

Virtual National Conference on Emerging Trends to Heal the Earth and Environment (ETHEE)

18th September 2021

Jointly organized by



School of Interdisciplinary and Trans-disciplinary Studies IGNOU, New Delhi







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Message



ignou THE PEOPLE'S UNIVERSITY

Today on World Ozone Day, we are celebrating 36 years of the Vienna Convention which is for the protection of the ozone layer. Vienna convention and Montreal Protocol brought together the major countries of the world to completely eradicate the use of the gases causing a hole in the earth's ozone layer, which is important in shielding human beings against fatal UV radiation. The phaseout of controlled uses of ozone depleting substances have immensely helped to protect the ozone layer for the present and future generations and have also contributed significantly towards global efforts to address climate change.

These problems can be addressed by multidisciplinary education framework by doing systemic interdisciplinary research towards development and sustainable environment. The sustainability of our contemporary global order is thus a matter of intense debates and discussions. In this context, on the occasion of world ozone day the present national conference on "Emerging Trends to Heal the Earth and Environment" on 18thSeptember 2021, organized by SOITS, IGNOU & STE will certainly provide an academic platform for sharing of research and scholarship cutting across disciplinary boundaries.

I look forward to the proceedings which would contribute towards policy making as well. I wish the organizers all the best for conceptualizing and effectively putting together several themes that are relevant to the current environmental issues andpolicies of the Government. I also take this opportunity to welcome the students, participants of this national conference and wish them good luck.

September 21, 2021

कुलपति कार्यालय Vice Chancellor's Office इन्दिरा गांधी राष्ट्रीय मुक्त विश्वविद्यालय Indira Gandhi National Open University

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प्रो॰ सुमित्रा कुकरेती सम-कुलपति Prof. Sumitra Kukreti Pro-Vice Chancellor







MESSAGE

Contemporary Environmental issues like Climate Change, Ozone layer depletion, Food Security, Natural Resource Management and our unsustainable lifestyles are a warning to future generations. We can deal with this effectively provided the current and future generations are educated on addressing and handling of the crises. This conference will provide a platformfor contributions of successful global practices and research in sustainability education, and in stimulating thinking on ways and perspectives to achieve the Sustainable Development Goals amongst all participants and participating organizations. I hope, it will stimulate the development and inspiration necessary to attain SDGs and shift us proximate to aequitable and more sustainable world.

I would like to congratulate the Faculty, SOITS for initiating the conference titled "**Emerging Trends to Heal the Earth and Environment**" on 18th September, 2021. I wish you all the best for the success of this national webinar.

(Prof. Sumitra Kukreti)

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MESSAGE

International day for the Preservation of Ozone Layer, September 16th, is an annual reminder of what can be achieved when every country on the planet works together. The Vienna Convention for the Protection of the Ozone Layer and its Montreal Protocol on Substances that Deplete the Ozone Layer are the first treaties in the history of the United Nations to achieve universal ratification. The Montreal Protocol has taken significant steps to protect the ozone layer, and the united global effort to phase out ozone-depleting substances has helped the hole in the ozone layer to heal and has protected human health, economies and ecosystems by limiting the harmful UV radiation reaching the Earth.

Today, we are celebrating and acknowledging the Montreal Protocol and its Kigali Amendment in its wider efforts to keep us, our food, and vaccines cool! This year's Ozone Day seeks to highlight the Montreal Protocol that does so much more, including, slowing climate change and helping to boost energy efficiency in the cooling sector, which contributes to food security.

India has for decades played a key role in bringing about the success of the Montreal Protocol and has committed to carry on the good work in phasing down HFCs by ratifying and implementing the Kigali Amendment to the Montreal Protocol. India showed leadership on climate-friendly cooling when it released the India Cooling Action Plan (ICAP) in 2019. The Montreal Protocol and the Kigali Amendment show us that by acting together, anything is possible. So let us act now to slow climate change, feed the world's hungry and protect the planet that we all depend on.

In this context the National Conference on "Emerging Trends to Heal the Earth and Environment (ETHEE)" aims to provide a platform for encouraging discussions and discourses, exchange of knowledge so that together we can anticipate a future of knowledge and research to Heal the Earth and Environment. This seminar aims to encourage us all to work together to preserve the ozone layer, promoting energy efficiency, and introducing low-carbon and low-emission technologies and practices to heal the planet and forging a brighter and more equitable future for all humanity. The seminar highlights the importance of safeguarding the Earth's protective ozone layer and shows that collective action, guided by science, is the best way to solve major global challenges.

