analysis; electrochemical evaluation; phytotoxicity; genotoxicity.

## EFFECT OF CHEMICAL MUTAGEN ON SEEDS GERMINATION AND SEEDLING GROWTH OF TRACHYSPERMUM AMMI (L.)

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### ABSTRACT

Physical as well as chemical mutagens are used to create a genetic variations in crop plants, are valuable approach to produce a crops with desirable traits like increase in yield, resistance to disease and better adaptability to the environment. Medicinal crops mostly seed spices are less notice to create variations. Ajwain (*Trachyspermum ammi L.*) is most important medicinal plant, cultivated for its leaves, seeds and its oils because it used for various medicinal purpose and production of several edible food items is known contains little genetic variability for different essential traits. The aim of this experiment to increase the genetic variability forenhancing the existing Ajwain varieties. The dry and healthy seeds of uniform sized of two varieties of Ajwain i.e. AA-1(Ajmer Ajwain-1) and AA-2 (Ajmer Ajwain-2) were treated with four different concentrations viz., 0.1%, 0.2%, 0.3% and 0.4% of chemical mutagens for 6 hours. Observations were made on seed germination, growth parameter such as root length and shoot length. At higher concentration seed germination and seedling growth decrease and at lower concentration maximum seed germination and seedling growth is obtained. Untreated seeds used as control, it is used to compared with treated plants. Ajmer Ajwain-1 is more sensitive to higher concentration of mutagen as compared to control.

**Keywords:** Genetic variability, chemical mutagen (EMS), seed germination and seedling growth.



## **PRODUCTION, CHARACTERIZATION, AND ANALYSIS OF MELANIN PIGMENT FROM BACTERIA ISOLATED FROM DTU LAKE FOR ITS ANTIOXIDANT AND ANTIMICROBIAL ACTIVITIES**

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### **ABSTRACT**

Melanins are composed of polymerized phenolic and/or indolic compounds, commonly found in organisms across all biological kingdoms. This study aimed to isolate the melanin producing bacteria collected from DTU Lake water; a total of 11 bacterial strains were screened based on its ability to produce melanin pigment on supplementation with L-Tyrosine to the nutrient media. Further the extraction of pigment and its purification and characterization for pigment was also performed. The pigment produced by different strains was characterized with analog to synthetic melanin using UV-vis spectroscopic analysis. Now, in order to increase the bacterial melanin production, optimization of process parameters such as pH, temperature, agitation, incubation time, L-tyrosine, and other various nutritional conditions, and results are to be analyzed statistically using the response surface methodology (RSM). Further these successfully extracted melanin needs to be subjected for its antioxidant activity and antimicrobial activity against selected microorganism such as Escherichia coli, Staphylococcus aurea and Salmonella typhi, and also check for its anti-oxidative property using DPPH as strong. Analysis of obtained melanin needs to be checked for its solubility in various different solvents, and its further preliminary confirmation by FTIR spectroscopy. However, out of total screened bacterial strains, strain RT 3 produced the maximum amount of pigment ~ 149 µg / ml of bacterial culture utilized. Hence, the isolated bacteria produced nearly black colored pigment which was tentatively inferred to as melanin due to its ability to utilize L-tyrosine as precursor.

**STUDY OF THE POTENTIALITY OF NATURAL PRODUCT AS PRIMING  
AGENT TO AUGMENT DROUGHT TOLERANCE IN SOME IMPORTANT  
DROUGHT SUSCEPTIBLE RICE (*ORYZA SATIVA*, *VAR INDICA* L.)  
VARIETIES OF WEST BENGAL**

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**ABSTRACT**

Water scarcity in the form of drought hinders crop plants from attaining their full genetic yield potential and consequently threatens food security of the nation in this millennium. Rice (*Oryza sativa*, *var indica*, Family: Poaceae) is the main staple food for Indians, especially in eastern part of the country. Drought is one of the natural hazards, due to sub-normal, erratic rainfall distribution and scarcity of suitable water for agriculture usages which can reduce crop yields by as much as 50% by 2020. The aim of the present study is to develop a sustainable low cost process for augmenting intrinsic drought tolerance potential of pre-monsoon drought susceptible ricevarieties of West Bengal using seed priming technique at seed germination and early developmental stage. In this study instead of chemical priming agent seed priming was done with flavonoids extracted from French marigold *Tagetes patula* L (Family: Asteraceae). Optimization was done in terms of effective priming techniques and exposing durations on the four high demandable but drought susceptible varieties Jaya (IET-723), Satabdi (IET-4786), Swarna (MTU-7029), Cottondora Sannalu (MTU-1010) of West Bengal along with drought tolerant variety Nagina (N22). The potential bioactive agent responsible for augmenting innate drought tolerance potentiality was assessed. In this study *in vitro* drought was induced using polyethylene glycol (PEG) 6000 in petriplates for assessing germination potential. After evaluating several morpho-physiological parameters from pot experiment (sequential dehydration and rehydration) at early growth stage suggested that sustainable natural product priming can be an effective measure to enhance plant's adoptability under drought stress by adjusting inherent metabolism.

## A FIELD OBSERVATION ON IMPACT OF SHRINKING WETLANDS ON WINTER VISITOR AND RESIDENT AVIFAUNA

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### ABSTRACT

By keeping eye on a small area wetland in Theri village of Shri Muktsar Sahib district of Punjab (30°12'N 74°34'E) India for two consecutive winters ; important Observations were taken and very shocking outcome was noticed . In first phase of data collection during the winters of year 2016-17 ,the avifauna diversity was recorded 20 species ; which reduced to 12 species of birds during the winters of 2017-18. This drastic change occurred due to Anthropogenic interference in this wetland area ,as 30% water logging area was converted to Agricultural land ; and as a result eight important bird species belonging to resident and migratory avifauna were not noticed during the second phase of observation in winters of 2017-18.

## IMPORTANCE OF SOIL SEED BANK IN CONSERVATION OF SPECIES: A CASE STUDY OF RAIN FOREST RESEARCH INSTITUTE, CAMPUS

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### ABSTRACT

Soil seed banks play an important role in vegetation recovery as well as serve as one of the means for continued existence because they contain propagules of plant species that might come up for site colonization after management and disturbance events. In this present work, assessment of the aboveground vegetation (AGV) and that of soil seed bank was made in campus of Rain Forest Research Institute so as to evaluate plant species composition and also to find out which species had higher potential of forming soil seed bank. The AGV was estimated using 1m x 1m quadrat and soil samples from different soil depths (0-3cm, 3-6cm and 6-9cm) were excavated using core sampler (diameter 10 cm). Soil seed bank was analyzed using the seedling emergence technique. Overall results showed the presence of 44 plant species in both the AGV and in the soil. 37 plant species were found in the soil forming seed bank while 19 species occurred in AGV. 12 plant species were common to both. Total number of species in different soil depth differed as; D1 (33) > D2 (32) > D3 (27). Similarly, total seed density (seeds/m<sup>2</sup>) in soil decreased in the order D1 (6608.21) > D2 (2473.90) > D3 (1696.63). Asteraceae formed the dominant family in the soil seed bank while Asteraceae and Poaceae with three species each dominated the AGV. Highest density (No./m<sup>2</sup>) in AGV was exhibited by *Imperata cylindrica* (15.65) followed by *Digitaria spp.* (9.24) whereas in the soil ecosystem highest density (seed/m<sup>2</sup>) was exhibited by *Mimosa diplotricha* (2163.11) followed by *Cyperus rotundus* (1945.72). *M. diplotricha*, *Digitaria spp.*, and *Paspalum dilatatum* were one of the common species found dominating all the soil depth. Sorensen index of similarity in both the ecosystems was 0.32. Margalef index of species richness of soil seed bank was 6.84 while its value was 6.39 for AGV. Shannon diversity index was 1.77 in AGV while it was 2.49 in soil ecosystem. Hence, this study will serve as baseline information on species forming potential soil seed bank that can be a useful tool for conservation and restoration efforts.

**Keywords:** Aboveground Vegetation, Soil Seed Bank, Seedling Emergence Technique, Diversity Indices

## IMPACT OF ELEVATED CARBON DIOXIDE ON PHYTOREMEDIATION POTENTIAL OF FORESTRY SPECIES

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### ABSTRACT

Level of atmospheric carbon dioxide gas (CO<sub>2</sub>) these days is over twenty fifth beyond at any time traditionally 420,000 years. Environmental pollution is one of the severe problems that the world is facing today. Various efforts have been made for environmental restoration in India but still it seems to be a formidable task. Along with increase in atmospheric CO<sub>2</sub>, heavy metals are also one of the major pollutants, which are discharged into the atmosphere from burning of fossil fuels, release of industrial wastes and use of agrochemicals. There has been increasing concern with regard to accumulation of heavy metals in the environment as they pose a threat to both human health and natural environment. *Acacia auriculiformis*, *Cinnamomum camphora* and *Grevillea robusta* are the plant species which are widely used for the phytoremediation of various heavy metals. In this study we examined the phytoremediation potential of these forestry species under elevated and ambient carbon dioxide conditions under various level of heavy metals as 10ppm, 20ppm, 30ppm, and 40ppm. Result shown here tells us that without heavy metal stress number of leaves of plant, collar diameter, plant height, photosynthesis rate, stem height, root height, stem weight and root weight increased in elevated CO<sub>2</sub> as compared to ambient CO<sub>2</sub>. However number of leaves of plant, collar diameter, plant height, photosynthesis rate, stem height, root height, stem weight and root weight of all these three forestry species increases in elevated CO<sub>2</sub> as compared to ambient CO<sub>2</sub> but simultaneously decreases with increase in various concentration of heavy metals viz., Cu, Cd, Cr.

## PERFORMANCE ENHANCEMENT OF MULTIPURPOSE SOLAR STEAM GENERATOR BY USING DIFFERENT NOVEL TECHNIQUES

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### ABSTRACT

The sun is the most sustainable source of energy for the power generation. Depletion in the source of fossil fuels and its costly extraction along with the hazardous emission during burning indicates towards the usage of alternative sources like solar energy, which is free of cost and in abundance in nature. Solar energy mainly utilized in various domains like solar power generation, solar cooking, solar distillation, solar drying etc. In vogue solar steam generator plays a vital role to generate steam for the numerous applications such as community cooking, textile industries, sterilization, power generation etc. Concentrated solar power (CSP) technology, which comprise of solar concentrator and the cavity receiver used to generate the steam. The cavity receiver is an important component for solar energy collection and subsequent transformation. The performance of concentrated solar thermal systems can be improved by effective collection of solar energy at the cavity receiver while minimizing the different types of heat losses. To overcome and minimize these heat losses different novel techniques such as solar selective coating and quartz glass cover on cavity receiver are mentioned in this paper by trapping the incident heat inside the cavity and thereby exploiting the maximum solar radiation. The preliminary research work shows increased efficiency of 10-12% by using combined effect of solar selective coating & quartz glass cover in comparison with the conventional solar steam generator.

## **ASSESSMENT OF SOCIAL VULNERABILITY TO FLOODS IN SRINAGAR CITY**

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### **ABSTRACT**

Urban floods are global phenomena, and their impact is increasing alarmingly. Furthermore, cities in developing countries are more heavily affected by flood catastrophes than the cities in the developed world. This is mainly due to the haphazard and unplanned growth of the cities. The cities in developing countries such as India and south-east Asia often have more severe flooding and damage because of greater densities of population, higher intensities of rainfall and lower drainage standards. Most of those cities have now reached a saturation point in terms of population growth and accommodation facilities so that developmental activities have now shifted to low lying areas and areas next to riverbanks. Therefore, the social vulnerability of cities is growing. This paper investigates the Ward-wise social vulnerability to Floods and Earthquakes in Srinagar City. The intensity, severity of Floods is increasing with time. Every year thousands of people are affected, and huge economic and environmental losses occur in Srinagar due to floods. Although natural hazards are well recognised the study of physical vulnerability to floods has got prominence from the very beginning while the social vulnerability mapping has not existed until now in Srinagar. This study aims to quantify the social vulnerability on a local scale, considering all 68 wards using the available census. The assessment of ward-wise vulnerability mapping has been done using eight indicators, and aggregated indexes were plotted in an ArcGIS. The sum of results shows that 23 Wards in Srinagar city have low social vulnerability while 26 and 19 Wards have medium and High social vulnerability to Floods in Srinagar City. The social Vulnerability mapping highlights the immediate need for the decentralized framework to natural disasters that can contribute to better Preparedness, planning and management to floods.

## ORIGIN AND EVOLUTION OF THE HIMALAYAN FLORA

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### ABSTRACT

The Himalaya located between 26° N to 41° N latitude (about 1700 km, north-south) and 70 °E to 105° E longitude (about 3200 km across) represents the youngest and the highest mountain chain of the world. Extending from Namche Barwa mountain complex in the east to Nanga Parbat massif in the west, the Himalaya constitute the source of origin of ten major river basins of the world and home for about 1.4 billion people. The formation of this mountain chain started in the early Cenozoic Era with the collision of the Indian and the Eurasian plates. It was followed by some major geo-physical events, namely disappearance of Tethys sea, formation of contiguous landmass connectivity, and evolution of monsoon system. These events laid the ground for colonization of a nascent Himalayan ecosystem by migrating floras and faunas from all directions. Starting with almost all borrowed flora, the Himalaya came to harbour about 30-40% endemism in plant biota. However, many unanswered questions regarding the Himalayan flora still remain such as: (i) what was the nature of early migrants in the Himalaya?, (ii) what were the ancestral distributional areas of these migrants?, (iii) what were the precise time periods in which maximum migrations and endemic diversification occur in the Himalaya?, (iv) whether plant migrations and diversifications were limited to just a particular set of taxa or were widespread across phylogenies? In order to seek answers to these questions, I performed phylogenetic and ancestral area reconstruction analyses on 3500 Himalayan plant endemics. The results pointed towards a positive coincidence between the diversification of endemic plant taxa and changes in geo-physical characteristics and climate in the Himalayan region. In particular, the monsoon system is postulated to have played the most dominant role in the evolution of endemic taxa in the region, particularly in the Western Himalaya. The results also revealed that the majority of plant endemics in the Western Himalaya owe their lineage to taxa which immigrated from South-East Chinese, Sino-Japanese, Irano-Turanian, and Centrasiatic regions, while in the Eastern Himalaya, majority of the endemics diversified from taxa which immigrated from South East Asian and Sino-Japanese regions.



## DECENTRALISED APPROACH OF WASTE WATER TREATMENT AND ITS EFFECT ON AGRICULTURE USING MICROIRRIGATION TECHNOLOGY

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### ABSTRACT

With increase in generation of waste water, farmers of peri urban area using it for the purpose of irrigation due to easy availability of it. Due to presence of excessive quantities of nutrients, pathogens and toxic chemical substances, continuous irrigation of agricultural land with such wastewater may cause heavy metal accumulation in the soil and vegetables, and then introduced into the food chain.

A field experiment was conducted for three years to investigate the effects of drip irrigation with wastewater, and treated water on crop quality at the Research farm of Indian Agriculture Research Institute, Delhi. A bioreactor was installed at field for the purpose of treatment of wastewater for the irrigation. In crops, the level of heavy metals was found more in wastewater irrigated crops than the treated water irrigated crops. From the study, it can be concluded that unlike treated wastewater, untreated wastewater cannot be used in agricultural land for a long time. Further, use of treated wastewater for irrigation does not have a negative impact on the consumers' health as well.

**Keywords:** bioreactor; drip irrigation; heavy metal; treatment; wastewater

## RECOVERY OF REUSABLE AND RECYCLABLE MATERIAL FROM INTEGRATED MUNICIPAL SOLID WASTE

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### ABSTRACT

With emerging urban lifestyle generation of solid waste is increasing with every pace. This is not only causes environmental, health and hygiene issues but also damage aesthetic sense of our earth. The solution to deal with this solid waste lies in not only reducing this generation of such waste but we also have to made a proper policies to promote the recovery of reusable and recyclables solid waste from municipal waste. For this purpose the households should be made aware and sensitized to segregate their waste into such categories which help the municipality officials in recovering the reusable and recyclable material from such waste. This will not only reduce the waste in the country but will also save precious resources of the mother earth. Hence, greater attention needs to be focused towards devising appropriate and effective mechanisms for waste treatment and disposal in urban cities. The most common method employed by municipal corporations for disposal is dumping of the collected waste at open dumpsites, consists of rich organic matter, which produces landfill gas by anaerobic digestion. Landfill gas is rich in methane and carbon dioxide. Methane gas is utilized as a clean fuel for power generation. Government also made rules for waste management such as G.S.R.320, G.S.R.338, G.S.R.343, G.S.R.317, G.S.R No.395 and S.O.1357. The proper disposal of Municipal Solid Waste is not only absolutely necessary for the preservation and improvement of public health but it has an immense potential for resource recovery. The collection and disposal of solid waste is one of the pressing problems in urban areas. Processing and treatment of waste is limited and final disposal is in unscientific dumpsites, posing problems of soil and water contamination and air pollution. A relative assessment of different technological options from environmental angle is necessary keeping in view the existing regulatory standards. The basic approach adopted is to promote environmentally sound waste disposal and treatment technologies and where in energy recovery is only an additional benefit. It is also kept in view that problem/solution in waste disposal at the current facility does not become a problem in air pollution or water pollution.

## INFLUENCE OF PLANT SPECIES ON ORGANICS AND NUTRIENT REMOVAL FROM PRIMARY TREATED SEWAGE

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### ABSTRACT

An attempt was made to investigate the removal of nitrogen and phosphorous from primary treated sewage using four aquatic plants i.e. two emergent plants (*Typha latifolia* and *Phragmites australis*) and two floating plants (*Eichhornia crassipes* and *Lamina gibba*). These plants were introduced into a reactor with volume of 49 L filled with primary treated sewage. The area occupied by these plants was measured by rod method. For maintaining photosynthetic process fluorescence lamps were used as a light source. The constant level of wastewater of each reactor was maintained by addition of de-ionized water. The NH<sub>4</sub>-N and PO<sub>4</sub>-P concentrations were measured at an interval of 5d. Results indicate that the highest removal of the NH<sub>4</sub>-N and PO<sub>4</sub>-P were ranged between 78 and 83 % using emergent plant (*Typha latifolia*). The final treated effluent NH<sub>4</sub>-N and PO<sub>4</sub>-P concentrations were 8 and 2 mg/L respectively. The results of this study revealed that the highest removal of nutrient from primary treated sewage using Typha might be due to its more vigorous root system that provides an expanded surface area for attached microbial growth compare to *Phragmites australis* and other floating plants. Moreover, this study also indicates the physiological characteristics of the aquatic plants were greatly affecting the performance of the system.

**Keywords:** Primary Treated Sewage, NH<sub>4</sub>-N, PO<sub>4</sub>-P, Aquatic Plants, Dissolved Oxygen

## BIOCHAR AS AN AMMENDMENT FOR COAL MINE SPOIL: A REVIEW

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### ABSTRACT

Biochar is a solid material obtained from the thermo-chemical conversion of biomass in an oxygen-limited environment. Biomass-derived biochar production has been demonstrated as a potentially viable strategy for developing negative carbon emission technologies for climate change mitigation and also as a material for effective amendment of relatively nutrient deprived soils. A unique challenge associated with rehabilitating mining-affected lands and how biochar can be used as a tool for mine land remediation has been discussed in this paper. Key findings from the various sources of literature based on biochar for environmental management are reviewed and primary data from several field trials of abandoned mine land reclamation through biochar application have been presented. A review on the optimum pyrolysis temperature and most importantly, the feedstock for biochar production are also reviewed. Both pyrolytic parameters and feedstock types are the main factors controlling biochar properties such as nutrient content, recalcitrance, and pH. Biochar produced at low temperatures may improve nutrient availability and crop yield in acidic and alkaline soils, whereas high-temperature biochar may enhance long-term soil carbon sequestration. In general, the studies show that the application of biochar improves the soil pH, bulk density, cation exchange capacity (CEC), water holding capacity (WHC), microbial activity and many other properties. Further, biochar is gaining increasing due to the above soil conditioning properties specially in a coal mine spoil which are not very cultivable and lack essential factors for supporting life. Although there exists a challenge to increase its applicability, work should be continued in this field to bring the best out of it.

## STUDY OF PHYSICO-CHEMICAL CHARACTERISTICS OF A NON-ALCOHOLIC BEVERAGE INDUSTRY EFFLUENT AND ITS INFLUENCE ON SELECTED FLORICULTURAL SPECIES

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### ABSTRACT

Coca-Cola enterprise located at Masurie- Dasna around national highway 24 in Ghaziabad, Uttar Pradesh produces and bottles non- alcoholic beverage products, viz., Coca- Cola, Thumbs up, Limca, Sprite and Fanta. The enterprise generates two types of sludge, viz., water treatment sludge (WTS) and effluent treatment plant sludge (ETPS), and two types of waste water, viz., effluent and influent from effluent treatment plant. The treated waste water is utilized for irrigating garden species, viz., calendula, marigold, rose, larkspur and dianthus predominantly during winters. A preliminary study was conducted during March to May, 2018 to study selected physico- chemical characteristics (Temperature, turbidity, total hardness, EC, pH, TDS, BOD, COD, PO<sub>4</sub> and NO<sub>3</sub>) of untreated and treated waste water. In order to analyze the state of pollution, the data so recorded were compared with similar data for ground water used by the people for drinking purpose in the area. Additionally, the soil from the garden where waste water was used for irrigation, was also collected and analyzed for EC, pH, organic carbon, organic matter, total nitrogen and phosphate; the data were compared with the data for soil irrigated with ground water. Results indicate higher concentration for total hardness, EC, pH, TDS, BOD, COD, PO<sub>4</sub> and NO<sub>3</sub> in treated waste water too. Interestingly, the garden soil irrigated with treated waste water has resulted better growth of all the floricultural species cited above. This may be due to higher concentration of PO<sub>4</sub> and NO<sub>3</sub> in the treated waste water which act as growth promoting substances. It is suggested that in order to maintain the quality of ground water and soil for long run, the waste water need to be treated following the guidelines of the Central Pollution Control Board; especially the retention time for the treatment of waste water need to be attended adequately.

**Keywords:** Waste water, beverage enterprise, physico- chemical characteristics of waste water and treated soil, impact on floricultural species.

## SEASONAL VARIATION BASED EMISSION ESTIMATION MODEL CONSIDERING VEHICULAR TRAFFIC - A CASE STUDY OF DELHI

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### ABSTRACT

In Delhi, monitoring of various air pollutants is carried out at nine different monitoring sites by the Central Pollution Control Board - CPCB. In the present study, a regression model has been developed to estimate CO for the area where monitoring is not conducted. At monitoring sites, disaggregated data of the pollutants, viz., CO and NO<sub>x</sub> for every single day of the year available on the official site of CPCB has been used. One-year data have been analyzed with respect to seasonal variation to observe trend in pollutant values. Apart from it, Census of India (2011) data of population density and vehicle ownership are included in analysis. Data with respect to various industries are collected from different online sources and considered for developing model. Among the alternate models developed, the best CO estimation model is based on vehicular ownership in an area. Two separate models for estimating CO have been developed for winter and summer season. On an average CO value estimated for Delhi is 1.07 and 1.81 mg/m<sup>3</sup> in summer and winter, respectively.

**Keywords:** Air quality, seasonal variation, regression model for CO estimation, Delhi

## **EFFECT OF LAND USE CHANGE ON CARBON SEQUESTRATION ABILITY OF SOIL IN NATIONAL CAPITAL REGION**

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### **ABSTRACT**

The prospect of global warming is a matter of public concern worldwide. The greatest contributor to global warming among the greenhouse gases over the past century has been carbon dioxide (CO<sub>2</sub>). The concentration of CO<sub>2</sub> in the atmosphere has been increasing since industrialization. Consensus has formed that the activities, particularly the alarmingly high unsustainable development, have a markedly high visible impact on the world's climate. CO<sub>2</sub> released mostly from deforestation-led land use change, agricultural expansion and fossil fuel burning in automobiles, industries, etc., are noted as potential causes of increased CO<sub>2</sub> concentration. To mitigate the adversities of climatic change, it is necessary that the excess release of CO<sub>2</sub> in atmosphere is trapped judiciously. Soil carbon sequestration is one of the method for trapping CO<sub>2</sub> from atmosphere for biomass production. In the present study, four different land uses, viz., mixed plantation, greenbelt, cropland and wasteland at Kasna village of district Gautam Buddh Nagar, Greater Noida, Uttar Pradesh have been assessed for sequestering carbon in soil by the tree species. Determination of soil organic carbon was done using Walkley- Black chromic acid wet oxidation method. Analysis of data revealed that soil under mixed plantation has the highest potential for sequestration of CO<sub>2</sub>. The land uses that sequestered organic carbon were ranked as: mixed plantation > cropland > greenbelt > wasteland.

**Keywords:** Land use, carbon sequestration, National Capital Region.

## ASSESSMENT OF ACCUMULATION OF ZINC IN SELECTED PLANT SPECIES AND SOIL OF GREEN BELT IN NATIONAL CAPITAL REGION

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### ABSTRACT

Environmental pollution due to toxic metals has conspicuously increased on account of increased vehicular traffic, rapid and speedy industrialization. Vehicular emissions and road traffic activities are the major source of heavy metal emissions in urban areas to the roadside soil and plant species. Though a range of heavy metals are considerably toxic, some of them like zinc serve as an essential micronutrient for plants. Zinc is an essential component of thousands of proteins in plants and also involved in many physiological functions. In the present contribution, accumulation of zinc metal in different plant parts of the selected plant species grown in the green belt of National Capital Region has been assessed. Soil samples were taken around the plants to characterize the zinc contamination. Quantification of zinc metal was done using Atomic Absorption Spectrophotometer. Analysis of data revealed that zinc metal accumulation in plant parts has been in the order: Mature leaf > Young leaf > Branch. The study indicated that *Azadirachta indica* and *Thevetia peruviana* have high accumulation potential of zinc in comparison to *Caliandra haematocephala* and *Nerium odoratum*.

**Keywords:** Zinc accumulation, green belt, National Capital Region.



## CURRENT ENVIRONMENTAL ISSUES IN INDIA AND THEIR IMPACT ON HUMAN HEALTH.

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### ABSTRACT

The rapid economic growth of India has surprised many experts but some aspects like diminishing availability of safe drinking water, deterioration in quality of air for breathing, rapid urbanization causing more and more deforestation and excessive use of pesticides are sidelining the growth story of India globally. To improve the awareness about many such issues, even Earth Day is also celebrated every year on the 22nd of April to recall awareness about the same. But, the question naturally arises as to why there is a need of celebration of day like Earth Day? Just to recall or it's because we seem to have forgotten what a beautiful gift the earth has given in the form of life. Even the air of cities like Delhi and Calcutta is not adequate for breathing. The current paper discusses the various burning environmental issues with their impact on human health and various measures which can be adopted to address those challenges.

**Keywords:** urbanization, deforestation, pesticides.

## REGULATORY EFFECT OF EXOGENOUS NITRIC OXIDE ON ANTIOXIDANT STATUS OF RICE VARIETIES GROWN UNDER DIFFERENT LEVELS OF SALT STRESS

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### ABSTRACT

Growth of rice productivity has reached a plateau, probably due to climate change, biotic and abiotic stress and intensive agriculture practices. To meet the growing demand, rice production must correspondingly increase by 70% but the current trends in global crop production are not sufficient even to double the production by 2050. According to an estimate by 2050, salinity may affect up to 50% of the existing arable land. The world is defied for the development of climate resilient crops due to trends in climatic fluctuations. Nitric oxide (NO) has now gained significant place in plant science, mainly due to its multifunctional role as bioactive molecule in plant growth and development. It also helps in the activation of antioxidant enzymes such as superoxide dismutase, glutathione reductase and functions as a signaling molecule in the cascade of events leading to gene expression. An experiment was conducted to assess regulatory effect of exogenous nitric oxide on rice varieties (Swarna sub-1 and BPT7-5204) grown under different levels of salt stress (50mM NaCl, 100 mM NaCl and 150 mM NaCl). 100µl of SNP (NO donor) was sprayed 4 times with a week interval, and then leaf samples were collected at 60 DAS for biochemical analysis. Enzymatic and non-enzymatic antioxidants were analyzed using standard protocols. The results showed that exogenous application of NO suppressed the adverse effects of salt stress by elevating the levels of antioxidants. Exogenous application of NO significantly elevated proline content (µ moles/g fw), peroxidase activity (µmol H<sub>2</sub>O<sub>2</sub> /mint./mg fw), ascorbate peroxidase activity (µmol H<sub>2</sub>O<sub>2</sub> /mint./mg fw), hydrogen peroxide (µmol H<sub>2</sub>O<sub>2</sub> /mint./mg fw) and total antioxidant activity (µmol H<sub>2</sub>O<sub>2</sub> /mint./mg fw) in both the rice varieties grown under salt stress conditions. However, the variety Swarna sub-1 showed superior responses in comparison to BPT 7-5204. NO can, therefore, be considered as important molecule to protect the cereal crops against the salt stress.

## **POLYAMINES ON ANTIOXIDANT STATUS OF GREEN GRAM (*VIGNA RADIATA* L.) UNDER ARSENIC-INDUCED OXIDATIVE STRESS**

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### **ABSTRACT**

Pulse crops provide example opportunities to diversify cropping systems and to assist in managing the risks involved in subsistence agriculture in the tropics amidst unpredictable weather and market pattern. Green gram, one of the important pulse crops in Asia, occupies a prominent place in a large number of tropical cropping systems. Polyamines (PAs), widely present in living organisms, are now regarded as a new class of growth substances, playing pivotal role in the regulation of plant developmental and physiological processes. PAs may also function as stress messengers in plant responses to different stress signals. An experiment was conducted to assess regulatory effect of exogenous application of polyamines on two green gram varieties (K-851, Pusa Basakhi), grown under different levels of arsenic stress (25  $\mu$ M sodium arsenate and 50  $\mu$ M sodium arsenate). 10  $\mu$ M of spermine (Spm) and 5  $\mu$ M of putrecine (Put) was sprayed 4 times with a week interval, and then leaf samples were collected at 60 DAS for biochemical analysis. Different enzymatic and non-enzymatic antioxidants were assessed to observe the impact of arsenic-induced oxidative stress. The results showed that exogenous application of polyamines suppressed the adverse effects of arsenic-induced oxidative stress by elevating the levels of antioxidants. The variety K-851 showed superior anti-oxidative response against arsenic-induced oxidative stress in comparison to Pusa Baisakhi. Whereas, Spm showed better response in comparison to Put application. . Exogenous application of polyamines significantly elevated proline content ( $\mu$  moles/g fw), peroxidase activity ( $\mu$ mol H<sub>2</sub>O<sub>2</sub> /mint./mg fw), ascorbate peroxidase activity ( $\mu$ mol H<sub>2</sub>O<sub>2</sub> /mint./mg fw), hydrogen peroxide ( $\mu$ mol H<sub>2</sub>O<sub>2</sub> /mint./mg fw) and total antioxidant activity ( $\mu$ mol H<sub>2</sub>O<sub>2</sub> /mint./mg fw) in both the green gram varieties grown under salt stress conditions.

## ASSESSMENT OF HEAVY METAL CONCENTRATION IN SELECTED VEGETABLE CROPS GROWN IN PERI-URBAN SOIL IN DELHI

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### ABSTRACT

The heavy metal pollution in water, soil, and its accumulation in vegetable crops (dietary food crops) has become the worldwide problem. Toxic levels of heavy metals pose various hazards to plants, animals, and human health. Because of the non-biodegradable or persistent nature, their removal from the environment becomes difficult. From food safety point of view, assessment of heavy metal concentration in vegetables grown on soil contaminated with heavy metals is becoming necessary. Therefore, the study was undertaken to assess the heavy metals concentration, viz., As, Cd, Pb, Ni, and Zn in vegetable crops, viz., *Brassica oleracea* var. *botrytis* L., *Solanum melongena* L. and *Spinacea oleracea* L. grown near the banks of Yamuna in the North-East district of Delhi. Digestion was done on block digester. Tri-acid mixture was used to digest the samples. Atomic Absorption Spectrometer was used to quantify heavy metals in the collected samples. Overall, the study revealed that the vegetable crops grown on the river banks are equally and highly contaminated with heavy metals, viz., As, Pb, Cd, and Ni because their concentration was reported to be well beyond the permissible limits given by FAO/WHO. Likewise, the concentration of heavy metals, viz., As, Pb, and Cd in irrigation water samples was beyond the permissible limits recommended by FAO. In general, the concentration of heavy metals, viz., As, Cd, Pb, and Ni in soil samples was found to be low in comparison to the concentration in vegetable crops indicating the accumulation of heavy metals in the vegetable crops. The reason behind heavy metal contamination could be the use of phosphate-based fertilizers and metal-based pesticides in crops, and the presence of heavy metals in industrial water received by river Yamuna in the vicinity of the area.

**Keywords:** Heavy metals; vegetable crops; Yamuna river water; peri-urban soil; Delhi.

## FERTILITY STATUS OF SOIL UNDER DIFFERENT PLANTATIONS AT SELECTED LOCATIONS IN NOIDA

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### ABSTRACT

Plantations have been the primary source to enhance productivity of land by improving soil fertility through the action of root system and the action of organic matter through litter fall. A study was conducted to evaluate fertility status of soil under different plantations in Sectors 96 and 97 of NOIDA, district Gautam Budh Nagar. Soil samples (0-30 cm depth) were collected from the plantations of *Terminalia arjuna*, *Syzygium cumini*, multi species plantation and barren land. The collected samples were air-dried, sieved and analyzed for various soil parameters, such as, pH, EC, organic carbon, macronutrient (nitrogen and phosphorus) and micronutrient (calcium and magnesium). It has been recorded that *T. arjunaplantation* site has low level of phosphorus because of the low moisture content which affected availability, uptake, compaction and alkalinity of soil (pH-8.3). *T. arjunahas* high level of calcium than the other sites because of the alkalinity of soil and calcium rich bark. The nitrogen level was low in each plantation.

**Keyword:** Soil fertility, plantations, NOIDA.

## **AIR POLLUTANTS REDUCTION USING NON-MOTORIZED TRANSPORT -FRIENDLY INFRASTRUCTURE IN MEGACITY DELHI**

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### **ABSTRACT**

Transport sector contributes a significant portion of air pollutants emission. Urban road transport (motorized and non-motorized transport, NMT) is the key factor of existing high level of air pollution in Delhi. It is considered that around 90 per cent CO emission is due to road transport only. Similarly, major portion of hydrocarbon and NOX are emitted from transport sector. More than 50 per cent trips in Delhi are made by NMT including walking, bicycling and cycle rickshaw trips. However, most of the NMT trips are considered to be made by captive users. Present study, therefore, focuses on quantifying emission of pollutants by transport sector for existing model split and trip length distribution as well as for a hypothetical scenario which is based on reducing emission by converting short motorized trips into non-motorized ones.

**Keywords:** Emission, Non-motorized transport, pollutant, Delhi.

**MOLECULAR DIVERSITY OF FAMILY BUFONIDAE  
(AMPHIBIA: ANURA) FROM UTTARAKHAND, WESTERN HIMALAYA**

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**ABSTRACT**

Over the last few decades, mitochondrial DNA has been the most popular marker of molecular taxonomy. Not surprisingly, a mitochondrial fragment, 16s rRNA, was recently elected as the standardized tool for molecular identification and diversity analysis. In the present study, we evaluate the usage of mitochondrial DNA for species identification and delineation of bufonids from Uttarakhand region of Western Himalaya. We analyzed partial sequences of the mitochondrial DNAs which elucidate species relationships with some other Bufonids species of Amphibian fauna. Sequences exhibited significant intraspecific variability among bufonidae family of amphibian species. Observations were recorded that *D. melanostictus* and *D. himalayanus* may indeed be a sister species though the two species have remained separated from each other by the Himalayas for considerable amount of time. It is concluded that partial sequence information of the mitochondrial gene can be used as a diagnostic molecular marker in identification and resolution of taxonomic ambiguities as well as establishing molecular phylogenetic relationships among amphibian fauna of western Himalaya. These findings will be the baseline for future phylogenetic studies as well as amphibian conservation management programme of Uttarakhand region of Western Himalaya.

**Keywords:** Anura, Bufonidae, mitochondrial DNA, Phylogeny, Western Himalaya.

## SERIOUS IMPACT ON HUMAN HEALTH BY AIR POLLUTANTS

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### ABSTRACT

Over past couple of decades it was realised that air pollutants cause a considerable damage in global climate and associated processes viz., greenhouse effects , ozone depletion , acid precipitation, El Nino effects etc. but, now air pollution has now become a worldwide phenomenon and every individual is one way or the other is facing problems caused by it. The impact can be seen locally , at regional and global level. Air pollutants can effect human health to varying degrees. At lowest levels , i.e., below the threshold there is no effect , such as visible damage , cumulative chronic effects , genetic effects or even gradual changes in the human health. The direct entry of gaseous air pollutants like SO<sub>x</sub> , NO<sub>x</sub> , CO<sub>2</sub> etc may lead to rashes, bronchitis, emphysema, asthma, lung cancer and many more incurable chronic diseases caused due to exposure to polluted air. The mortality rate is higher in urban areas. Sulphur dioxide is the most serious and a widespread pollutant. The particulate pollutants such as asbestos, silica, carbon, beryllium , lead etc are also capable of causing major ill effects on human health. The death toll by smog can be enormous. Increase in the diseases associated with air quality thus requires more detailed studies based on available health statistics for better solutions to curb this problem.



## IMPACT OF DIMINISHING BIODIVERSITY IN URBAN SETTLEMENTS

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### ABSTRACT

The purpose of this article is to study the role of biodiversity in changing the surrounding environment of urban settlements. Biodiversity is the existence of a wide variety of plants, animals, microorganisms and other species living in their natural environment. Biodiversity is vital for human survival and livelihoods. It is essential for ecosystem as healthy ecosystem cleans our water, purifies air, maintains soil, regulates the climate, recycles nutrients and provides us with food. Biodiversity is under serious threat as a result of human activities. The major threats are: population growth, pollution, global climate change, deforestation and species extinction. The growth of cities caused biodiversity to decline by fragmenting or destroying large areas of natural habitat on which many species depend. The rising population is driving the expansion of urban areas and increasing the demand for natural resources. Biodiversity is reduced in this process when existing organisms in the habitat are displaced or destroyed and hence results in species extinction. A sharp decline in biodiversity is affecting every region of the world and the ability to supply food, clean water and sustainable environment. Indirectly, changes in ecosystem services affect livelihood, income, migration etc. If our ecosystem fails, if too many species become extinct or disabled from performing their functions, then humans will not be able to survive on earth. We have a key role to play in conserving and restoring biodiversity by increasing our knowledge of environmental issues, impact of diminishing biodiversity and supporting actions that conserve our ecosystem. We need to conserve it for future generations. A brief study on measures taken to conserve biodiversity in Delhi/NCR is included in this research.