I wish you all a productive and successful conference.

(Prof. Shachi Shah)

अंतर विषयक एवं परा विषयक अध्ययन विद्यापीठ School of Interdisciplinary & Trans-Disciplinary Studies

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SAVE THE ENVIRONMENT (STE) (A SOCIETY FOR RESEARCH, AWARENESS & SOCIAL DEVELOPMENT)



Message

With great delight, **Save The Environment** and **School of Interdisciplinary and Trans-disciplinary studies** (**SOITS, IGNOU**) welcome all to the **Virtual National Conference on Emerging Trends to Heal the Earth and Environment**(ETHEE) being organized online on 18th September, 2021 to mark this year's celebration of World Ozone Day. The year 2020 halted life across the globe with the imminence of COVID-19 pandemic; but 2021 is being termed as the 'year of recovery and healing' with humankind bouncing back to 'new normalcy' of which the online mode of this conference is one example.

The United Nations has declared the theme for World Ozone Day, 2021 as 'Montreal Protocol - Keeping us, our food and vaccines cool'. According to the official website of the UN, this year's Ozone Day seeks to highlight the Montreal Protocol that is efficiently working towards slowing down climate change and accentuating energy efficiency in the cooling sector while contributing to food security. Although sustenance of life on planet Earth is impossible without solar energy, however, the vast amount of ultraviolet radiation emanating from the Sun can lead to depletion of life. Here comes the Ozone layer, acting as the perfect protective stratospheric shield, safeguarding us from inimical UV rays. Therefore, it is our foremost responsibility to protect our Ozone cover against depletion by curbing detrimental substances like aerosols, CFCs and halons. Various governmental and non-governmental organizations have been working proactively since the past few decades to spread awareness globally about the urgency of Ozone layer preservation.

Studies compiled by UN in 2019 show that, as a result of cumulative efforts towards Ozone preservation, parts of the ozone layer are recovering at a rate of 1-3% per decade since 2000. The efforts, albeit at a slow pace, are productive and certainly indicate that we must continue our endeavor of shielding 'Earth's own umbrella', by restricting the usage of all kinds of Ozone depleting substances in our day-to-day lives.



As a concerted step to the above perspective, the said online national conference is being organized to bring together eminent academicians, researchers, government authorities and policy makers to discuss various themes relevant for Ozone preservation, for instance, steps to reduce depletion, effect on climate change, consequences on health, propagating awareness and community participation, etc.

SAVE THE ENVIRONMENT (STE)

(A SOCIETY FOR RESEARCH, AWARENESS & SOCIAL DEVELOPMENT)

I am highly indebted to our Chief Guest, Prof. Nageshwar Rao, Hon'bl Vice-Chancellor, IGNOU, New Delhi& Patron, ETHEE and to our Guest of Honor, Prof. Arunabha Majumder, Chairman, IWWA, Ex-Director and Head, Dept. of Sanitary Engg., AIIH&PH, Kolkata & Patron, STE for their valuable time and inputs in organizing the event. I am grateful to Prof. B. Rupini, Professor, SOITS, IGNOU, New Delhi & Convener of the conference for her whole-hearted support in organizing the conference successfully. I am also thankful to the Organizing secretaries, Prof. Shachi Shah, Director, SOITS, IGNOU; Dr. Sushmitha Baskar, Assistant Professor, SOITS, IGNOU and Dr. Jigni Mishra, Project Associate, IARI & E.C. member, STE for their relentless efforts and constant support. I sincerely thank the entire organizing committee and conference secretariat for being there persistently.

Special thanks are reserved for all the participants and audience, especially the young researchers who have contributed their innovative ideas and outlook for preserving the Ozone layer which we shall come across in this abstract book.

I extend my best regards to everyone on the occasion of World Ozone Day and welcome you all to the virtual conference on Emerging Trends to Heal the Earth and Environment.