**Keywords:** Ecosystem services, Climate change, Biodiversity, Deforestation.

## **PSIDIUM GUAJAVA L. (GUAVA) A MEDICALLY BOON**

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### **ABSTRACT**

Herbs, shrubs and different trees on the earth were used to reduce the risk of chronic degenerative diseases since ancient time of period. The modern medicines (Allopathic) are evolved from the Ayurveda and Unani therapy. Nowadays peoples are again turning towards the ancient herbal treatment rather naturopathy to reduce the risk of different ailments. Higher the population and industrialization, different diseases have reached epidemic proportion. COPD and Allergy is reaches their peak, study shows. Guava (*Psidium guajava* L.) is natively from South America. We use guava to uptake only as a fruit for the taste but it is having high potential capabilities to reduce the risk of different chronic diseases because it is a high nutritive values enriched with high quality Vitamin C, one of the major vitamin which increases the immune mechanism as well as essential minerals not only this the different parts of guava also being used to treat the different kinds of diseases by Ayurvedic and Unani Doctors. The common portion of the guava trees are being used the barks, the leaves, the flowers bud, and the fruits itself along with seeds. According to the different study shows the different part of the plant have been used to treat the different diseases like hepatic-protective, antioxidants, anti-inflammatory, anti-carcinogenesis, anti-allergic, anti-constipation, anti-diabetes, etc. *Psidium guajava* L. have many effects on health and it should be researched more extensively with clinical trials.

**Keywords:** *Psidium guajava* L., COPD, Ailments, Ayurvedic, Unani, Clini.

## MAKING SMART CITIES INTO SMART SUSTAINABLE CITIES

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### ABSTRACT

Sustainability has always been a pivotal component of Indian culture. Indian philosophy and values has always underscored a sustainable way of life. The fact that economic growth alone is not sufficient to enhance wellbeing was already apprehended by ancient India. Smart cities can be defined in various ways by various cities and countries. The concept is defined by the aspiration of people dwelling there. The core infrastructure elements in a Smart City would include; adequate water supply, assured electricity supply, sanitation, including solid waste management, efficient urban mobility and public transport, sustainable environment, safety and security of citizens, particularly women, children and the elderly, and health and education etc. Rather than talking about Smart cities it would be appropriate to have “smart sustainable cities” which sustain water by retrofitting system for wastewater reuse, provide assured electricity but only from renewable energy resources, provide best sanitation with integrated municipal solid waste management, affordable public transport that runs on biofuels and blended fuels (2G ethanol), provide holistic education which connect people to nature and motivate them to understand and apply old sustainable practices and culture to their life. Narrow view of environment will just lead to depletion of natural resources and generating pollution beyond the assimilative capacity of nature. We may end with smart city but will make the surrounding cities worse to survive. The agenda of 'Smart City Mission' of India can become sustainable success if we are able to change the mindset and attitude of citizens towards environment and its importance.

**Keywords:** Smart city, sustainable, eco.

## HYDRATION STUDIES OF BLENDED CEMENT

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### ABSTRACT

Due to population growth and industrial development demand of cement is continuous increases day by day. Scientists of all over the world are busy to reduce the cost of production of cement India is very vast country it depends upon agricultural rice paddy are produce in large amount their collection create large pollution to save atmosphere from pollution their utilization in cement industry save from it it has good pozzolanic material quality all experimental datum like Wn, Setting time Liquid Analysis Compressive strength Expansion Analysis shows that Blended cement has good quality than OPC. It has also reduce the corrosion effect.

## **EFFECT OF CARBOSULFAN ON SEED GERMINATION AND PRIMARY METABOLITE IN *VIGNA MUNGO***

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### **ABSTRACT**

Carbosulfan is a commercially formulated insecticide which belongs to carbamates class of synthetic pesticides. The IUPAC name of carbosulfan is 2,2-Dimethyl-2,3-dihydro-1-benzofuran-7-yl [(dibutylamino) sulfanyl] methyl carbamate. Carbosulfan is formulated with other carbamates and member/s of other classe of synthetic pesticide. Nowadays carbamates and carbamates with organophosphates pesticides are widely used as an effective insecticide over the globe. The main purpose of this study is to evaluate the significant stimulus at different concentrations of carbosulfan (1ppm, 10ppm, 50ppm, 100ppm and 500ppm) towards seed germination and estimate the content of various photosynthetic pigments in *Vigna mungo* i.e Black Gram (Urad). Two different methods have been applied for this work, first moist sterile cotton in petri dish and second with sterile soil in ice-cream cups. Primary metabolite such as photosynthetic pigments (chlorophyll, xanthophyll and carotenoid) etc. were estimated by thin layer chromatography and biospectrophotometer, qualitative and quantitative estimation respectively. The percentage germination and shoot length were enhanced in lower concentrations (1ppm) as compared to control on soil. However morphogenic response significantly declined with increasing concentration of carbosulfan on moist cotton. Photosynthetic pigments significantly reduced with increasing concentrations of carbosulfan as compared to control in both methods. We also observed that harmful effect on germination and growth beyond 10 ppm, but still surviving the seedling at higher concentration (500ppm).

**Keywords:** Carbosulfan, *Vigna mungo*, Chlorophyll, Xanthophyll and Carotenoid.

## ENVIRONMENTAL BENIGN CHEMISTRY

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### ABSTRACT

India has a low per capita emissions of greenhouse gases but the country as a whole is the third largest after China and the United States. India is the world's largest consumer of fuelwood, agricultural waste and biomass for energy purposes. Scientific studies include biomass combustion in India is the country's dominant source of carbonaceous aerosols. Adulteration of gasoline and diesel with lower priced fuels increase emissions of harmful pollutants from vehicles, worsening air pollution. Exposure to particulate matter for a long time can lead to respiratory and cardiovascular diseases. The beginning of green chemistry is frequently considered as a response to the need to reduce the damage of the environment by man-made materials and the processes used to produce them. A quick view of green chemistry issues in the past decade demonstrates many methodologies that protect human health and the environment in an economically beneficial manner. Sustainable Chemistry or Green Chemistry, is an area of chemistry focused on the designing of products and processes that minimize the use and generation of hazardous substances. It is the design of chemical products and processes that reduce or eliminate the use or generation of substances hazardous to humans, animals, plants, and the environment. Chemicals that go up the stacks and down the drains are simultaneously a serious detriment to the environment, and a threat to natural resources. Green chemistry discusses the engineering concept of pollution prevention and zero waste both at laboratory and industrial scales. This chemistry covers all these aspects of eco-friendly methods and promotes their use in research laboratories and in industrial organic synthesis processes. It encourages the use of economical and eco-compatible techniques that not only improve the yield but also bring down the cost of disposal of wastes at the end of a chemical process. Green chemistry involves green solvent, green catalyst, and green techniques/ methodologies in the chemical processes. Also, there are the methodologies which do not require solvents or using less solvents than the conventional methods. The environmental protection agencies in various countries played a significant early role in fostering green chemistry through its pollution prevention programs, launch journals related to green chemistry, provide funds and developing professional coordination.

## **ENVIRONMENT POLLUTION, HAZARD AND DISASTER AND CHALLENGES IN SOUTH ASIA: AN OVERVIEW**

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### **ABSTRACT**

In this paper I, would focus on Environment Pollution, hazard and Disaster and Challenges in South Asia: An Overview. Environment Pollution and Disaster, whether natural or manmade, have been affecting the lives of the people in almost countries not only South Asia but also across the globe. Physical and social vulnerability of its people, due to the huge population and poverty, further enhances disaster risk. The severe devastation brought on by the 2004 Indian Ocean Tsunami and 2008 Cyclone Nargis, kedarnath flood, kashmir flood, Nepal earthquake, Kerala flood was indeed a wake-up call. Now one just wonders how severe the next disaster must be before the region as a whole commits itself to hard choices. South Asia covers diversified climatic zones and experiences an array of climate change impacts. Human pressures together with changing hydrology and land resources have distinct impact on the production of food grain and resilience of ecosystems. The most threatened areas are grasslands and mountain forest ecosystems of the Himalayas and ecosystems of the Sundarbans. Forests of South Asia having most biologically diverse ecosystems on the planet are destroyed due to rapid deforestation and urbanization. Moreover, the South Asia partake the worst air pollution in the world, and it is maximum in India. Thar Desert is extending at a rate of 100 ha per year which may cause damage to approximately 13,000 ha of cultivated lands and pastures in India and Pakistan. Availability of freshwater is highly seasonal in this region, and water supplies become more threatened by higher temperatures, changes in river regimes, and greater incidence of coastal flooding. This paper discusses major environmental issues faced by the South Asian people. Major environmental issues discussed here are climate change, geophysical setting, ecosystem changes, overgrazing, import of hazardous wastes, deforestation, desertification, pollution, population pressure, collapse and pollution of land resources, water resources and lack of potable water, biodiversity loss, food security risks, depletion of energy resources, and degradation of river and marine resources. Different problems created by mentioned environmental issues like biodiversity loss, impacts to the marine environment, atmospheric pollution, deficient urban structure, water scarcity and degradation, soil erosion and land degradation, natural disaster, pests, and diseases have been depicted in this chapter. Some recommendations have also been provided on the basis of major environmental issues identified and resultant problems.

**Keywords:** Environment Pollution, Hazard, Disaster South Asia

## IMPROVED TOLERANCE TO HEAVY METALS STRESS THROUGH WATER BUDGETING IN ADULTS OF DROSOPHILA MELANOGASTER

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### ABSTRACT

The purpose of the present study was to ascertain the role of juvenile heavy metal (HM) stress on fluid content in *Drosophila melanogaster* populations selected for divergent traits. The optimum concentrations chosen were 13mM and 5  $\mu$ M for two heavy metals FeSO<sub>4</sub> (essential) and CdCl<sub>2</sub> (non-essential). Interestingly, supplementation of supposedly essential HM, FeSO<sub>4</sub> and non-essential HM CdCl<sub>2</sub> did not affect water content. Taken together these results, suggest that the stress response mechanisms are perhaps stress specific rather than conserved across animal system.

**Keywords:** Heavy metals (HM); water; homeostasis.



## GAMETOPHYTE DEVELOPMENT OF ONYCHIUM CRYPTOGRAMMOIDES

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### ABSTRACT

*Onychium cryptogrammoides* is a small, terrestrial fern and is found in tropical regions and of the Old World, in Northeast Africa, Iran, India, Japan, New Guinea, and China. The spores were collected from Tungnath, Uttarakhand for studying spore development and reproductive biology of *Onychium cryptogrammoides*. Development pattern of spore germination, gametophyte growth, differentiation, sex ontogeny and gametophyte of *Onychium cryptogrammoides* were studied in vitro conditions. In vitro culture of fern gametophytes provides a means of (in controlled conditions) studying their unique adaptive features and experimental system for the investigation of cellular and organ level growth and differentiation of gametophyte. The culture of fern gametophytes provides a means of studying their unique adaptive features and experimental system for the investigation of cellular and organ level growth and differentiation of gametophyte. The fern gametophyte in a simple structure, generally consisting of a single sheet of cells dotted with gametangia. It lacks differentiation into leaves, stems, and root and complex tissues such as vascular and epidermal tissue. Ferns gametophytes are haploid, and independent of the sporophyte plant. It has great potential to yield important and significant insights in understanding functions of unique to the gametophyte, sex determination, gamete production and fertilization. The spore germination and prothallial development are found to be of *Vittaria*-type and *Ceratopteris* type respectively. Sex organ development is of leptosporangiate type. The fern gametophyte in a simple structure, generally consisting of a single sheet of cells dotted with gametangia. It lacks differentiation into leaves, stems, and root and complex tissues such as vascular and epidermal tissue. Ferns gametophytes are haploid, and independent of the sporophyte plant. It has great potential to yield important and significant insights in understanding functions of unique to the gametophyte, sex determination, gamete production and fertilization.

## **CONVERSION OF FLORAL WASTE FROM GWALIOR TEMPLES INTO VERMICOMPOST - A NOVEL ECOFRIENDLY APPROACH**

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### **ABSTRACT**

In India, enormous amount of floral waste comes out from temples and due to improper methods of disposal, becomes the source of environmental pollution, foul smells, filthy and unhygienic atmosphere, spreading of infectious diseases and bad image to the locality and city. It was planned to conduct a study on conversion of floral waste into useful vermicompost. Composting earthworms do not survive in decaying flowers, hence other waste stuffs like cattle dung, soil, sand, dried leaves, husks, coco peat, saw dust, shredded paper, compost were mixed to make suitable medium for the culture of African earthworms *Eudrilus eugeniae*. Mixing of other waste also helps to control problems of laechate formation, multiplication of pathogens and emission of foul odours. Encouraged with these results, it was decided to process bulk amount of floral waste procured from temples. The target waste is mixed with dried leaves, shredded papers, ready compost and little bit of soil and the mixture is filled in tank, surface bed and container systems for vermicomposting. After a period of 2 weeks of equilibrium culture of worms was released. The worms rapidly feed and breed in the medium and in about 2 months vermicompost is ready to be harvested, sieved and packed for the use and supply.

On 5th June 2015 “Garden and Temple Waste Unit” was inaugurated in the premises of School of Studies in Environmental Science. Since then this Centre is functioning well and presenting an ideal example of “Clean India Mission”.

## **NON-INVASIVE BIOACOUSTICS TECHNIQUE AS A METHOD OF ASSESSING BIODIVERSITY**

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### **ABSTRACT**

India is a mega-diversity nation. It's 2.4 percent of earth's land accounts for around 7-8 percent of world's recorded species. Among its rich biodiversity, it harbors around 1200 species of birds which accounts for 12-13% of total bird species in the world. With such a rich avian fauna, India has tremendous potential in the field of avian bioacoustics. The powerful technique of bioacoustics is non-invasive and is of great value in the field of species identification and animal conservation. Bioacoustics provides valuable data for scientists and conservationists. It can be used to identify the presence of individual species or to assess the diversity of a group of species. Also, an emerging field of research is to use the soundscape of a place (combination of biophony, anthrophony and geophony) as a rough measure of biodiversity and ecosystem health. For conservationists, acoustic sampling can provide evidence whether conservation efforts are working or not. The field of bioacoustics is still in a nascent stage in India. It holds immense power in the field of conservation. It can be utilized to engage young students and researchers in science and develop scientific workforce specializing in bioacoustics technique which will help towards conservation efforts.

## ANTIBACTERIAL EFFECTS OF UNDERGROUND PART OF MEDICINAL PLANT (BARLERIA PRIONITIS) WITH ETHANOL EXTRACT ON PATHOGENIC STRAINS

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### ABSTRACT

**Introduction:** Plants are most captivating creation on this Earth. From isolation, identification of active constituents from the extract, to specific therapeutic activity with dose-response relationship has been made by modern researchers only. However, synthetic chemistry development is so high, still higher plants are the major source of medicinal compounds. So through the present study, we can explore traditional medicine by investigating this medicinal plants (Barleria prionitis) underground part i.e. Roots with ethanol extract. To investigate the Antibacterial activity of medicinal plant (Barleria prionitis) root ethanol extract.

**Methodology:** Selection of plants was done with random sampling methods. The collection was done from fields and nurseries of Aligarh, Modinagar, and AMU. Plant authentication was done from NBRI. Barleria prionitis roots extraction was done by the Soxhlet method using ethanol. After extraction, phytochemical estimation, the extract was selected for MIC. MIC was done with dilution method on five bacterial strains. Data were expressed as  $\pm$ Standard error mean and deviation with range.

**Results:** Investigation of BRE (Barleria root ethanol extract) were selected for second screening with MIC, these samples were investigated against five bacterial strains (*Pseudomonas aeruginosa*, *Salmonella typhi*, *Bacillus thuringiensis*, *Bacillus anthracis*, and *Chlamydia pneumonia*). In which, BRE gave a very high value of MIC i.e. 1 to 7.5 mg/100  $\mu$ l, in this case, BRE gave a higher value of MIC only for *Pseudomonas aeruginosa*, rest of bacterial strain showed low MIC inhibition

**Conclusion:** Barleria root ethanol (BRE) extract have shown very good inhibition for all experimental bacterial strains but it has an excellent effect against *pseudomonas aeruginosa*.

**Keywords:** Barleria prionitis, Roots, Ethanol, Antibacterial, medicinal plants.

## CHARACTERIZATION OF DIFFERENT SOURCES OF WATER AND THEIR EFFECT ON GROWTH CHARACTERISTICS OF TRITICUM AESTIVUM

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### ABSTRACT

Deterioration of underground sources of water due to improper disposal and mismanagement of industrial effluents has become a worldwide problem. Further, situation becomes worse when these chemicals escape through treatment plants and reoccur in drinking water supply which causes many diseases and health-disorders. According to W.H.O survey, usage of polluted water is the main reason behind deadly diseases like salmonellosis, diarrhea, dysentery, cholera etc. Hence, it is very important to examine the quality of water regularly for day to day use. In the present study we have characterized different sources of underground water by examining various notable parameters like BOD, COD, pH, conductivity, total dissolved solutes, ammonia nitrogen, ammonium nitrogen, fluoride, chloride, nitrate and sodium content. Level of above mentioned parameters were above the permissible limits in hand pump and boring water supply which indicates deteriorating quality of underground water. However, quality of municipal supply of drinking water was better but will soon be in danger zone if the improper disposal of industrial effluents continues in the same manner. Further to investigate the toxicity effect of these water samples on plants we have examined germination vigour potential of Black gram and found decreased growth potential which is an alarming concern not only to environment but for the survival of future generation round the world.

**Keywords:** Underground water, pollution, parameters, Triticum aestivum, vigour potential.

## CAUSAL DYNAMICS BETWEEN CO<sub>2</sub> EMISSIONS AND GDP PER CAPITA: A COMPARATIVE ANALYSIS OF DEVELOPED AND DEVELOPING ECONOMIES

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### ABSTRACT

Environment - Economy nexus has been one of the major concerns of every economy. One of the biggest pollutant to the environment has been Carbon Dioxide (CO<sub>2</sub>) which has been the focus of the present study which examines the relationship between CO<sub>2</sub> and Economic Growth in Developing as well as Developed economies. The present study includes India and China as the two emerging developing economies & Japan and USA as the two developed economies. The variables included in the study are CO<sub>2</sub> emissions in metric tonnes per capita & GDP per capita ( as an economic growth variable). To see the impact of economic growth on CO<sub>2</sub> emissions, the study uses econometric techniques of Causality & Co-integration & Vector Autoregression (VAR). To test the stationarity of variables, Unit Root ADF test has been used in the study. The study period is annual data for the variables for the period :1960-2014. The findings of the study reveal that in case of both the developing countries under study the two variables were co-integrated & GDP per capita was causing CO<sub>2</sub> emissions but vice versa was not true. In case of two developed economies the variables were not found to co-integrated and no cause effect relation was proved in their study. In terms of stationary in both the variables were found to be stationary at first difference except China where the variables were second difference stationary.

**Keywords:** Economic Growth, CO<sub>2</sub>, VAR, Causality , Co-integrati.

## CONTENT ANALYSIS OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORTS IN INDIA

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### ABSTRACT

EIA is a process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made (MOEF & CC, Manual EIA). It was given a legislative status through a Notification issued by the Ministry of Environment, Forests and Climate Change (MoEF & CC) in January 1994 under Environmental Protection Act (EPA) 1986, then came the Notification September 14, 2006 and with around 25 amendments to it, it supersedes all the earlier Notifications and it is in present use. Using web, research papers related to EIA in India were searched, 27 research papers found published from 1986 to 2016 (by keywords as EIA, India, South Asia) out of which none of them focusing on online system. The purpose is to analyse EIA reports submitted by project proponent in the online system. Category 'A' projects having big capacity and handled by Central Government got Environmental Clearance (EC) in 2015 are studied, these were in total 282 reports. The present state of research took shape after year-wise trend study, zonal distribution study, qualitative analysis of reports, content analysis of alternative analysis and public consultation chapters.

*Table.1 - Proportion of main chapters by activity (%)*

Main chapters	Coal Mining	Industrial-I	Industrial-II	Infra., CRZ, etc.	New Construction and Industrial Estates	Non-coal	River Valley and Hydro.	Thermal Projects	Total
Introduction	100.0	96.4	93.6	60.3	45.2	98.7	100.0	100.0	81.9
Project description	100.0	96.4	96.8	56.9	47.6	98.7	100.0	100.0	81.9
Site description	100.0	94.5	96.8	67.2	76.3	98.7	100.0	100.0	87.9
Current environmental status	87.5	96.4	96.8	60.3	66.7	98.7	100.0	100.0	85.1
Legal & regulatory framework	87.5	92.7	96.8	46.6	4.8	88.6	100.0	50.0	68.8
Alternative analysis	75.0	41.8	25.8	29.3	0.0	54.4	40.0	50.0	35.8
Environmental Impact study	100.0	96.4	96.8	60.3	50.0	98.7	100.0	75.0	82.6
Mitigation measures	100.0	96.4	96.8	74.1	80.5	100.0	100.0	75.0	90.4
Consultation	100.0	83.6	83.5	27.6	2.4	100.0	100.0	75.0	65.2
Monitoring	100.0	96.4	100.0	56.9	45.2	98.7	100.0	75.0	81.6
Risk & Safety	100.0	94.5	96.8	51.7	9.5	100.0	100.0	75.0	74.8
Cost aspects	100.0	92.7	96.8	44.8	19.3	98.7	100.0	75.0	74.1
Summary and Conclusion	87.5	94.5	96.8	98.3	9.5	96.2	40.0	100.0	73.1

Qualitative analysis result is shown in Table. 1 where horizontal showing the activities and vertical showing the names of the chapters in total 282 reports. As 101 reports had alternative analysis, it found out that 14 had site/ route/ alignment alternatives, 12 had technical alternatives, 2 had with/ without project scenario mainly. As 184 had public consultation, it found out that it had different kind of content mainly 184 had proceedings/minutes, 131 had attendance, 64 had advertisement/ notice/ circular, 24 had photos of the meeting.

## FUNGAL PATHOGEN ASSOCIATED WITH CITRUS LIMETTA RISSO

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### ABSTRACT

Horticulture is the science and art of growing plants (fruits, vegetables, flowers and other cultivar). It also highlights the plant conservation, landscape restoration, soil management, garden design and etc. India is the second largest producer of fruits after Brazil. Fruits play an important role in human nutrition by contributing the necessary growth factors such as vitamins and essential minerals in human daily diet, which is also helpful in maintaining a good health. Rot diseases caused by fungal pathogens, provoke severe losses of agricultural and horticultural crops every year (Salman 2005; Parveen et al., 2016). CITRUS LIMETTA RISSO. belongs to the family Rutaceae. Though leaf spot and fruit rot is a common disease, severely affecting the growth and yield of the plant, it has gained, least attention of researchers. A current research includes the collection of Citrus leaf spot disease sample collected from Merkera district of Karnataka, India. The pathogen was isolated from surface sterilized small pieces of the leaves and twigs, incubated on Potato Dextrose agar (PDA) at 25°C. The study was based on the colony characteristics [morphological and cultural characteristics], Fungal pathogen *Helimentosporium*, was identified as a causal agent of the disease,. Disease management studies is under process.

**Keywords:** *Helimentosporium*, Colony characteristics, Rot disease, PDA, *Citrus Limetta Ris.*



## **A POPULATION-BASED STUDY OF OCCUPATIONAL HEALTH OF WELDERS ON THE BASIS OF GENERATED FUMES AND LOCAL ENVIRONMENTAL CONDITIONS**

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### **ABSTRACT**

Welding is a very demanding and challenging job used in many occupations such as manufacturing, construction, industrial maintenance and repair, ship and boat building etc. But few of the individuals actually called themselves welders, while the mostly of these are dependent on other professions such as fitter, painting, grinding, mechanics, own small scale shops etc. along with welding. Therefore a large part of our industrial workforce is related to welding directly or indirectly. Most of the welders in industries are prone to respirational health issues. Non-usage of personal protective equipment (PPE) leads an exposure to respiratory, skin, eye, ear, and neurological problems generated by welding fumes.

A questionnaire based survey was organised to collect demographic records, smoking records, and respiratory symptoms. Forced expiratory volume in one second (FEV1), forced vital capacity (FVC), and peak expiratory flow (PEF) were measured by PFT device to evaluate the health status of welders engaged in SMAW process. We visited some organised and unorganised places in NCR region of New Delhi and surveyed welders and welding related personnel. Respiratory symptoms related both to cigarette smoking and a measure of lifetime exposure to welding fume. Factors such as environmental conditions and TLV for welding also taking into consideration. Welder's technical education, awareness, experience and salary & family structure also plays an important role in their consciousness about their health. We have collected the data and currently analysing it.

## SOCIO, ECO, ETHICAL IMPACT OF NANOTECHNOLOGY

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### ABSTRACT

Nanotechnology is one of the emerging branch of science in present time from past. From few decades there has been wide implication in area of nanotechnology and its environmental issues. The present paper is dealing nanotechnology and consequential issues related with society, ecosystem on ethics and health. Certain features of nanotechnology are likely to important in determining of impact in certain area of society and environment. The paper is elucidating all there aspects clearly.

**Keywords:** Nanotechnology, Environmental issues, Ethical, Society, Ecosystem.



**BIO-ACTIVE COMPONENTS/PHYTOCHEMICALS AND  
THEIR USE FOR CONTROL OF FASCIOLA LARVA  
INFESTATION IN INTERMEDIATE HOST SNAIL**

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**ABSTRACT**

Fascioliasis is one of the most debilitating zoonotic diseases in cattle populations. These parasitic trematodes (*Fasciola hepatica* and *F. gigantica*) are leaf-shaped worms. The world health organization (WHO) has estimated that 2.4 million people are infected with *Fasciola*, and a further 180 million are at risk of infection. Human fascioliasis is food-borne trematode infection, commonly acquired by eating encysted metacercaria on aquatic leaves which eaten as vegetables. The snails (*Lymnaea acuminata*, *Indoplanorbis exustus*, *Bulinus*, *Passaria*) serve as intermediate host for parasitic flat worm of the *Fasciola* species. This disease ranks as major causes of morbidity and mortality both in man and live-stock and contribute to socioeconomic problem. Traditionally use of medicinal plants in different disease and parasitic control has been identified throughout the world from the beginning of the human civilization. These medicinal plants have different bio-active components/phytochemical which is highly potent against parasites. The controls of fascioliasis infestations in different part of world are frequently using synthetic drugs among cattle and human populations which are very effective in curing fluke infection, but it's also causes a number of side effects. Snail is an intermediate vector host for fascioliasis infections among cattle and human. The different larval stages of the *Fasciola* are completed life cycle in the snail body. The infected snail population can be control by using bio-active components/phytochemicals with different technique it may be effective in fascioliasis control. Thus, the use of different bio-active components/phytochemicals or plant products can be useful for control of the vector snail population below threshold level. Bio-active components/phytochemicals are easily available biodegradable and more ecologically safer. It may be effective and new approaches for the control of fascioliasis infestations.

**Keywords:** Fasciolosis; *Fasciola hepatica*; *F. gigantica*; Snail control; Bio-active components; Phytochemical.

## EVALUATION OF CYTOTOXIC POTENTIAL OF MIMUSOPS ELENGI COLUMNAR PURIFIED BARK EXTRACT ON HELA CANCER CELL LINE

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### ABSTRACT

Evaluation of cytotoxic potential of ethanolic and column purified extract of *Mimusops elengi* on HeLa Cancer Cell Line. Cancer is one of the biggest worldwide health concerns. It has anti-inflammatory activity in addition to that its cytotoxic activity on cervical cancer cell lines can be evaluated. The *M. elengi* is used as a medicinal plant from centuries, contains several compounds like flavonoid, saponin etc the metabolic extract of bark was screened for its anti-inflammatory and cytotoxic activities. HeLa cell line is an oldest and most commonly used human immortal cell line used in scientific research The ethanolic and column extract of *M. elengi* was prepared using column purification extraction method. Cytotoxic assay of ethanolic extract and column purified of *M. elengi* was carried out in HeLa cell lines. Saponin is present in these fractions was confirmed by preparative TLC and HPLC. The maximum cytotoxic activity among all concentrations up to 48 h was found in 48h of exposure. The IC<sub>50</sub> values of column purified pure compound ethanolic extract of *M. elengi* HeLa cell lines of 24h 71.33µg/mL and 48h 11.23µg/mL, respectively. The presence of saponin in column purified extract was confirmed by TLC and HPLC and it may be responsible for the high cytotoxic activity in the HeLa cell lines as it is also reported in the literature.

## AEROSOL AND ATMOSPHERE

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### ABSTRACT

An aerosol is a suspension of fine solid particles or liquid droplets in air or in another gas. Natural examples of aerosol are fog dust, forest exudates geyser steam, haze particulate air pollutants and smoke. Aerosol can influence climate by scattering light and changing earth's reflectivity, they can also alter climate via clouds on a global scale these aerosols indirect effect typically work in opposition to greenhouse gases and cause cooling. Aerosols scatter sun directly back in to space. Aerosols in the lower atmosphere can modify the size of cloud particles. Aerosols play an important role in climate and atmospheric Chemistry. Due to scattering of Sun light, provide condensation nuclei for cloud droplets. Aerosols play an important role in the balance of the Earth's climate. Aerosols decrease visibility, contribute to acid rain and affect human health. Due to aerosols asthma, breathing difficulties, these diseases occur.

**Keywords:** Aerosol, Atmosphere, Fog, Climate.

## EFFECT OF GLOBAL WARMING ON THE ENVIRONMENT

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### ABSTRACT

The global warming is a phenomena in which the increase of the average temperature on earth. Therefore earth getting heats, disasters like hurricanes, droughts and floods are getting more frequent. Over the last 100 years, the average air temperature near the earth's surface has risen by a little less than 1 0C or 1.3 degrees Fahrenheit. Deforestation is major factor for the global warming because day by day increasing the amount of CO<sub>2</sub> in the atmosphere which is responsible for the global warming. The ocean is a huge carbon sink, holding about 50 times as much carbon as the atmosphere. Burning different fossil fuels like natural gas, coal, oil and gasoline raises the level of carbon dioxide in the atmosphere, and carbon dioxide is a major contributor to the greenhouse effect and global warming. The climate change would increase the number of people suffering from death, disease and injury from heat waves, floods, storms and droughts. Floods are low-probability, high-impact events that can overwhelm physical infrastructure and human communities. We can reduce the amount of CO<sub>2</sub> by the more plantations on the earth and environmental education in human societies. Environmental awareness is a major tool for the control of global warming.

**Keywords:** Global warming, Environmental education.

## **ETHANOL IS A RENEWABLE SOURCE OF ENERGY FOR SUSTAINABLE DEVELOPMENT IN INDIA**

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### **ABSTRACT**

Ethanol is a renewable resource of energy and it is an alternative to fossil fuels for sustainable development. Production of ethanol by fermentation process in which sucrose (from sugar cane and sugar beet etc.) or starch (corn, wheat, potato etc.) converted into cellular energy and thereby produces ethanol and carbon dioxide as metabolic waste product at the end. Ethanol produced by fermentation called bioethanol is used as biofuel and also produce bioelectricity. Brazil is the largest sugar producer in the world from sugar cane is an example in which ethanol became a significant co-product of sugar mills produced around 95% of their electricity need as bioelectricity and in transport automobile industry now selling the second generation of "flex- fuel cars" which run on move on fuel. Usually gasoline blended with ethanol fuel (20-25%) or only hydrated ethanol (E 100) or both fuel stores in same tank. India is the second largest sugar producer in the world after Brazil so it is very difficult to dispose the waste generated after extracting sugar from sugar cane juice (molasses) biogases and straw. If this waste can be utilized to extract ethanol which would be eco-friendly and highly economical and beneficial and reduced the dependence to fossil fuel so it became future source of energy. Present paper is based on the production of ethanol using sugar cane, biogases and straw as a raw material and to use it is an alternative fuel in internal combustion engine and as a bioelectricity.

**Keywords:** Ethanol, Fossil fuels, Bioethanol, Biofuel, Eco-friendly.

## INDUSTRIAL DEVELOPMENT WITH THE SUSTAINABILITY OF NATURE AND NATURAL RESOURCES

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### ABSTRACT

In present era, ever increasing population and ever proliferation demand for variety of products of market preferences in favor of deliberate under utilization of natural resources and depreciation of theft have explored the available reserves natural resources is at the danger level of depletion. The closed eye way utilization of the resources clearly discriminate exploitation of resources and dumping the obnoxious by product in the environment so that the environment gradually becoming more abstracted and different natural chain and cycle era being interrupted so whole ecosystem is going to damage The present paper is discussing the bringing human use of natural resources with sustainable limit of consumption and made effort to save it. This is the time for creating the awareness and thinking, to conversion of non-stainable development to sustainable development and change the linking regarding consumption with society. At present we have required to change attitude and habituated mind set of human bring by well educational planning with the efficient governance of academicians under the low and environment protecting framework.

**Keywords:** Sustainable, Exploitation, Natural resources.





## WATER POLLUTION DUE TO IDOL IMMERSION

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### ABSTRACT

We already know that Water is the most important resource on the planet. It is the essence of all life on earth. And yet if we ever see a river or lake around our city, it would be evident to us that we are facing a very serious problem of water pollution. It has been suggested that water pollution is the leading worldwide cause of death and diseases. India & China are two countries with high levels of water pollution. The whole water is getting polluted through many sources such as urban runoff, agricultural and industrial, human activities etc. But the main objective is regarding the water pollution due to idol immersion. India is a rich cultural country in which diverse cultural and religious festivals are organised. After worship these idols are immersed into water bodies. Idols are mainly constructed by Plaster of Paris, clay, small iron rods and decorated with different paints which can lead to alteration in the water quality after immersion. Paints which are used to colour these idols contain heavy metals such as mercury, lead, arsenic, zinc etc. which are potent carcinogens. The floating materials released after decomposition result in eutrophication, increase in acidity. Heavy metal pollution caused by idol immersion can damage the ecosystem, mainly aquatic ecosystem. The polluted water also causes various types of disease in human beings including skin diseases. The effects of idol immersion on various water bodies of India like Ganges river, Bhoj wetland, Yamuna river etc. General guidelines for idol immersion is that idol should be made from natural materials, water soluble non-toxic dyes should be used, synthetic liner may be placed in the bottom, well in advance. Now a days, idols are made up of alum, so that idols can easily dissolve in water and clean the water because alum is used as water purifier. These guidelines if followed and acted upon can help in bringing tremendous change in the water quality of water bodies.

**Keywords:** Water pollution, Sources of water pollution, harmful chemicals, heavy metals.

## **BIOMASS AND CARBON STOCK ESTIMATION BY FOREST INVENTORY AND REMOTE SENSING DATA IN TEMPERATE FORESTS OF INDIA.**

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### **ABSTRACT**

Anthropogenic activities through unsustainable development have caused widespread global warming and disruption of carbon balance in the biosphere. Nature has an excellent sink for CO<sub>2</sub> in the form of forests. Sustainable management of these forests will help to fix the carbon from atmosphere into terrestrial environment. This study aims to use ground survey data coupled with remotely sensed data to improve the accuracy for estimation of forest biomass and carbon. The study was conducted in moist Deodar forest and Ban-oak forest of Uttarakhand. The species diversity and richness were determined and tree biomass and carbon stocks were estimated using allometry method. The biomass and carbon data were correlated with the remotely sensed data from Landsat 8 (USGS). This study also observed vegetation cover change and land-use and land-cover change of the sites with base year 2013 and current year 2018. Result shows the tree biomass for moist Deodar forest as 920.194 Mg/ha, carbon stock of 423.018 MgC/ha and an increase in the area under forest cover by 7.29 % within 2.5 km radius. The Ban-oak forest has a total tree biomass of 620.718 Mg/ha, carbon stock of 281.947 MgC/ha and a decline of 5.81% in the area under forest within 1.5 km radius. This study reveals the standing biomass and carbon stock for the two study sites along with the clear change in the land-use and land-cover change for the study sites. This data can be used as a baseline for estimating the biomass and land-use changes and strategies for sustainable management of our forests.

**Keywords:** Biomass and carbon, temperate forest, allometry, remote sensing, land-use and land-cover.

## KUMBH MELA: A REASON OF WATER POLLUTION

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### ABSTRACT

KUMBH MELA is said to be the most religious events regarding ritualistic activity. It is mass Hindu pilgrimage of faith where millions of Hindu gathers at ghats to take holy dip in river. People also use the water for drinking (AACHMAN) irrespective of the water quality. KUMBH is said to be the holy festival and it has been celebrated in PRAYAGRAJ, HARIDWAR, UJJAIN & NASIK since long. The organic pollutant contributed during mass bathing is significantly revealed as one of the major cause of water pollution. Apart from washing with detergents, pilgrims offer milk, curd, ghee flowers idols immersion, ashes and other religious material into water. Many times polythene bags are used for various purposes, these polythene and other non-biodegradable materials are dumped at the river bank site or remain either floating on the water surface or reaches the river bed substratum creating lethal effect to aquatic life. Introduction of waste to aquatic ecosystem, initiate biochemical reaction due to the presence of bacteria and other micro-organisms, result in the enhancement of BIOLOGICAL OXYGEN DEMAND (BOD). Contamination of water with fecal matter consider to be the greater risk to human health as it more likely to contain dangerous pathogen. Higher level of fecal matter cause greater risk of water borne diseases. Total Coliform count-an indicator of microbial contamination increases due to fecal matter. Millions of devotees immerse themselves at the confluence of river Ganga and Yamuna which are hit by the alarming pollution level during Kumbh. According to the report of CPCB (CENTRAL POLLUTION CONTROL BOARD) and UP State Pollution Control Board (2015) the water quality at Sangam (PRAYAGRAJ) gets more affected due to mass bathing and other religious activities apart from sewage discharge.