With regards,

ibra Neissa

Dr. Kshipra Misra, Convener, Virtual National Conference on ETHEE, 2021 Former Additional Director, DIPAS (DRDO), Delhi & President, Save The Environment





MESSAGE

There has been increasing focus on investment in regional environmental stewardship in natural resource conservation, reduction in ozone depletion practices for executing environmental management policies and awareness programs across the globe. But the concept of environmental stewardship has not reached adequately to the common public with regard to enormous use of fossil fuels, depending on unsustainable technologies, emissions of greenhouse gases. Manifesting a clear rationale and comprehensive analytical framework, stringent rules could strengthen our ability to understand the environmental stewardship in different contexts and how to support and manage the local efforts. The scientific fraternity is playing a significant role in the execution of the Montreal Protocol and final steps of phase out of CFCs by cautioning the world. The main aim is to do systemic research to establish the validity of the environmental stewardship as a valuable and holistic concept for guiding productive and sustained relationships with the environment and for a healthy ozone for sustainable environment.

The practicable insights of environmental stewardship will fetch significant modifications on the perception of laydown and promote more practical and flexible to execute environmental policies and programs. As a scientific fraternity our goal is to raise the contour of environmental stewardship

Prof. B.Rupini Conference Convenor

About Organizers & Committees

About STE

SAVE THE ENVIRONMENT (STE) is the organization that aims to spread awareness to the society about environment, health and water. It was founded and registered on 19th November 1990. STE has collaborated with various organizations in the past 29 years such as All India Institute of Hygiene & Public Health, AIIH&PH and India Canada Environment Facility, DRDO Ministry of Defence, Department of Science and Technology (DST), Indian Institute of Management (IIM), Ahmedabad to mitigate the effects of arsenic and provide arsenic-free drinking water.

The vision of the society is to protect present and future generations from various Environmental Hazards. The NGO has been actively organizing various interactive sessions such as conferences (National and International), workshops, seminars and awareness programs including poster competitions, quiz competitions, science exhibitions and webinars among the future generations.

About IGNOU

"The Indira Gandhi National Open University (IGNOU), established by an Act of Parliament in 1985, has continuously striven to build an inclusive knowledge society through inclusive education. It has tried to increase the Gross Enrollment Ratio (GER) by offering high-quality teaching through the Open and Distance Learning (ODL) mode.

Vision

IGNOU, the National Resource Centre for Open and Distance Learning (ODL), with international recognition and presence, shall provide seamless access to sustainable and learner-centric quality education, skill upgradation and training to all by using innovative technologies and methodologies and ensuring convergence of existing systems for massive human resource required for promoting integrated national development and global understanding.

Mission

To advance frontiers of knowledge and promote its dissemination through sustainable Open and Distance Learning systems, seamlessly accessible to all, including those hitherto unreached, from among whom the leaders and innovators of tomorrow will emerge".

Today, it serves the educational aspirations of over 3 million students in India and other countries through 21 Schools of Studies and a network of 67 Regional Centres, around 2,000 Learner Support Centres and 20 overseas institutions. The University offers about 200 certificate, diploma, degree and doctoral programmes, with a strength of nearly 250 faculty members and 230 academic staff at the headquarters and regional centres and over 35,000 academic counsellors from conventional institutions of higher learning, professional organisations, and industry among others.Recently, IGNOU has been awarded NAAC A++ for its academic excellence."

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Geomicrobiology: An Emerging Science and Way out to Environmental and Health Problems

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Abstract

Geomicrobiology involves the role of microorganisms in geological environments and geochemical processes. Extreme environments such as caves, hot springs, deep-sea hydrothermal vents, marine environments, extreme cold environments such as Arctic and Antarctic, deserts, and heavily polluted environments, host diverse microbial species of varied interest. Researchers from various fields are partnering to investigate such microorganisms for a variety of environmental and health applications. It is estimated that our planet still has 99.99 percent of its microbial diversity unexplored. So, to delve deeply into the exploration of microbial diversity and its functions, the metagenomic approach acts as a lens for a broader picture than traditional culturing methods. The metagenomics approach entails the direct investigation of microorganisms in specific environmental samples. Several such discoveries have made significant contributions to medicine, pharmaceutical industries, bioremediation, biodegradation, biomineralization, biofuel production, space exploration, and other fields. Thus ,this article discusses the identification of extreme microbes and their possible potential applications in environment and health.