**Keywords:** Ganga River, Physico-chemical Properties; Water Quality; Pollution; Environmental condition.

## RIVER REJUVENATION: DREAM OR REALITY?

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### ABSTRACT

History is something we should always look back to. Because, it paves the way to see the upcoming future. And history indicates that our civilization born along the river and it died when river shifted. If we see this thought process by wearing spectacles of contemporary world and taking India at centre, we are clearly making a statement that we didn't learn anything from history and we are moving towards a gloomy future. The river-Nation's lifeblood, are facing an alarming crisis in our country. In our culture river is not just considered as water bodies but as a life-giving God and goddess. That's why we call the Ganga river as a Ganga Maiya. Unfortunately, this Ganga Maiya turn into one of the most endangered and polluted rivers in the world. This is not the only case of Ganga, it is the situation of every major rivers of our country whether it is a Glacier feed or forest feed river. Statistical data are showing that major river will become seasonal in next 20 to 25 years. So, the big question is how will we sustain our daily life? In present scenario, 2 out of every 3 cities are already dealing with daily water shortage. Farmers have no water to irrigate their land for cropping. Every year we spend some month with no water- dry like situation and some month with excess water- flood like situation. Estimate says that 65% of our water needs are made by rivers. These data certainly indicate that we had done comprehensive structural damage to our River system. To be true, water hasn't gone anywhere but it is not just where it needed. Everyyear due to monsoon we got 40 to 50 days rain. The onerous task is how to hold this water for 365 days and increase the groundwater level. For this we need proper vegetation and soil with enrich organic content. We need to shift from soil depleting crops to tree based agriculture. And need to stop our economic lust. If we don't do this, then in few years we won't be drinking from bottles, we will be bathing from bottles.

## **AN EFFECTIVE STRATEGY FOR HEAVY METAL REDUCTION: A REVIEW ON BIOREMEDIATION**

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### **ABSTRACT**

Heavy Metals are essential trace elements but when this accumulated at high concentration can be toxic, so the persistent heavy metals pollution poses a threat to living in the environment. The heavy metals are reactive even at low concentration and once accumulated in food web can adverse effect public health. Unlike organic pollutants, if heavy metals once introduced in environment, that cannot be degraded easily, so conventional physical and chemical methods are not effective as well as they have economic disadvantage and introduction of new chemicals into environment. The main strategy of the remediation of pollution is to reduce the mobility and toxicity of metals. One of the efficient methods to reduce metal pollution is Bioremediation. Bioremediation is an innovative technique which utilizes the microbial metabolic system to expel the pollutants and also it utilizes moderately low cost and low technology method. There are many microbes that have potential to remove heavy metals, for instance *Pseudomonas aeruginosa*, *Corella vulgaris*, *Rhizopus arrhizus sulfolobus*. Using microbe's full potential will not just remove this harmful metals from the earth but it will also not create any bad impact on the living so hence it can be looked upon a promising methods for future to get rid of such metals and decrease the toxic level. Thus we should all invest in methods like these in which there is no toxicity and adverse effect of the method itself. This review discuss the toxic effect of heavy metals and describe the potential of microbes (Bioremediation) to reduce heavy metals pollutants.

## ASSESSMENT OF HEAVY METALS (PB AND ZN) CONCENTRATION IN SELECTED FLORICULTURAL SPECIES GROWN IN SOIL IRRIGATED WITH YAMUNA RIVER WATER

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### ABSTRACT

Water of river Yamuna is used for both abstractive and in-stream purposes like irrigation, domestic water supply and industrial, etc. The river experiences pollution due to point and non-point sources where National Capital Region and Delhi (NCR-D) is the major source, followed by Agra and Mathura. Regionous people in the flood plain area of Yamuna practice horticulture using water of river Yamuna as the only source of irrigation. Presence of heavy metals- Pb and Zn in particular, have been reported generally in Yamuna water. An attempt, therefore, was made to study to accumulation of Pb and Zn in rhizosphere soil and plant parts (root, stem, leaf and flower) of floricultural species, viz. Rosa "santana", Chrysanthemum and Tagetes erecta commonly cultivated in the Yamuna river bank, Delhi using water of Yamuna for irrigation. The concentration of Pb and Zn was analyzed using Atomic Absorption Spectrophotometer following flame technique. Among the test species, the concentration of Pb and Zn was recorded higher in Chrysanthemum, followed by Rosa "santana". Among soil and plant parts, the concentration of Zn was maximum in leaf for Rosa santana (1.93 ppm) and Tagetes erecta (1.63 ppm) and root (2.39 ppm) for Chrysanthemum. The concentration of Pb was recorded maximum in case of flower (3.23 ppm) for Rosa santana and leaf and root (3.23 ppm) for Chrysanthemum and non detectable for Tagetes erecta.

**Keywords:** Pb and Zn concentration, Floricultural species, Yamuna river water.

## LIMITATIONS OF ENVIRONMENTAL IMPACT ASSESSMENT STUDIES: SOME EXPERIENCES FROM INDIA

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### ABSTRACT

Economic development and environmental sustenance are intricately interlinked. Every developmental activity has some impact on the environment. The impacts categorized as “very severe” “irreversible” and “irrecoverable” are of concern as they degrade the environment and adversely effect sustainability of the economic development. Environmental Impact Assessment (EIA) has been established as a tool in twentieth century to strike a balance between (economic) development and environment. In India, following the Environment (Protection) Act, 1986, the EIA is mandatory for getting an Environmental Clearance (EC) for setting-up of new and expansion of existing development projects. It is now a life-cycle activity of a development project.

The environmental appraisal of the (economic) development projects in India are undertaken currently as per provision of the EIA notification, 2006 based on EIA/Environmental Management Plan (EMP) reports prepared by the project exponent(s) with the assistance of consultants. Although, every attempt is made to prepare a technically-sound EIA report, limitations still exist in reporting. Non-availability of primary data based on long-term studies has been the major limitation. At time, data are fudged or furnished without adequate field study. The technical human resource for preparation of EIA report is many times not upto the mark; the report prepared by the “so-called” experts have a chance of misrepresentation of environmental impacts of the project. Dilution through amendments, violation of procedures and poor monitoring and compliance of EC conditions are recorded as other drawbacks of the current EIA system. This contribution highlights such real life limitations of the current EIA practice, based on field experiences in India which may serve a base information for strengthening the current EIA system in the country.

**Keywords:** Environmental impact assessment, Limitations.

## IN DANGER OF LOSING BIODIVERSITY: ROLE OF EDUCATION

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### ABSTRACT

Biodiversity offers many diverse tangible goods and intangible services to humankind, and stability to the ecosystem. Drastic reduction in biodiversity has been reported worldwide being caused by the activities of the rapidly expanding human population and changed life style. A conservative estimate of the biodiversity loss has projected that by the year 2050, upto 60,000 species of plant (one in every four) will become extinct or nearly extinct. While the natural loss of species and their population due to succession, predatism, etc., is evolutionary and acceptable, the loss of biodiversity on account of threats from humans are detrimental prominently due to habitat loss, expansion and intensification of agriculture, pollution and invasion of alien species. Conservation of the existing biodiversity and regeneration of the species under threat is, thus, a major challenge that the humankind is facing today in the rising economies in the shrinking world. A significant amount of efforts- technological, institutional and capacity building-are underway to achieve biodiversity conservation by the governmental and intergovernmental activities. However, these initiatives call for greater participation of public at large. Role of education- the formal and informal, adult and women education – is, thus, crucial in shaping our behaviour and establishing rules for self for the use of bioresources. As women contribute half of the Indian civil society, affirmative action to ensure representation and power to women in local level planning and governance for biodiversity conservation, and their capacity building in the changing technological scenario are necessary to make them effective and equal partners in biodiversity conservation. This contribution discusses some of the issues of biodiversity conservation education in Indian perspective to make conservation of biodiversity a people's movement.

**Keywords:** Biodiversity conservation, Education, Indian perspective.



## ENVIRONMENTAL MANAGEMENT: AN ENTREPRENEUR'S PERSPECTIVE

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### ABSTRACT

Environment is a common property resource that serves as source of diverse resources – renewable and non-renewable, and sink for the wastes generated in the process of economic development. Over decades, respect and care of environment have now been recognized essential on account of irreparable damage caused to it. While most countries made significant advances in GDP and Human Development Index, studies suggest that these have been achieved at the cost of environment and social structures. Many traditional societies have been devastated by the development of (business) forests, water systems, and intensive agriculture and fisheries. In the age of Anthropocene era, a good life and sustainable (economic) development can not happen naturally, we have to work towards these. How we organize ourselves and establish rules to govern our actions will play a major role in determining whether we move towards more sustainable paths. A good governance for managing environmental issues, thus, calls for reforming decision-making processes to increase opportunities for participation of entrepreneurs and public, including a wide variety of activities ranging from consultations and hearings as part of Environmental Impact Assessment to conservation of natural resources. The paper discusses some of the issues concerning environmental management in India.

**Keywords:** Environment management, Governance, Indian perspective.

## MARCHING FROM LIFESTYLE ENVIRONMENTALISM TO LIVELIHOOD ENVIRONMENTALISM: SOME PERSPECTIVES

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### ABSTRACT

During the past three decades, there has been a paradigm shift in environmentalism both in the developed world and the developing nations. The depth between developed and developing economies has reduced gradually, particularly on environmental resources front-climate, biodiversity, marines and ozone shield. Conservation and protection of environment is now not an elitist concern, it matters for all- government, corporates and citizens. Greater emphasis is now being given to good life, human values, professional ethics and sustainable diet. The direct livelihood issues, such as, air pollution in cities, increasing pollution in rivers and oceans, poor sanitation, waste disposal, water logging and declining water table, promotion of nutraceuticals in human diet and equitable sharing of benefits of biological resources, etc., are cared deeply in global agenda of economic development (Sustainable Development Goals 2017), national policies and electorate. Additionally, impact of climate change in the form of changing monsoon patterns, unseasonal rains, increasing incidence of droughts and floods and other natural disasters, swelling ranks of climate refugees and sinking of islands (like Munroe Thuruthu in Kollam district of Kerala), etc. – are changing the nature of the debate. Voices are being raised to follow the principle achieving “shared growth” through discussions and collaboration in engaging in global governance. All this is happening in a rapidly growing economy where the trade-offs with environmental conservation are becoming sharp concern. Awareness of environmental issues has improved at political and citizens' front. The political parties now value peoples' right of living (e.g., forest rights of the Scheduled Tribes under Forest Rights Act, 2006) in election manifesto and campaign. The issues of enabling environment, fuel energy, and clean and green environment are now becoming as basics for citizens to cast vote in election. Thus, life style environmentalism which had focus on materials and wealth is now giving way (gradually) to livelihood environmentalism based on value to humans and ecological services, ethics and traditional knowledge and practices of food and environmental security. How seriously are we walking the talk of livelihood environmentalism and sustainable development, this contribution puts forward analysis of some actions in real life in India. It is noticed that we are still not close to the hope.

**Keywords:** Environmentalism, Sustainable development, Global and Indian initiatives

## DETECTING TIMING OF LAND CONVERSION ANOMALY IN RESPONSE TO URBAN GROWTH: A TIME-SERIES ANALYSIS

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### ABSTRACT

Urbanization is an important driving factor that result in rapidly changing the existing land use, impact agricultural land conversion, climatic condition, environmental degradation, hydrological cycle etc., and often pose threat to the human society. However, these processes of land conversion have multiple steps that do not follow the simple linear conversion rules. Such anomalies in the timing and season of land conversion can be effectively detected by Breaks for Additive Season and Trend (BFAST) time series decomposition algorithm. A large number of Landsat derived spectral indices e.g., Normalized Difference Vegetation Indices (NDVI) has been used to detect the timing of land conversation of a small area of land in the fast growing city of Surat. Results indicate that the algorithm can detect the area of significant agricultural land conversion, and the timing of changes. The outcome of the analysis can help the policy makers to monitor and evaluate the historical land use change in response to the urban growth, the understanding of which will enable them to identify the forces of such conversion and thereby, implement the necessary policy implication.

**Keywords:** urban land conversion, BFAST, time-series analysis, Landsat NDVI, Surat.

## EFFECT OF VARYING RATIO OF GREEN TEA AND OCIMUM GRATISSIMUM IN A BINARY MIXTURE ON POSSIBLE SYNERGISTIC ANTIOXIDANT INTERACTIONS

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### ABSTRACT

Green tea (*Camellia sinensis*) is a popular beverage and is gaining popularity due to its refreshing and health promoting properties. In order to enhance the green tea flavour and medicinal properties, various green tea combinations are available commercially. The present work aims to investigate the antioxidant interactions of one of the well-accepted binary combination of green tea with *Ocimum gratissimum* (tulsi) at different ratios (3:1, 2:1, 1:1, 1:2, and 1:3). In this study various chemical models such as (DPPH, ABTS and NO scavenging tests) and ex-vivo assays (lipid peroxidation and anti-haemolytic activities) were employed to determine the radical scavenging potential of above-mentioned infusions. The interactions were analyzed by combination index (CI) and isobolograms applying Compusyn software (Version 1.0). GT exhibited high radical scavenging ability as compared to OG infusion. The interaction between GT and *O. gratissimum* (OG) at various proportions ranged from strong synergism to moderate antagonism. Overall, green tea and OG combination (1:1) displayed highest antioxidant potential and maximum synergism in all the performed assays. Thus, this study provides the scientific basis for combining aqueous infusions at particular ratio to attain maximum antioxidant potential.

**Keywords:** Green tea, *Ocimum gratissimum*, combination index, isobologram, antioxidant.

## TEMPORAL ANALYSIS AND CHARACTERISTICS OF URBAN LAND USE CHANGE AND URBAN PLANNING: A CASE STUDY OF LUCKNOW

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### ABSTRACT

Land use is defined as spatial aspects of the types of human activities on the land to serve human needs. The land on which non-agricultural functions are performed is known as urban land use which results from complex interaction of society's cultural background, state of economic development and land's physical nature. The rapid growth of population and demand for resources, coupled with inappropriate management practices have exerted unprecedented pressure on land. Study of land use changes and its optimal use is prerequisite for sustainable land management and urban planning. Lucknow, a multicultural city is governed by Municipal Corporation (LMC) and occupies a total geographical area of 349 sq. km, consisting of 110 municipal wards with a total population of about 28.2 lakh. The total land use of city was 9170 Ha in 1987, estimated to increase 71221 Ha in 2031. Lucknow is characterised by multifarious uses of land. Historical legacy, administrative magnet, migration, transportation and commercial functions have played a vital role in shaping its land use. Continuous expansion of city has resulted in unsustainable and haphazard urban sprawl, increased pressure on civic amenities and other problems which are rooted in the way urban planning is made and governed.

The study aims to analyse the land use pattern of Lucknow city from 1987 to 2031 (proposed) and to identify major factors responsible for shaping such patterns. The study also aims to examine spatial variation in different urban land uses, assessment of urban growth, critical appraisal of stakeholders, highlighting deficiencies in urban planning along-with measures for viable planning in accordance with Masterplan. The study is based entirely on secondary data, obtained mainly from Masterplan, LDA, Statistical diary and other literature thereby identifying 9 categories of land use. Geospatial techniques of GIS and Remote Sensing are used for understanding and analysis along-with the interpretation of satellite imageries to detect land use changes for the reference period.

The study finds that rapid urbanisation, migration and residential demand are the driving force for land use changes and city faces an uncontrolled urban sprawl. Areas are being converted for urban use having weak suitability for future development in absence of systematic plan and infrastructural investment. Patterns of urban growth do not follow Master Plan and preferred land suitability. ULB's have failed to provide basis infrastructural facilities. The study suggests strict zoning regulations based on land suitability and carrying capacity. Future land transformation should be supported by a coherent urban planning policy.

**LAND USE LAND COVER CHANGE AND ASSOCIATED CHANGE  
IN GROUNDWATER LEVEL: A CASE STUDY OF TWO  
SEMI ARID DISTRICTS OF INDIA**

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**ABSTRACT**

Land Use and Land Cover changes are occurring at all levels i.e. local, regional, global particularly over the last few decades. Given the scenario these changes will continue in future too and they have an impact on resource availability. This study is an attempt to find out the association between change in Land Use Land Cover and resultant change in groundwater level. Two semi arid districts of Rajasthan have been chosen for the assessment. This pattern has been clearly depicted through spatio-temporal analysis of groundwater change and land use land cover change in GIS environment through spatial analysis tools. Groundwater level (1995-2012) has been studied through observation wells data. Change in groundwater level has been shown with the interpolation of the spatial pattern of slope value for each observation well. Landsat images have been taken for three time periods i.e. 1991, 1998 and 2011 for both districts. Areas which are associated with sharp increase in built up areas also show even sharper decline in groundwater level. The increase in imperviousness has a major impact on groundwater. The increase in urbanization results in a reduction in infiltration, which affects the groundwater recharge and storage. Groundwater is a major source of drinking water across the world and plays a vital role in maintaining the ecological value of many areas.

## **RIVER CONSERVATION AND REJUVENATION IN INDIA: AN OVERVIEW OF RIVER GANGA**

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### **ABSTRACT**

India, as a country wears numerous a decent crown; it is viewed as the support of human progress, it was the messenger of the Vedic culture, the harbinger of Sanatana (customary) Hinduism, the origin of Lord Buddha and Buddhism. In all these process, rivers like Ganga, Yamuna and other played a significant role, and history tell us that all the major civilization has evolved on the banks of rivers; same is the case with India. We were dependent on rivers for irrigation, transportation, trade, and other miscellaneous work from the very beginning of our civilization and it continues till today, but we don't realize their importance often as they keep on doing their work silently. Ganga- one of the backbones of today's India has become a source of life for nearly 400 million people living in its basin. As people are heavily dependent on the water for their daily needs. With the passage of time as human greed increases so as the exploitation of rivers and it is very evident from many reports. Today, the Ganges is considered the sixth most polluted river in the world. As water is scarce and is a major source of concern it becomes important to clean up the rivers for our sake and for a better future to meet the goal of sustainable development.

On the basis of above backdrop, the paper is divided into four sections and various subsections. First section of the paper will focuses on importance of river rejuvenation and conservation to meet the Sustainable development goals. The second part of the paper will analyze the present scenario of river rejuvenation and conservation in India, it will focus on the impact of lifeline of Indian citizen i.e. river Ganga. The third part will discuss about the initiative taken by the government of India to rejuvenate the Ganga River. Fourth section of the paper would be on the impact of initiatives taken by the Indian government for the rejuvenation of the river Ganga. Further it will give focuses on the Namami Gange, Ganga Grams Project, Minimum River Flow for Ganga, and currently drafted river Basin Management Bill, 2018, and what else can be done to save ourselves by conserving and rejuvenating our mother. The last sections of the paper will conclusion and recommendation.

## EMPIRICAL RELATION BETWEEN ENERGY USE AND HUMAN DEVELOPMENT: EVIDENCE FROM BRICS NATIONS

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### ABSTRACT

The energy use plays an important role in enhancing economic growth, maintaining better quality of life and thus helps in overall human development. Ceteris paribus, Energy Use have a statistically significant relationship with human development. In order to verify this relationship empirically, we have used OLS and panel regression techniques controlling factors like economic growth and urbanisation. Our findings have confirmed the existence of statistically positive and significant relationship between energy use and human development keeping economic growth and urbanisation constant in BRICS nations. Since human development is largely dependent on energy use, therefore, there is a need for urgent policy intervention for sustainable supply of energy in BRICS nations.

**Keywords:** HDI, Energy Use, GDP, Panel Data, Regression.

JEL Classification Code: C22, C23, O15, Q43



**DISTRIBUTION AND PERIODICITY OF DIATOMS IN  
BHADRA RESERVOIR, KARNATAKA, WITH RESPECT TO  
SUSTAINABLE DEVELOPMENT**

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**ABSTRACT**

The diversity of diatoms in back water of Bhadra reservoir (Station-I) and its down stream stretch of the river Bhadra (Station-II). Diatoms were higher during summer and lower in winter. Anomoenies sphaerophora, A. brachysira, Achnanthes lanceolata, Achnanthes subsessilis, Cymbella ventricosa and Tabellaria species occurred as rare forms. In total, 21 genera and 51 species of diatoms were recorded during the period of investigation. The physico-chemical factors that regulated the distribution pattern have been discussed in detail.

**Keywords:** Bhadra reservoir, Diatoms, Periodicity, Seasonal variation.

## **GREEN SYNTHESIS OF SILVER NANOPARTICLES AND ITS BIOLOGICAL ACTIVITY USING MUNTINGIACALABURA FRUIT EXTRACT**

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### **ABSTRACT**

Synthesis of silver nanoparticles using fruit extract has been gaining considerable attention as an eco-friendly approach in green chemistry. The present work reports the synthesis of *Muntingia calabura* silver nanoparticles (McAgNPs) by the addition of appropriate amount of *Muntingia calabura* fruit extract to the aqueous AgNO<sub>3</sub> solution under constant stirring at room temperature for 24h. The addition of fruit extract leads to the formation of stable colloidal silver nanoparticles. The peak obtained at 460 nm using UV-VIS spectroscopy confirmed the formation of silver nanoparticles. Scanning electron microscopy analysis showed the spherical and oval morphology of the silver nanoparticles. Energy-dispersive X-ray spectroscopy (EDS) analysis indicated the abundance of silver nanoparticles in a chemical composition. DLS/ZETA POTENTIAL analysis was applied in order to measure the particle size distribution and nature of surface charge of the McAgNPs. Further the antibacterial activity against the silver nanoparticles was established.

## **ELEUSINE CORACANA SEED EXTRACT MEDIATED SYNTHESIS OF COLLOIDAL SILVER NANOPARTICLES AND STUDY OF ITS ANTIMICROBIAL ACTIVITY**

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### **ABSTRACT**

The present work throws light on the synthesis of silver nanoparticles using appropriate amount of Eleusine coracana (Ragi) seed extract and aqueous AgNO<sub>3</sub> solution under constant agitation at room temperature for 9 to 12 hours. The reduction of silver ions by phytochemicals present in the seed extract leads to the formation of stable colloidal Eleusine coracana silver nanoparticles (ECAgNPs). The peak obtained at 430 nm using UV-VIS spectroscopy confirmed the formation of silver nanoparticles. FT-IR spectroscopy was used to study the interaction between silver ions and biomolecules present in the fruit extract. XRD analysis confirmed the homogeneous crystalline nature of the ECAgNPs with size of about 32 nm. Scanning electron microscopy analysis showed the spherical morphology of the silver nanoparticles. Energy-dispersive X-ray spectroscopy (EDS) analysis indicated the abundance of silver in a chemical composition. DLS analysis was done to measure the particle size, and zeta potential of the synthesized ECAgNPs. The AgNO<sub>3</sub> nano particles were tested for its antimicrobial activity against human pathogens. The findings of this investigation greatly anticipated potential use of AgNO<sub>3</sub> nano particles for its antimicrobial activities. The results of the study support the advantages of bio-green method for synthesizing silver nano particles with plant seed extracts.

**Keywords:** Eleusine coracana, Ragi, AgNO<sub>3</sub> nano particles, seed extract, EDS, XRD and FTI.

## CHEMICAL PROFILE AND FREE RADICLE SCAVENGING ACTIVITY OF ADENOCALYMMMA ALLICEAE MISER

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### ABSTRACT

*Adenocalymma alliceae* is an ornamental, medicinal climber belonging to the family Bignoniaceae which is native to Amazon and commonly known as Garlic plant. The plant was reported to have many biological properties including antibacterial, antifungal, anticancer activity, being having various sulphur rich biocompounds. The callus was initiated under in vitro culture conditions using young leaf explants. The methanolic extract of leaf callus of *A. aliiceae* was subjected to qualitative analysis and the result revealed the presence of alkaloids, carbohydrates, glycosides, flavonoid, saponin, tannin and phenol. The phenol and flavonoid were also estimated quantitatively. The dried and finely ground calli was extracted with different solvents using Soxhlet apparatus. The antioxidant activity was evaluated by DPPH radical scavenging assay. The concentration of 500 µg/ml of Methanol extract showed 87% anti-oxidant activity in comparison to all extract.

**Keywords:** Antioxidant, *A. aliiceae*, Methanol extract, DPPH, antioxidant activity.

## **GREEN SYNTHESIS AND CHARACTERIZATION OF SILVER AND GOLD NANOPARTICLES USING SEED EXTRACT OF VERNONIA ANTHELMINTICA AND EVALUATION OF ITS ANTI-MICROBIAL ACTIVITY**

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### **ABSTRACT**

Vernonia anthelmintica is a medicinal plant which is about 1.5 m in length the stems are branched and pubescent. It is used for anthelmintic, laxative and detoxifier. In the present study Vernonia anthelmintica seeds were used for green synthesis of gold and silver nanoparticles and the antimicrobial activity was tested against microorganism Bacillus subtilis, Escherichia coli and Staphylococcus aureus at different concentrations of seed extract .UV-Visible spectroscopy, FTIR, and SEM confirmed the synthesis of gold and silver nanoparticles. Silver NPs showed absorption at 420nm whereas Gold NPs showed maximum absorption at 540nm, SEM images showed the nanoparticles to be of uniform size but clumped together. Silver NPs showed higher antimicrobial activity than gold NPs against the micro-organisms tested.

**Keywords :** Vernonia anthelmintica, Gold nanoparticles, Silver nanoparticles, Antimicrobia.

## INFLUENCE OF PH AND TEMPERATURE ON BIOLOGICAL SYNTHESIS OF GOLD AND SILVER NANOPARTICLES FROM ACACIA SINUATA PLANT EXTRACT

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### ABSTRACT

Biological synthesis of nanoparticles (NPs) has more advantage then the chemical synthesis because of its lesser side effects and faster synthesis . Acacia sinuata a medicinal plant, which belongs to family Mimosaceae grows in abundance in the tropical jungles of India, especially in the Deccan region. It is used as a detergent in many parts of India and is revered as a scalp cleanser. The fruit of soap nut has tonic and astringent properties, which are beneficial in the treatment of skin disorders. In the present study effect of pH and temperature on biological synthesis of gold and silver NPs from Acacia Sinuata plant extract was carried out. The NPs were synthesized at acidic, neutral and alkaline pH and different temperatures of 37 oC, 50 oC, 70 oC and 100o C. Gold and Silver NPs were synthesized at different pH and temperature by treating the plant leaf extracts with gold chloride(1mm) and silver nitrate (1mm) and spectroscopic studies showed the absorption peak at 540nm for gold NPs and 420nm for silver NPs. Gold NPs synthesis was observed more at alkaline pH and at 70 oC whereas silver NPs synthesis was more at neutral pH and temperature of 50 oC .At acidic pH and higher temperature of 100oC there was decrease in NPs synthesis this may be due to the denaturation of enzymes responsible for reduction of metallic gold and silver.

**Keywords:** Acacia sinuata, Gold nanoparticles, Silver nanoparticles, pH and temperature.

## FUNGAL PATHOGEN ASSOCIATED WITH CITRUS LIMETTA RISSO

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### ABSTRACT

Horticulture is the science and art of growing plants (fruits, vegetables, flowers and other cultivar). It also highlights the plant conservation, landscape restoration, soil management, garden design and etc. India is the second largest producer of fruits after Brazil. Fruits play an important role in human nutrition by contributing the necessary growth factors such as vitamins and essential minerals in human daily diet, which is also helpful in maintaining a good health. Rot diseases caused by fungal pathogens, provoke severe losses of agricultural and horticultural crops every year (Salman 2005; Parveen et al., 2016). CITRUS LIMETTA RISSO. belongs to the family Rutaceae. Though leaf spot and fruit rot is a common disease, severely affecting the growth and yield of the plant, it has gained, least attention of researchers. A current research includes the collection of Citrus leaf spot disease sample collected from Merkera district of Karnataka, India. The pathogen was isolated from surface sterilized small pieces of the leaves and twigs, incubated on Potato Dextrose agar (PDA) at 25°C. The study was based on the colony characteristics [morphological and cultural characteristics], Fungal pathogen Helimenthosporium, was identified as a causal agent of the disease. Disease management studies is under process.

**Keywords:** Helimenthosporium, Colony characteristics, Rot disease, PDA, CITRUS LIMETTARISSO.

## INVESTIGATION OF OPTIMUM CONDITIONS FOR THE PRODUCTION OF A CYTOTOXIC PIGMENT METABOLITE FROM FUSARIUM CHLAMYDOSPORUM

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### ABSTRACT

In nature, fungi grow on diverse habitats and exhibit diverse distribution requiring numerous specific essential elements for growth and reproduction. When these organisms are cultured in laboratory, they are grown on specific culture medium for preservation, microscopically examination and biochemical and physiological characterization. A wide range of media are used for laboratory culturing of fungi as it influences the vegetative growth, colony morphology, pigmentation and sporulation depending upon various factors (Gunasekaran et al., 2008). It is important to study the morphology that favors the formation of a desired product in order to predict the design of the fermentation processes for an efficient and economic production system (Mapari et al., 2008a). In the present study the optimum conditions for the production of cytotoxic pigment from *Fusarium chlamydosporum* has been studied. The culture conditions optimized for pigment production were carbon source, nitrogen source, pH, temperature, incubation time, inoculum age and wavelengths of light. The highest pigment yield was found at dextrose 2%, peptone + beef extract (0.4%), pH 6, temperature 30°C, incubation time 7 days, inoculum age - 6 days old and green wavelength of light.

**Keywords:** Pigment, metabolite, cytotoxicity, optimization, fermentation conditions.



## **INDUCTION OF SYSTEMIC RESISTANCE IN TOMATO BY LEAF EXTRACTS OF AMOMUM NILGIRICUM AGAINST RALSTONIA SOLANACEARUM.**

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### **ABSTRACT**

Amomum nilgircum plant is a newly reported species belonging to Zingiberaceae family and was reported from silent valley national park, Western Ghats, India. Ralstonia solanacearum is one of the most destructive phytopathogens causing bacterial wilt of tomato. In the present study, the leaf extracts are screened for their induced systemic resistance in infected tomato plants. The germination percentage was recorded maximum in leaf extract at 5% concentration followed by 2.5%, 1% 0.5% and 10%. They significantly increased the seedling vigour index of tomato seeds by 2031.49, 1841.86, 1681.01, 1597.78 and 1466.6 respectively and seed germination by 98.6%, 97.2, 97.1%, 96.4 and 96.3% respectively as compared to control (94.2%). In greenhouse experiments, leaf extracts were showed reduction of wilt incidence by 47.9% at 5% concentration followed by 2.5%, 1% 0.5% and 10% at 42.8%, 41.5%, 38% and 37% respectively as compared to pathogen. The induction of defense systemic resistance enzymes, such as peroxidase (POX) and polyphenol oxidase (PPO) phenylalanine ammonia-lyase (PAL) and superoxide dismutase (SOD) were studied. The maximum enzyme accumulation was found to be in leaf extracts treated plants after challenge inoculated with pathogen as compared with control. Under field conditions, the maximum wilt reduction was observed in leaf extract treated at 5% concentration while lowest wilt reduction at 10% concentration.

**Keywords:** Amomum nilgircum; Ralstonia solanacearum; plant growth promotion; tomato; defense enzymes.

## IN-VITRO ANTIOXIDANT ACTIVITY AND PHYTOCHEMICAL SCREENING OF AQUEOUS STEM BARK EXTRACT OF GARDENIA GUMMIFERA LINN.

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### ABSTRACT

Gardenia gummifera an endemic medicinal plant belonging to the family Rubiaceae, which found in deciduous slopes of the Western Ghats of India. The plant is well known for its diverse applications in folk medicine. The present study was designed to scrutinize the in vitro free radical scavenging activity of stem bark aqueous extracts (ASE) from Gardenia gummifera by certain prominent assays viz. DPPH radical scavenging, nitric oxide scavenging, metal chelating activity with reference to standard ascorbic acid and EDTA respectively with different concentrations ranging from 100µg/ml, 200µg/ml, and 300µg/ml. An IC<sub>50</sub> value aqueous extracts of G. gummifera in terms DPPH scavenging activity has calculated as 182.07µg/mL (ASE), 110.66µg/mL (Std. Ascorbic acid). In nitric oxide radical scavenging activity is 205.38µg/mL (ASE), 106.82µg/mL (Std. Ascorbic acid) and for metal chelating activity 151.86µg/mL (ASE), 104.73µg/mL (Std. EDTA). Moreover, the extract was primarily found to contain phenolic compounds (114.97µg/1mg) and alkaloids (43µg/1mg) that play a significant role in regulating antioxidants. So, the in-vitro studies clearly described that the aqueous stem bark extract of G gummifera has a considerable antioxidant activity and indicates that this plant is a better source of natural antioxidants, which might be helpful in preventing the progress of various oxidative stresses.

**Keywords:** Gardenia gummifera, Antioxidant activity.

**AQUATIC BIODIVERSITY STUDY IN RAWASAN STREAM:  
AN IMPORTANT TRIBUTARY OF RIVER GANGA IN GARHWAL,  
CENTRAL HIMALAYA, INDIA**

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**ABSTRACT**

Himalayan region of India divided into three physiographic zones i.e., Greater Himalaya, Lesser Himalaya and Central Himalaya. Uttarakhand is known for its natural beauty of the Himalayas, the Bhabhar and the Terai. The Garhwal Himalaya is one of the hot spot of biodiversity situated in the western part of Central Himalaya and consists of good network of riverine systems, which physiqued it an important place for research work. The present study has been carried out in an important tributary of River Ganga in Pauri Garhwal District. Geographically, the Rawasan stream is bounded by 29°55'33.82"N and 78°26'42.41"E having an elevation of 2,664.04 feet and an eye altitude 13,320.21 feet. Aquatic biodiversity is the rich and wonderful variety of plants and animals from crayfish to catfish, from mussels to mayflies, from tadpoles to trout that live in watery habitats. During the present study five different sites was selected and observed a boast variety of aquatic flora and fauna. In Rawasan stream the benthic fauna comprised of 35 genera belonging to 8 orders (Ephemeroptera, Trichoptera, Diptera, Coleoptera, Odonata, Plecoptera, Hemiptera and Acariformes). During the investigation it was found that the periphytic algal community of Rawasan stream was represented by 21 taxa belonging to 3 major classes namely Bacillariophyceae (Amphora sp., Bacillaria sp., Cymbella sp., Diatoma sp., Fragilaria sp., Gomphonema sp., Navicula sp., Synedra sp. and Tabellaria etc), Chlorophyceae (Cladophora, Closterium sp., Microspora sp., Oedogonium, Spirogyra sp., Ulothrix sp., Volvox sp. and Zygenema sp.) and Cyanophyceae (Anabeana sp., Calothrix sp., Nostoc sp., and Rivularia sp). Overall 24 species of fish belongs to, 3 families, 5 sub-families, 2 orders and 9 genera have been recorded from Rawasan stream. The most abundant fish species in these tributaries were Barilius sp. followed by, Noemacheilus sp., Schizothorax sp and Pseudecheneis sp. respectively. In spite of this some crustaceans and annelids species has been also reported and keep for examination. From this study it has been concluded that Rawasan stream being biologically rich in diversity and hence the proper managerial planning is absolutely necessary for sustainable utilization of the resources.

**Keywords:** Aquatic animals, Benthic fauna, Rawasan stream, Garhwal Himalaya.

## SOCIOLOGY OF SUSTAINABLE DEVELOPMENT

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### ABSTRACT

This paper tries to understand the sociology of sustainable development. The paper focus on how define sustainable development, its principles and objectives, as well as the role and importance of sustainability with sociological perspective. The concept of sustainable development is the totality of socioeconomic development forms and methods not only on the short or medium term, but also on the long term. There is basic for long term vision on the development process, systemic thinking and interconnection; economy, society and the environment. Sustainable development is linked with the concept of quality of life and pursues three objectives: economic welfare, social stability and environment protection. Sustainable development, the most holistic of all the models includes an analysis of the relationship between sustainable development and issues of environmental justice, including issues of equity, poverty and social justice both within nation states and between them. This paper has very ambitious objectives like; How develop a scientific temper in society for environmental concern.

How develop an eco-friendly relationship among society, state and market.

How development further with continuity & change to establish an ecological democracy.

This research paper will try to tell us about the scientific tempered cultural support among the people for ecological modernization and ecological democracy is very important. In terms of ecological modernization or changing attitudes and practices which may be supportive of sustainable development, some positive if relatively small changes in attitudes can be noted. These include some increase in a positive attitude to science and to the possibility of economic growth without environmental harm. Furthermore, there is a continuing high level of support for state environmental regulations and an increase in the minority who support eco-friendly acts. Sustainable development occur such life style which nature oriented. Sustainable development is linked with the concept of quality of life. There are some major concerns for sustainable development; economic welfare, social stability, environmental protection, ensures the human and natural capital with economic growth.

## **YAMUNA RIVER FLOODPLAIN AND DELHI AS GLOBAL CITY: ISSUE OF GOVERNANCE AND VULNERABILITY**

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### **ABSTRACT**

Human intervention has deteriorated the river system and created problems for sustainability of both river system and urban system. Delhi's ecosystem comprises natural ecosystem like Aravalli ridge forested area and Yamuna River floodplain and all the planned and unplanned activities. This study focuses on understanding the importance of a river in urban system and effect of river system on communities living next to the river. Poor planning policies for fluvial system has created the problem of ecological sustainability, especially in urban areas. Various studies have been explored regarding approaches to urban planning, relationship between natural and urban ecosystem, urban governance issues and system of land records in India for understanding the current situation. Vulnerability has been measured for the wards located next to Yamuna River. The results show that most of the wards located next to the river floodplain lie under highly vulnerable category. Moreover the governance structure is complicated and has compromised with the ecological aspect while planning for floodplain. It is suggested that while planning development project for urban landscape the governing agencies must keep in the mind that nature and human work in unison and participatory approach will go long way in providing the foundation for sustainable development.

**Keywords:** Urban system; Yamuna River system; Vulnerability; Governance; Urban planning; Sustainability.

## INTERSECTIONALITY OF GENDER IN HOUSEHOLD'S WILLINGNESS TO PAY FOR SAFE DRINKING WATER: A CASE OF INDIA'S MOST BACKWARD DISTRICT

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### ABSTRACT

Climatic, geological and anthropogenic factors affects people's access to safe and clean water which is further magnified in case of arid and semi-arid region of India. One such case is that of Nuh district of Haryana, India's most backward district as ranked by Niti Aayog. In Nuh's socio cultural ethos, the present study was designed to estimate differentiation in the willingness to pay for safe drinking water in saline and sweet villages. Data was collected from household sampled from six villages in two blocks of Nuh district of which three villages were saline and three were sweet water. A structured questionnaire was administered on sampled that were households were selected randomly. A total of 178 household were interviewed from the study villages and logistic regression model was used to analyse the data. Results indicates suggest that gender is the major variable that influences the WTP implying that women respondents have more WTP compare to male respondent. This could be because women manage domestic water requirement and given the drudgery they undergo, their WTP is higher compared to their male counterparts. Other variables that significantly influence WTP are household size, time spent to collect water, WTP for farming and water availability. A comparative analysis of sweet and saline villages depicts that the sweet water villagers (INR 236) are willing to pay more than the saline water (INR 223) villagers. This finding is contrary to the assumption that women in saline water villages undergo more drudgery procuring water.