Keywords: Geomicrobiology, Extreme Environments

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Emerging Trends to Heal the Earth and Environment (ETHEE) 18th September 2021

Potential Groundwater Contaminants in Agra Region, Uttar Pradesh- A Case Study

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ABSTRACT

The present study is focused on Potential groundwater contaminants either in suspension or in solution in the Agra region. The research outcome provided that the amount of Salinity, Fluoride, Chloride, Nitrate, Arsenic, Iron, Sodium, Total dissolved solids, Total Hardness, Total Alkalinity, calcium and magnesium are groundwater contaminants in the region, major reason of behind the groundwater contamination is overexploitation of groundwater aquifers for Irrigation, drinking, domestic and other purposes and more runoff of rainwater during monsoon season. 50 blocks of Agra district are having serious concern as these blocks are either overexploited or critical in nature. Agriculture is the main source of income of about 90% of the population of the Agra region and more than 70% of water requirement for irrigation is being fulfilled by ground water. Declining trend of quality and quantity of groundwater affects gross domestic product(GDP) in the form of decrease in the productivity of agriculture, Industries, social and other developmental activities of the nation. Total dissolved solids, Total hardness, Total alkalinity, Chloride, Salinity, Calcium and Magnesium values are not meeting the requirements of acceptable limit in most of the the locations as per Bureau of Indian standard IS 10500: 2012.

Keywords: Groundwater, Agra Region & Contaminants.

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Benefits of Green Highway Considerations in achieving Sustainable Development Goals

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Research Scholar* Professor** School of Interdisciplinary and Trans-disciplinary Studies Indira Gandhi National Open University, New Delhi

ABSTRACT

Green highway considerations or nature-based solutions play a critical role in achieving sustainable development goals. The Green highway considerations such as reuse and recycling of construction material, the conservation of natural resources, societal benefits, watershed management etc. These are proved to benefit the environment and the mental and physical health of human beings. This paper presents a critical review of benefits on green highway considerations that promote good health and social well-being through conservation of natural resources, protection of trees along the roads and highways to reduce air and noise pollution. Reuse and recycling process to reduce the GHG emissions or fuel consumption, and watershed management to increase the groundwater levels. Societal benefits create road safety and aesthetic along the highways. This comprehensive study provides and will prove the benefits of green considerations that must follow in every stage of the project cycle through proper planning at the beginning of the road construction management to achieve the sustainable targets.

Keywords: Green highways, climate change, carbon credits, human health and sustainability.

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Emerging Trends to Heal the Earth and Environment (ETHEE) 18th September 2021

Spatiotemporal Analysis of Urban Growth Over Greater Noida Using Remote Sensing and GIS

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¹Research Scholar, SOITS, IGNOU, Delhi, India ²Assistant Professor, SOITS, IGNOU, Delhi, India

During past three decades, changes in the economic reforms in the Greater Noida has attracted a large number of populations which led to the transformation of its LULC pattern. It has significant effect on the local environment and rise pressure on water, agriculture and human health. Remote sensing and GIS are helpful in detecting land use changes effectively. This study extracted the urban built-up area feature from Landsat TM (2000 and 2010) and Landsat OLI (2020). It aimed to analyze the urban growth changes during 2000-2020 and pattern of built-up surfaces in relation to the population growth in the region. The result shows that the urban growth changes have occurred with continuous increase in urban built-up area. Urban built-up area is increased by 5.53% (2000-2010) and by 6.84% (2010-2020). This urban growth was mainly resulted from the transformation of agricultural and barren land. The study will help planners to develop suitable sustainable policies and integrated planning of urban and non-urban area to maintain balance between urban growth and natural environment.

Key words: Urban growth, Remote sensing, GIS and Sustainable.

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Role of different metal based nanoparticles in plant protection and fertilization (*Oryzasativa*)

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ABSTRACT

Agriculture has been the backbone of Indian economy and proved itself in fulfilling hunger of the nation's population since past century. But excessive use of chemical fertilizers and pesticides for more crop yield proved to be harmful for environmental health. Nanotechnology, an emerging field of applied sciences, is helpful in environmental protection. Nanoparticles received great attention due to their unique properties like surface to volume ratio high reactivity, tunable pore size, particle morphology and beneficiary applications in various sectors. In recent years, nanoparticles (NPs) are considered as better alternate instead of traditionally used chemical fertilizers or pesticides because of their physiochemical properties. Among many types of NPs, metal oxide NPs likeAl₂O₃, TiO₂, SiO₂,Fe₂O₃, ZnO and CuO₂affects growth and development of many plant species positively. They mainly influence root and shoot growth, biomass production, seed production and biochemical activities. Some NPs could act as pesticides because of their antimicrobial characteristics and ROS mechanism. Silver, Copper, Selenium and Cerium have antibacterial or antifungal properties. In our daily diet, rice is a basic ingredient for more than 50% of population. So it is essential to apprehend the interaction of rice plants with metal oxide nanoparticle and provide standard information on the influence of these ENPs on this crop plant. In this review paper, we will discuss about the effect of copper, silver, titanium and cerium oxide NPs on rice plant growth and seed germinationalong with a discussion on their antimicrobial property.