1. Saline water (mostly called as salt water) is a water that contains high concentration of dissolved salt (mainly NaCl).
2. Sweet water refers to fresh water as opposed to brackish or sea water, saline water. It is known for good for drinking purpose

**Keyword:** Household drinking water, WTP, water scarcity, Saline and Sweet water.

## **DRAINS LEADING TO DEVELOPMENT OF HEAVY-METAL RESISTANCE IN ESCHERICHIA COLI – A CASE STUDY OF RIVER YAMUNA, DELHI STRETCH, INDIA**

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### **ABSTRACT**

River Yamuna is facing a troublesome situation. Its ever-growing pollution problem yet remains a matter of great concern. While it has many sources of pollution, in the present study, we talk about two major drains namely Najafgarh drain and Shahdara drain as the major culprits. These two drains not only discharge incessantly a huge burden of organic as well as inorganic pollutants, but also our study has showed that their intermixing zones into the river are the hot-spots for the development of heavy-metal and antibiotic resistant bacteria. With the use of atomic mass spectrometry, heavy metal concentrations of selected heavy metals were determined at their intermixing zones. We also plotted growth curves of bio-indicator *Escherichia coli* isolated from these zones in the presence of same heavy metals and also determined their antibiotic susceptibility pattern against 24 clinically significant antibiotics. Using Heavy-metal Pollution index, Water-quality index, Multiple Antibiotic Resistance index and other statistical techniques such as Principal Component Analysis, we concluded that these sites are the major contributors of factors that are leading to the development of resistance in bacteria. The study concluded the successful use of *E. coli* as an indicator of heavy metal contamination.

**Keywords:** River Yamuna, heavy-metal resistance, antibiotics, *Escherichia coli*.

**ANALYSIS OF HEAVY METALS CONCENTRATION IN  
GROUND WATER QUALITY FROM HARIHAR TALUK  
DAVANGERE DISTRICT, KARNATAKA, INDIA**

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**ABSTRACT**

Ground water is a crucial problem in water supply systems, thus protection and purification of ground water quality have a crucial capacity in any community. The impact of seasonal changes on the heavy metals contamination of ground water quality in Harihar taluk, Davangere District has been analysed for a period of monsoon, Pre-monsoon and post monsoon seasons during April 2016– Dec2016. The present study was disbursed on ground water to search out the heavy metals such as iron, manganese, chromium, lead, copper, zinc and cadmium. Thirty water samples were collected from different locations, so as to assess the drinking water quality in and around of Harihar taluk. The experimental values are tabulated and compare the values against drinking water quality standards recommended by WHO, it contains some metals are above the permissible limit and few were within permissible limit.

**Keywords:** Ground water, Seasonal variations, Contamination of heavy metals.



## **SYNTHESIS AND APPALICATION OF BAO NANO-PARTICLE FOR THE PHOTOCATALYTIC DECOLOURIZATION OF METHYL VIOLET 10B**

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### **ABSTRACT**

Disposal of azo dyes from textiles, paper, plastics, leather, cosmetics and many other industries to water bodies poses a great threat to environment. These industrial dyes are responsible for most of the non-aesthetic pollution and eutrophication and can generate dangerous by-products through oxidation, hydrolysis, or other chemical reactions taking place in the wastewater phase. Methyl violet is a mutagen and mitotic poison; therefore concerns exist regarding the ecological impact of the release into the environment. Methyl violet has been used in large quantities for textile and paper dyeing, and about 15% of such dyes produced worldwide are released into water bodies. Numerous methods have been developed to treat methyl violet pollution. The three most prominent methods are chemical bleaching, biodegradation, and photodegradation. Chemical bleaching and biodegradation have many drawbacks involving high operating costs, incapability to degrade dyes completely. Now-a-days, photocatalysis is supposed to be one of the best methods for removing the dyes from wastewater because of the ability of this method to completely mineralize the target pollutant. In photocatalysis light alone does not rapidly degrade methyl violet, but the process is accelerated upon the addition of large band-gap metal oxides nanoparticles. In this study, BaO nano-particle was synthesized by solution combustion method using the urea as fuel and was used for the degradation of selected Methyl violet 10B azo dye. This nano-particle was characterized by using X-ray diffraction (XRD), UV-absorbance studies and Scanning Electron Micrograph (SEM). The average size of nanoparticle was found to be 45 nm. The experiments were carried out by varying parameters such as catalyst concentration, pH, varying dye concentration and effect on sunlight. The experimental results demonstrated that, the synthesized BaO nano-particles achieved maximum degradation of 96%.

**Keywords:** Photocatalyst, Degradation, Nano-particles, BaO, Methyl violet 10B.

## ASSESSMENT OF IMPACTS ON SOIL QUALITY IN SURROUNDING REGION OF COAL BASED THERMAL POWER PLANT

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### ABSTRACT

Thermal power plants are considered as the backbone of power generation sector. However, immense quantity of pollutants including SO<sub>2</sub>, NO<sub>2</sub>, hydrocarbons, fluoride, heavy metals and fly ash, are released from the process, which has made such giant industries a culprit for immeasurable and eternal impacts on surrounding environment and the community. The present study has made an effort to evaluate the impacts of a regional thermal power plant (Indira Gandhi Thermal Power Plant, IGSTPP) on the surrounding areas, with special reference to the soil. For the present study, to estimate the impact of pollutants on soil, samples in downwind direction were collected upto a distance of 30 km with an interval of 5 km and analysed for pH, organic matter, P, Na, K and S concentrations in soil. The pH of the collected soil samples was observed between 6.1 and 7.3, and decrease in acidic nature of soil was detected, which was possibly because of fall-out of SO<sub>2</sub> content in nearby area. However, the pattern is amplified on going distant from the power plant site, demonstrated in term of increasing pH and decreasing soil sulphate concentration (1056.4 – 544.2µg/g). The acidic conditions of soil affect the decomposition process and thus the availability of minerals. The increased organic content (0.27 – 4.73%) near to the power plant site may also contributed to soil acidity, which may cause imbalance in cation-anion and affect soil fertility on reducing the microbial population. The soil acidity may enhance release of monovalent ions under acidic conditions. The similar assumptions are supported by higher potassium (K) concentration near to the thermal site (216.25µg/g). The results of the present study revealed a significant direct effect on soil characteristics, which further resulted in reduction of fertility and unsuitability of soil for plant growth near to polluted site.

**Keywords:** Thermal power plant, coal, acidity, soil fertility, pollutants.

## ASSESSING HEAVY METAL CONTAMINATION IN GROUNDWATER AROUND STONE QUARRYING IN MAHENDERGARH, INDIA

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### ABSTRACT

Mining and stone quarrying is one of the oldest occupation after agriculture, which significantly contributed in economic growth and development. However, the various impact posed on environment through the mining activities could not be ignored. The semi-arid region of Mahendergarh district is facing decline in water level, which became more sever with risk of contamination of the groundwater with heavy metals. There is also a high probability that the contaminants might move to the aquifer system from the seepage of bottom floor of the stone quarry. The groundwater in the surrounding region is utilised for irrigation and drinking purpose. Therefore, it become so crucial to assess the contamination level in the groundwater considering various problems including reduced growth and development, nervous system damage, cancer etc. even exposure to some metals cause development of autoimmunity, rheumatoid arthritis and kidney problems, on human health through heavy metals. The present study attempted to evaluate the heavy metal contamination in the groundwater in surrounding regions of mining in Mahendergarh region of Haryana State. Various metallic trace elements including Zn, Pb, Fe, Ni and Mn were analysed from the water samples and the study found that Zn and Mn were found with the prescribe limit for drinking water. However, Pb (0.00 – 0.022mg/L), Fe (0.4 – 0.5mg/L) and Ni (0.03 – 0.05 mg/L) were more than the permissible limits as per Indian Standards for Drinking Water and may cause health hazards. The study suggested that people living in the surrounding region of stone quarrying sites are at higher risk of groundwater contamination and the risk factor may be increased considering their increased daily drinking water intake in the semi-arid region.

**Keywords:** Stone quarrying, groundwater, Heavy metals, Mahendergarh, Contamination.

## **ANTIBIOTICS A CLASS OF EMERGING TOXIC CONTAMINANTS IN WATER**

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### **ABSTRACT**

Water is one of the most important natural resources for humans, animals, and plants. Water pollution is a serious problem, and antibiotics are one of the emerging class of contaminants that are being detected at low levels in surface water around the world. Since 1950, over-use and disposal of antibiotics have raised in food, animals, and agriculture. These antibiotic contaminants could indicate an adverse effect on health and the environment. One of the possible main concern for public health is that a portion of prescribed medicines is not always consumed completely and eventually discarded in sewage systems or in landfills through solid waste. So far little is known about the possible adverse effects of antibiotics on the environment, public health, and the possible biotransformation or metabolites of these contaminants. Probably one of the most discussed effects of these contaminants is the antibiotic resistance. Penicillin is one of the most used antibiotics because of its versatility in the agriculture, biological and environment. Once entered to the environment as a contaminant, it can bioaccumulate, biomagnify and can lead to the development of resistance in pathogenic bacterial species. Penicillin can also create metabolites and have an adverse effect on human health by provoking different types of allergies. In this study, we have identified the presences of penicillin in surface water samples from different locations and drinking water treatment plant.

## ROLE OF ALGAE IN WATER POLLUTION

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### ABSTRACT

Pollution of surface water has become one of the most important environment problem. Algae is an important aquatic organism. It is an important component of biological monitoring programme for evaluating water quality. Algae are the main primary producer in all kind of water bodies they are valuable indicators of ecosystem condition because they respond quickly both in species composition and densities to a wide range of water acidity due to change in water chemistry. They play an important role for biological purification of waste water since they are able to accumulate plant nutrients, heavy metals, pesticides, organic and inorganic toxic substances and radioactive metals in their cells. Thus algae of many kinds are good indicator of water quality.

## CLIMATE CHANGE AND SUSTAINABLE DEVELOPMENT

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### ABSTRACT

Climate change is one of the complex problems facing mankind today. It describes changes in the state of the atmosphere over time scales ranging from decades to millions of years. However, increase in the emission of greenhouse gases (carbon dioxide, methane and nitrous oxide ) due to human activities causes the enhanced greenhouse effect. Apart from the three natural greenhouse gases, the increased emission also includes several “man-made” gases including chlorofluorocarbons (CFCs), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF<sub>6</sub>). This rise in the average temperature of the Earth is called global warming, which is likely to lead to unprecedented climate changes on a global scale threatening the ecosystems of the entire world. It is disrupting national economies and affecting lives, costing people, communities and countries greatly today and even more tomorrow. Weather patterns are changing, sea levels are rising, weather events are becoming more extreme and greenhouse gas emissions are now at their highest levels in history. The international political response to climate change began at the Rio Earth Summit in 1992, where the 'Rio Convention' included the adoption of the United Nations Framework Convention on Climate Change (UNFCCC). Sustainable Development Goal 13 aims to “take urgent action to combat climate change and its impact”, while acknowledging that the United Nations Framework Convention on Climate Change is the primary international, intergovernmental forum for negotiating the global response to climate change. To strengthen the global response to the threat of climate change, countries adopted the Paris Agreement at the COP21 in Paris, which went into force in November of 2016. In the agreement, all countries agreed to work to limit global temperature rise to well below two degrees centigrade. In the 2030 Agenda for Sustainable Development, Member States express their commitment to protect the planet from degradation and take urgent action on climate change. The Agenda also identifies, in its paragraph 14, climate change as “one of the greatest challenges of our time” and worries about “its adverse impacts undermine the ability of all countries to achieve sustainable development.

## IMPACT OF DIWALI CELEBRATION ON URBAN DELHI- A CASE STUDY

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### ABSTRACT

A study was conducted to assess the variation of ambient air quality with respect to particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>) and gaseous pollutant (SO<sub>2</sub> and NO<sub>2</sub>) in Delhi. The sampling was carried out at Pre-Diwali Day (PDD) and Diwali Day (DD) during the period of 2016 to 2018 at four locations namely Income Tax Office (ITO), Pitampura, Janakpuri and East Arjun Nagar. The concentrations of particulate matter was beyond the permissible limit as compared to National Ambient Air Quality Monitoring Standards (NAAQS) of CPCB, 2009. PDD, the concentration of PM<sub>10</sub> and PM<sub>2.5</sub> varied from 232-297 µg/m<sup>3</sup> and 136-169 µg/m<sup>3</sup> with an average concentration of 252±31 µg/m<sup>3</sup> and 151±17 µg/m<sup>3</sup> respectively. On DD the concentration of particulate matter PM<sub>10</sub> and PM<sub>2.5</sub> respectively varied from 595-993 µg/m<sup>3</sup> and 433-915 µg/m<sup>3</sup> with an average concentration of 869±188 µg/m<sup>3</sup> and 746±214 µg/m<sup>3</sup>. There was a significant increase in SO<sub>2</sub> concentration but the concentration of NO<sub>2</sub> did not shown any considerable variation. The concentration of SO<sub>2</sub> and NO<sub>2</sub> varied from 8-14 µg/m<sup>3</sup> and 11-67 µg/m<sup>3</sup> respectively with an average concentration of 12±3 µg/m<sup>3</sup> and 37±25 µg/m<sup>3</sup> at the selected locations of Delhi. The deterioration of ambient air quality depends on average mixing height, meteorological parameters (wind speed, wind direction, relative humidity and temperature) and the month of the DD. The contribution of stubble burning increases the concentration of both PM<sub>10</sub> and PM<sub>2.5</sub> in the ambient air. This study revealed that the average concentration of particulate matter were higher during DD (7th November 2018) as compared to DD (19th October, 2017) and DD (30th October, 2016). In the year 2018, Delhi had the cleanest DD celebration as Supreme Court banned on sale of fire crackers in Delhi but still during the DD the concentration of particulate matter were higher due the stubble burning and adverse metrological condition in Delhi.

**Keywords:** Fire Cracker, Diwali, Air Pollution, Delhi.

## IMPLICATION OF NON TIMBER FOREST PRODUCTS TOWARDS RURAL HEALTH AND NUTRITION: AN OVERVIEW

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### ABSTRACT

In the present day, malnutrition is recognized among the most widespread and destructive causes of human suffering globally. According to Global Nutrition Report 2017, about 88% of countries face a serious burden of malnutrition. It is not clear, how the today's global system will meet future food needs. So in the context, forest provides a large range of edible foods (i.e. seeds, fruits, leaves, roots, mushrooms etc.) which may help in solving the issues. Wild forest foods form a major role for diet of most rural households and improving nutritional quality in providing essential vitamins, protein, calories and so on. In India several forest products such as Chironji, Mahua, Amla, Bael, Tendu, Ber, Honey etc. and, some medicinal plants are available in forest areas. In health and nutritional context, these products are having numerous health promoting potential such as antioxidant, neuro-protective, cardio-protective, anti-aging and so on. It seems that few forest plant food products can provide most of the nutrients that the body needs. In addition forest fruits contain huge amount of vitamins, potent bioactive, valuable source of protein, fatty acids, and calories. Therefore, scientific intervention of these forest products need towards aimed to enhancing nutritional value for formulating health foods with nutritional active properties. Moreover, the traditional system of medicine, play an important role in keeping rural people healthy and have a strong faith in its efficacy by rural people. These traditional medicines have much importance to combat various health issues in rurals. This paper highlights the forest plant foods and medicinal plants to explore their therapeutic and nutritional potential to evaluate future research opportunities. And this will help in strengthen the contribution of forest plants towards rural health and nutrition.

Keywords: NTFPs, Forest plant food, Traditional medicine, Rural health



**THE EFFECT OF ACHYRANTHES ASPERA (FAMILY: AMARANTHACEAE)  
ENRICHED PELLETTED DIETS ON THE GROWTH, INNATE  
IMMUNE SYSTEM AND ANTI-OXIDANT SYSTEM OF  
LABEO ROHITA IN POND CULTURE SYSTEM**

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**ABSTRACT**

**Introduction:** Fish and fishery products represent a very valuable source of protein and essential micronutrients for good health. Diseases and various parasitic infections are responsible for major losses to aquaculture industry. Immunostimulation is one of the useful tools to prevent infectious diseases. The use of herbal compounds as immunostimulants has been increasing rapidly in aquaculture to avoid the use of hazardous antibiotics.

**Experimental Design:** Rohu, *Labeo rohita* (153.81 ± 2.88 g) were cultured in 3m<sup>2</sup> hapa (2.0 m × 1.5 m) under three different feeding regimes. Three replicates were used for each treatment. All hapas were kept in a pond of CIFE, Rohtak Centre, Haryana. Two diets were formulated using seeds (0.5%) and leaves (0.5%) of *Achyranthes aspera*. The diet without plant ingredients served as control.

**Results:** Average weight, myeloperoxidase and nitric oxide synthase levels were significantly ( $P < 0.05$ ) higher in plant supplemented diets fed rohu compared to control group. TBARS and carbonyl protein levels were minimum in the experimental groups compared to the control one.

**Conclusion:** Enriched diets enhanced the immune response of fish in pond culture condition and help to combat the constant challenge of waterborne pathogens. The use of herbal compounds is also better than hazardous antibiotics which are frequently used in intensive aquaculture.

## MICROBIAL BIOFORMULATION FOR THE REMEDIATION OF SOIL POLLUTED WITH HEXAHYDRO- 1,3,5- TRINITRO- 1,3,5- TRIAZINE (RDX) - A MESOCOSM STUDY

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### ABSTRACT

Energetic chemicals comprising of explosives and propellants, make their way into the environment due to lack of proper handling and disposal practices. One of the vastly used high explosive, Hexahydro- 1,3,5-trinitro- 1,3,5- triazine (RDX) is a cyclic nitramine which is commonly found as a contaminant in manufacturing facilities as well as in live firing ranges (Hawari and Halasz, 2002). It is characterized by a low solubility of 60 ppm, but once dissolved it can pass through the soil layers, in turn polluting the ground water. Explosives are detrimental to both human and environmental health. Animal studies have suggested, RDX to be a potential human carcinogen (USEPA, 2011). Other health effects of RDX exposure include; seizures, headache, vomiting and dizziness (Kaplan et al., 1965). Muscle twitching, convulsions and confusion have also been reported in other neurological effects (Williams et al., 2011). These extreme health effects necessitates the need for treatment of RDX contaminated environmental media.

Physical, chemical and biological methods for the remediation of such polluted soils are available but these methods do not give a sustainable solution as the pollutant is transferred from one phase to the other. Biological treatment technologies utilizing nature's degraders –the microbial agents loaded on a naturally occurring organic/inorganic resources can provide an eco-friendly solution for hazardous chemical contaminated soils. Immobilization of microbes onto a natural solid support can aid in its better delivery and survival.