Keywords: Nanoparticles, Environmental Protection, Fertilizers, Antimicrobial Property.



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Arsenic in Rice grain: Risks and challenges

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ABSTRACT

In nature arsenic is widely distributed and it has gained notoriety for its toxic properties and adverse impact on human health. Arsenic contaminated groundwater used for drinking purpose has been envisaged as a problem of global concern. Arsenic contamination of groundwater has been detected in many stretches of Ganga and Brahmaputra river basins. In West Bengal, presence of arsenic in groundwater has been confirmed in 84 Blocks spread over in 8 Districts. In these areas, presence of arsenic beyond acceptable limit (0.01 mg/l) has been found in 64% hand pump fitted bore-wells as per study conducted by AIIH&PH. More blocks are found to be arsenic affected since permissible limit of arsenic in drinking water has been reduced to 0.01 mg/l by BIS. People residing in arsenic affected areas are at risk and measures are being taken up to supply arsenic free safe water to the people.

Arsenic contaminated groundwater is used extensively for crop and vegetable cultivation. Study conducted in Shantipur (Nadia), Deganga (North 24-Parganas), Padmapukur (South 24-Parganas) and JotSujan, Jiagunj (Murshidabad) revealed presence of arsenic in rice grains in varying concentration and ranging between 75 and 4270 μ g/Kg. Presence of arsenic in rice grain beyond 500 μ g/Kg may pose serious risk to the consumers since provisional maximum tolerable daily intake (PMTDI) of inorganic Arsenic is 2 μ g/Kg body weight as per Joint FAO/WHO Expert Committee on Food Additives.

Recently, a study was undertaken to find out how best the arsenic could be removed from rice grain so as to reduce the risk of Arsenicosis. Two varieties of rice (Swarna and Nolat) were collected from a village (Jot Sujan) in Murshidabad District and as per laboratory analysis arsenic in rice grains were found to be 1200 µg/Kg (Swarna) and 1100 µg/Kg (Nolat). Rice samples soaked in water for different span of time and thereafter washing with water indicated considerable reduction of arsenic in rice grain. Arsenic reduction in rice grain of Swarna and Nolat variety was found to be in the range of 59.58---69.42% and 57.17---67.54% respectively while soaking in water for 2—10 hrs. Thus practice of soaking rice in water for a considerable period of time and washing with water before cooking will minimize risk of arsenic entering in human body. Again, separation of starch water from boiled rice after cooking will further reduce arsenic in cooked rice. In arsenic affected areas arsenic free/safe water supply need to be ensured. In drinking water arsenic should not be more than 0.01 mg/l. This will minimize risk of arsenicosis in human body considerably even if there will be entry of arsenic in human body through dietary intake to a certain extent. Risk of arsenicosis is more among the people who consume rice from paddy, cultivated using arsenic contaminated groundwater. Such instances may be common if farmers consume same rice daily as grown in their land but cultivated with arsenic contaminated groundwater. Drinking of arsenic safe water as well as soaking rice for 6 to 10 hrs before cooking will minimize risk of arsenicosis to a great extent.



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Awareness generation among themasses through community participation

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Environment awareness generation is the most effective tool to bring about a change in society with respect to cleanliness, environmental health, hygiene, social stigmastaboos and soon. For bringing about environment awareness in the society, programs may be executed by virtue of "folk songs, nukkadnatak, folk dance, pamphlet distribution, advertisement vehicles, creating and distributing appropriate information, education and communication (IEC) material to targeted beneficiaries. Awareness generation can be of various types. It depends primarily on the theme which it focusses on. They include the following Behavioral Change programs, Social stigmas redressals, Personality development programs, Environmental awareness, and Financial literacy programs. Behavioral change programsmainly focus on changing the attitude or behaviour of the beneficiaries.