This work focusses on the use of one such innovative bioformulation developed for the remediation of soil contaminated with 60 ppm RDX at mesocosm levels. Janibacter cremeus isolated from explosive contaminated site was immobilized on a mixture of inorganic clay mineral and an organic amendment of cocopeat. The survival of the bacteria was monitored by observing the colony forming units (CFU) at regular intervals, the increase in CFU proved survival of the bacteria in soil medium. Total nitrogen content of the samples was also monitored throughout the study. It was found to decrease by 56%. The results showed 60 % degradation of RDX in 30 days. Further optimization of this process has potential for sustainable remediation of hazardous explosives contaminated soils

## **SPIRITUAL DIMENSION OF ENVIRONMENTAL PLANNING AND SUSTAINABLE DEVELOPMENT**

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### **ABSTRACT**

Some elevated people had first recognised the impending danger of environmental degradation in 1970s. Soon after this development, environmental planning and sustainable development was in limelight. Number of legislative measures was adopted since then at global, regional and local levels but it was not adopted in true spirit. The old practices of ruthless exploitation of resources remain unabated. This was again fuelled by the adoption of vigorous consumerism in late decades of 20th Centuries. Consequently, we are facing physical and man-made disasters every now and then. Even the developed countries of Europe and U.S.A have been facing the brunt of nature in the form of disasters. It is also ironical that we are seeking technological solutions to improve our environmental quality and life styles in one hand and doing every effort to destroy this world on the other. Our words are not in accordance with our actions. We talk about global peace, safety of planet, prosperity for all etc and also make conferences on it but we continue to hamper world peace and security by adopting faulty environmental planning and unsustainable practices. In spite of best intent our environmental planning and sustainable development practices are not yielding desired results. What went wrong with environmental planning and sustainable development is that we want to clean and green the world but we are not ready to clean our mind. The world appears divided on global environmental conferences. The blame game and continuance of unsustainable practices by hawks and crooks became the hallmark in almost all conferences. The human plan of engineering solution to this vexed issue was miserably failed. The obvious question is what next? In this context, spiritual dimension of environmental planning and sustainable development become relevant. At this outset, the purpose of this paper is first to examine the historical analysis of environmental planning and sustainable development; secondly, to segregate the causative factors or genesis of unsustainable development; and finally to look into the spiritual solution of environmental safety and sustainable development.

**Keywords:** Spiritual; Environmental Planning; Sustainable Development; Disaster; Safety; Spiritual Solution.

## PACKAGED SUSTAINABLE FOOD: AN INDIAN PERSPECTIVE

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### ABSTRACT

Generally, the development concept is used to indicate a social and economic improvement of society. Thus, urbanisation considered as the indicators of economic growth that generate favourable conditions for market access to enhance productivity. Although, the real progress of a society can be possible only while considering the environmental aspects. Food security is the primary factor of social development as it is necessary to maintain life and growth of present and future generations. Food and food ingredients are the output of the food system that involved the range of activities of growing, harvesting, processing, packaging, transporting, marketing, consumption, and disposal of food and food-related items. A sustainable food system interlinks the economic, environmental, social, nutritional, health, and cultural aspects of society. Therefore, sustainable food is the backbone of a healthy population. It is an asset of a country that reflects on the productivity and economic prosperity. This study indicates that in India, current trends in the production and consumption of food inadequate to accomplish the nutrition requirements. Also, health and environmental issues related to food packaging severely affected in the urban area. In this context, the current study delivers a conceptual framework for packaged sustainable food, which is an opening to address these issues. Subsequent, the conceptual framework has outlined with definitions.

**Keywords:** Food security, nutrition, sustainable food, sustainable packaging, urbanisation.

## **SOCIAL NETWORK AND STUDENT MIGRATION TO THE NATIONAL CAPITAL REGION**

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### **ABSTRACT**

Social networks of individuals and groups play an important role in the process of migration. This paper is an attempt to understand the influence and contribution of social networks in student migration, specific to the ontological centre for higher learning centre the NCR. Over the course of the period of education in the NCR, students required myriad of help in different domains to successfully complete the necessary module of the course. The study found out that regardless of whether the students have migrated to the NCR from nearby place or from far flung corners of the country, accommodation is one of the primary problems shared by all. In order to simultaneously cope with the problem of accommodation and also to sustain through the time period of completion of the course smoothly students have reported that they need constant support. The study has also found out that many of these networks rely on online platforms to seek as well as provide help. After reaching the destination, the new migrant students soon realise the need of friends or people from whom they could seek help.

**Keywords:** Social Networks, Higher Education, Metropolitan cities, Societal ties.

**EVALUATION OF METAL TOLERANCE OF SELECTED INDIAN VARIETIES OF TRITICUM AESTIVUM. ANALYSIS OF PRESENCE OF HEAVY METAL ON GROWTH OF SELECTED VARIETIES OF TRITICUM AESTIVUM.**

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**ABSTRACT**

Wheat is one of the most important food crop cultivated worldwide on a large scale. Several abiotic factors are known to challenge growth and productivity of wheat. Presence of heavy metals is considered to be an important factor affecting growth of plants. In the present study five different wheat varieties (HD2687, HD2329, C306, PBW343, HD2307) were selected and were grown in presence of different concentrations of heavy metal mercury and lead (100mM, 200mM, 250mM). Increasing concentration of Hg was found to adversely affect germination rate, shoot and root length. Chlorophyll content was found to decrease in plants grown under Hg stress whereas proline content enhanced as compared to control plants. Similarly at higher concentration of Pb germination rate declined to 45.8% as compared to 100% in control. Plants obtained exhibited retarded growth with an average shoot length of  $6.5 \pm 0.5$  cm and maximum shoot length 10.5 cm after one month of growth. Initial results obtained in the study indicated deteriorating effect of presence of heavy metals on growth of wheat.

## **NANO-SCIENCE AND NANOTECHNOLOGY FOR ENVIRONMENTAL ISSUES AND APPLICATIONS**

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### **ABSTRACT**

Environmental contamination is one of the major issues worldwide today and is expanding with time leading to serious and harmful effects to the whole earth. For example the air contains various pollutants viz. chlorofluorocarbons, CO, volatile organic compounds, hydrocarbons, and nitrogen oxides. Along with the air, water and soil are also contaminated with many organic and inorganic compounds. Moreover, the major sources for water and soil contamination are sewage water, industrial effluents, oil spills, random use of pesticides and fertilizers. The solution to minimize these effects on the environment should be found out to save the earth in future. Nanotechnology is an important field of study and has gained a great deal of interest in the applications of nanomaterials in improved systems for monitoring and cleanup of different parts of environment. Nanomaterials can be used to develop the pollutants sensing, detection and help in the improvement of the novel environmental remediation technologies. This paper firstly discusses the introduction of nanoscience, nanotechnology, nanoparticles, their fundamental properties, classification and different applications. In the later part of the paper, the applications of nanotechnology in environmental fields, in particular, its application in air, water and soil pollution monitoring, remediation and its future trends in this field.

**Keywords:** Nanoscience, Nanotechnology, Nanoparticles, Air pollution, Water Pollution, Soil Pollution.

## GREEN GOOD DEEDS: A STUDY

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### ABSTRACT

There has been a rapid growth in Indian economy and with this growth there has been an increase in using resources for the production, as well as consumption across the world. Over consumption of such resources has resulted in the deterioration of the environment. The consequences of environmental degradation have resulted in solid waste generation in huge amount, air, water and soil pollution, global warming etc. which has become a concern for government, consumers and producers which lead to the green movement for the preservation of environment.

In this study an attempt is made to find out different ways that research and development department of industries are continuously working to develop products that are environment-friendly and cause less environmental destruction. Primary data reveals about the amount solid waste generated by different states and cities of India and further different techniques are discussed using green goods into our daily life to minimize solid waste disposal into landfill.

**Keywords:** Environmental degradation, pollution, green goods.



## **CARRYING CAPACITY BASED DEVELOPMENT PLANNING OF AIR ENVIRONMENT - A LONG TERM SOLUTION ON DELHI AIR POLLUTION CRITICALITIES**

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### **ABSTRACT**

Urban areas are characterized by high population density on one hand, and vast economic development on the other. Besides the transportation for mobility is another important activity. The resulting pollutant emissions place an increasing pressure in the air quality of these areas. Whereas in the developed countries reasons for poor air quality are primarily the industrial activity, domestic- spatial heating and transportation but, nowadays as a result of the rapid increase in construction activity and domestic energy (for cooking) as well as mobility the major current urban air pollutants come from many such sources. In fact in Delhi alone a survey done under "Source Apportionment for Six Cities" reflect that there may more than 50 different urban sources of air pollution. Another significant source of air pollution for developing countries, is the rapid rates of both urbanization and growth in vehicle fleet are expected to be the highest in the world (World Health Organization/United Nations Environment Program, 1992).

Air pollutants emitted from such sources are transported, dispersed or deposited by meteorological and topographical conditions. Thus, the resulting ground level concentration patterns have to be estimated to enhance the quality of Life. It's for this reason that the assessment of assimilative capacity for the desired thresholds is perhaps the only long term solution to address the air pollution criticalities of urban agglomeration like Delhi. The development of framework for carrying capacity based planning involves, mainly, identification of the resources of the region and scope of their utilization vis-à-vis environmental impacts. The carrying capacity of Air Environment gives a rough estimate of the emission load for required resource consumption (matching with the man-made and natural sources for the desired Quality of Life) it can sustain under a set of specific conditions (release condition, topographic, meteorological and other conditions).

The tasks of planners and other professionals as a long term solution, therefore, require an in-depth understanding of carrying capacity of Air Environment and its application to keep a balance between built environment and natural environment as a long term solution for the Delhi air pollution criticalities associated with burgeoning activities of urbanization that is becoming a defining feature of 21 century.

In this paper important factors associated with Delhi Air Pollution criticalities on one hand as well as the factors important for designing the Carrying Capacity Based Air Pollution Source planning are highlighted.

## SDGS' PERSPECTIVE ON ENSURING HEALTH FOR ALL

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### ABSTRACT

To see health from a human right perspective establishes that all human beings have an equal right to health and compels the state to work out measures to ensure this. Protection from disease is not only elementary to survival, but it also provides human dignity and worth of individuals and strengthens economic growth and prosperity.

Suffering from disease impacted the well being of an individual; it burdens family and public resources, weakens societies. Poor health constitutes suffering and deprivation of the most fundamental kind. It demands essential adequate minimum standard of health care facilities, which should be made available to all people irrespective of their social, geographical and economic position. Over the years, significant strides have been made in increasing life expectancy and reducing child and maternal mortality. Globally, the incidence of major infectious diseases has declined since 2000, including HIV/AIDS, malaria, and TB, but the challenge of these and new pandemics remain in many regions of the world. We have made immense progress globally in finding newer treatments, vaccines, and technologies for healthcare, but universal affordable access to healthcare remains a challenge.

The international community, through Goal 3 of SDGs: “ensure healthy lives and promote well-being for all at all ages”, has committed itself to a global effort to eradicate disease and strengthen treatment. It addresses the emerging health issues and aims to substantially reduce the numbers of deaths and illnesses caused by air, water, and soil pollution and contamination along with promotion of wellbeing.

In this background, paper focuses to understand measures taken by the government to ensure health and wellbeing and its impact vis-à-vis SDG3.

## **HEALTH RISKS AND VULNERABILITY OF THE COMMUNITY NEAR BHALASWA LANDFILL SITE IN DELHI**

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### **ABSTRACT**

Rapid urbanization process has aggravated the problem of waste not only in the cities but also in the peripheral areas. Changing lifestyle, increased per capita incomes and the impact of globalization have led to increased generation of waste in the surroundings. Subsequently there is an increasing difficulty of acquiring new land areas for solid waste disposal in cities. Waste is not treated efficiently due to huge cost involved on the waste disposal sites leading to resource depletion of the immediate environment. Landfill sites hence are the potential sites of health risks and health disasters to the surrounding population. In Delhi waste generation is increasing with the increase in population. At present there are three open landfill sites that are already exhausted in terms of its space. The indiscriminate and unscientific disposal of wastes has created environmental stress around these landfill sites. There is ground water contamination along with air and land pollution making the study area more vulnerable to health risks. The present study explores the health risks of the community staying in and around the Bhalaswa Landfill site in North Delhi squatter settlements. The non-availability of safe drinking water and sanitation, nearness to the landfill site, groundwater contamination, lack of health care facilities all have resulted in to the high exposure to health risks to the municipal workers, ragpickers and residents in that area. The study finds that the community is vulnerable to health risks due to their low socio-economic condition, nearness to landfill site and the consequent ground water contamination in the study area. Community participation and awareness in the process of generation, collection, transportation and disposal of solid waste can adhere to sustainable waste management.

## **EFFECT OF THERMAL, CHEMICAL AND THERMO-CHEMICAL PRETREATMENT OF SUGARCANE BAGASSE ON ENHANCED ANAEROBIC DIGESTION**

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### **ABSTRACT**

Sugarcane bagasse (SB) is a recalcitrant compound with high amount of lignin, cellulose and hemicellulose. It is not much efficient in biogas production and mainly used for ethanol production. Due to non-degradation of SB, it is pre-treated with different chemical, mechanical and biological methods. Therefore, the aim of this study was to assess the enhanced biogas production from pretreatment (thermal, alkali, acid, thermal-alkali and thermal-acid) of SB to break down the recalcitrant compounds. The experimental set consists of six different batch reactors of 500 mL capacity namely (control or without any pre-treatment (WP0), Thermal Pretreatment (T0), Acid Pre-treatment (AC0), Alkali Pre-treatment (AL0), Thermal Acid Pre-treatment (TAC0) and Thermal Alkali Pre-treatment (TAL0). The experiments were carried out for 30d at ambient conditions. The alkali and acid pre-treatment were performed with 1N NaOH and 1N H<sub>2</sub>SO<sub>4</sub> and thermal pre-treatment was performed in an autoclave. The biogas was measured using water displacement method and the highest biogas production was achieved in thermal-alkali pretreatment of SB (5958mL) followed by alkali pretreatment (5331mL). The regression coefficient obtained was greater than 0.95 for all the results. Experimental results were modelled using Gompertz and Logistic model and were well fitted. Based on the results of this study, it was observed that the thermal-alkali pretreatment of SB was most efficient pretreatment methods for enhanced biogas production. The results for pH, VFA and ammonia were statistically significant with  $p < 0.05$ .  
Keywords: Anaerobic digestion, biogas, pretreatment, SB.

## **WATERSHED MANAGEMENT AND COMMUNITY PARTICIPATION FOR STRENGTHENING LIVELIHOOD OPPORTUNITIES FOR TRIBAL COMMUNITIES**

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### **ABSTRACT**

The conventional idea of drought as a natural phenomenon of arid region is changing now. It is because of the fact that many areas receiving high rainfall are facing acute water scarcity. This shows that drought or famine is just not the water scarcity or absence of precipitation, but it is more related to water resource management or mismanagement in the area. In the case of Rajasthan, every year some part of state is affected by drought. Despite this, the state considers water stress as a temporary phenomenon where short-term relief measures are considered to be a solution. Udaipur district of south Rajasthan has been suffering from the problems of water scarcity, environmental degradation, poverty and lack of livelihood opportunities. The present paper is an empirical investigation based study of the livelihood patterns and resource base of tribal communities of Kotra block of Udaipur, Rajasthan. While tribal communities in the region earlier had a forest resource based livelihood, but large-scale deforestation forced them to shift to farming activities on a sloping land and seasonal migration too. Continued and damaging run-off resulted in the loss of forest cover and agricultural land led to an adverse effect on the water availability in the study area. Illiteracy, low resource base, lack of insufficient infrastructure and absence of community participation undermine the livelihood patterns. Therefore, tribal in the study area deserve special attention for strengthening their livelihoods and expected to make the target tribal households livelihood-proof with better dietary resources, livelihood opportunities and linkages for sustainable development strengthened. Study also argues that an integrated watershed development through tribal-wisdom and conventional methods have successfully improved the surface and ground water resources. Present study is based on both primary and secondary sources of data. The field investigation method with a structured questionnaire schedule has been adopted.

**Keywords:** Livelihood, Tribal Communities, Water Resource Management, Community Participation and Development.

## ANTIMICROBIAL COMPOSITE MATERIALS FOR WATER TREATMENT

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### ABSTRACT

The bacterial strains have the ability to create biofilms on any artificial surfaces such as adsorbent through the non-specific interaction like electrostatic and H-bond which enhance the adhesion of bacteria and ultimately lead the hazardousness of water. Therefore, before screening any adsorbent it must be sure that the adsorbents should have the anti-microbial activities to reduce the microbial adhesion. Further to this, it is challenging for scientist community to find out the advance techniques to provide microbe's free, clean and affordable water through protecting the water source and purifying polluted waters. This study reveals the advancement made in the water treatment technology through the synthesis of economic, eco-friendly, and anti microbial materials based various nanohybrids composites by mixing the nanoparticles into the Nigella sativa plant seeds using simple co-precipitation method. Physiological properties of these materials were analysed by FTIR, XRD, SEM-EDX, TEM, TGA and DSC analysis. Prepared materials have shown the inhibitory action against the Gram-positive and Gram-negative bacteria's (Escherichia coli and Staphylococcus aureus) species and also used as an adsorbent for dyes and arsenic, and showed good adsorption capacity. This novel composite, therefore, is affordable and sustainable adsorbent for complete purification of water for current and future scenario.

## **BOTANIC GARDEN: CHANGING ROLE IN 21<sup>ST</sup> CENTURY**

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### **ABSTRACT**

The 21st century, being an era of climate change, biodiversity loss, human population explosion, rapid industrialization and urbanization provides opportunities for botanic gardens as a source for addressing social issues, e.g., recreation, outdoor education, etc., in addition to their role in plant diversity conservation. This contribution describes the status of botanic gardens in India. It is noticed that the botanic gardens are prominently contributing for plant diversity. Interviewing a sector of civil society, it was observed that the changing role of botanic garden is least understood by the citizens. A greater emphasis on awareness for citizens by the botanic garden staff about the changing role of botanic garden is greatly called for.

**Keywords:** Plant diversity, Botanic garden, Changing role.

## SILVER NANOPARTICLES A NOVEL SOURCE FOR PLANT GROWTH ENHANCEMENT

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### ABSTRACT

Nanotechnology is defined as the systems and processes which operate at a scale of 100 nm or less. Nanotechnology has many applications in the field of agriculture. There are majority of nano-materials which are known for its plant growth promoting effects. Nanoparticles have unique physiochemical properties such as high reactivity, particle morphology and large surface area. They can also boost the plant metabolism. Silver nanoparticles are being used to enhance seed germination, plant growth, and as antimicrobial agents to control plant diseases. The present study was conducted to observe the effects of nanoparticles synthesized from *Sonchus asper* and *Camellia sinensis* on fenugreek. Several growth and molecular parameters were studied. Fenugreek seeds were treated with five different concentrations of silver nanoparticles i.e., 1%, 5%, 10%, 20% and 50%. A control plate without any nanoparticle treatment was also maintained to observe the variations in treated seeds as compared to the untreated seeds. Seeds were incubated under favorable conditions for growth. All the growth parameters such as germination percentage, coleoptiles length, fresh and dry weight, vigour index and molecular parameters including protein and DNA content were observed after seven days. 10% and 20% concentration of nanoparticles synthesized from *Camellia sinensis* and *Sonchus asper* respectively was found to be the best for all the growth and molecular parameters. Lower nanoparticle concentrations showed better results than the untreated seeds. However, higher concentrations were proved to be slightly toxic to the seed germination. These results suggest that release of biologically synthesized silver nanoparticles into the environment could have only positive effects on plant communities. Enhanced seed germination as well as early plant growth can be achieved using nanoparticles. These results are further in harmony to the protein and DNA content as well as DNA quality. In conclusion, these results reveal that the application of silver nanoparticles synthesized from *Sonchus asper* and *Camellia sinensis* significantly enhanced seed germination potential.

**Keywords:** *Camellia sinensis*, Fenugreek, Germination percentage, Nanoparticles, *Sonchus asper*, Seedling vigour.





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