Behaviour of a person is something which is determined solely by his/ her perception of society. As it is a raw memory based on mere observations., It can be changed, given that counter agreements are reinforced with facts and scientific proofs. For example, maintaining clean surroundings and change in the habit of going out in the open for defecation. In our studywe have dealt with such type of awareness campaigns at ground level. Impacts in the form of case studies are being shared in the later part of this abstract.

Social stigma redressals programme is often associated with discrimination and exclusion and is usually linked with low level of education and awareness among people. Stigma can pose a threat and may act as a hurdle in Nation development.For example, Health Emergencies like Covid-19 outbreak has sparked social stigma and discriminatory behaviours against the people of certain ethnic backgrounds. Similarly, awareness programs focusing on environmental issues, financial literacy, and personality development (Skill development) basically involve active participation of community as well as the trainers or facilitators to get thebest results.

In this study we organise someawareness tohave a greater reach and impact. There is complete absence of sanitary infrastructure (IHHTs)in most of the villages in Mewat area of Haryana. A wide range of misconceptions and stereotypes are deep rooted in the community. First, we tried to arrange at least one individual household toilet per house. We chose one village at a time and equipped them with provision of a toilet. After our initial intervention we observed thatpeople still use the opendefecation. We conducted asurvey and impact assessment to identify the possible reasons. Ourfindings indicate a positive

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correlation between the ignorance or lack of awareness and open defecation. We designed various awareness programs aimed at changing the behaviour of the people. The first step involved approaching the Sarpanch of the Gram Panchayat and appraising him/her about the objectives of the project. The Gram Panchayat members and Anganwadi workers were alsoinvolvedfor greater community participation. Secondly, we conducted behaviour change campaigns once a week. These carried out at an individual level through training at home, community level at Gram Sabha, Anganwadi centers through folk songs, folk dance, and other audio-video mediums. Thirdly, we organized workshops and seminars for school going children in their schools for disseminating the knowledge and know-how about maintaining the good personal hygiene, menstrual hygiene management, clean and neat surroundings through school sanitation clubs. Fourth, distributing free sanitary pads and IEC materials amongst women of the reproductive age, including information of efficient use of sanitary pads, their proper disposal and diseases related to menstrual health. Fifth, revival or linkage of SHG's and running of skill development programs to make them independent and financially stable.

The above-mentioned programs were periodically conducted in the concerned village. Further studies, shows the change in behavior of community. As the awareness generation is inclusive in nature, it involves allsegments of the community. Meanwhile, the real beneficiaries are adolescent girls, children, women, and elderly people. The impact can be seen through achange in behavior, cleanliness of the surroundings (environment), decreased disease infection rate, reduction in social stigmas and taboos, decreased school dropout rate, and efficient menstrual hygiene management. In anutshell, we can say that community participation apre-requisite thesuccessful implementation active is to of environmentalawareness programs.

Keywords: Environmental Health, Sanitation, Hygiene.

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Evaluation of heavy metal pollution in groundwater and associated health risk in the proximity of a Coal Thermal Power Plant

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ABSTRACT

Groundwater samples were collected from bore wells around the coal thermal power plant, Ropar Punjab India to determine the level of heavy metal pollution. The concentration of different metals including Al, Fe, Mn, Co, Cu, Cr, Cd, Zn, Pb, As in groundwater samples were measured using inductively coupled plasma mass spectrometry (ICP-MS). Different indices such as Heavy metal pollution index (HPI) and Metal Pollution Index (MI) were applied to determine the level of pollution. In addition, possible health risks posed to adults and children population through the consumption of heavy metals (Co, Cu, Cr, Cd, Zn, Pb, As) was also examined. Furthermore, multivariate statistical techniques were also applied such as correlation, hierarchical cluster analysis (HCA) and principal component analysis (PCA). The concentration of Al, Fe, Mn, As, Pb was found exceeded the permissible limits of BIS and WHO. Noncarcinogenic hazard quotient for As and Pb was observed (HQ>1) with highest value for adults as 3.71 whereas in children with highest value as 14.85. The study revealed that children population is more prone to non- carcinogenic health hazard as compared to adult population in the investigated area. However, HPI for all the groundwater samples was found below thecritical value (100). Hence the study provides the groundwater status in the investigated area and will be helpful in the protection of human health in accordance with groundwater resources.

Keywords: Thermal power plant; Groundwater pollution; Heavy metal pollution index; Health risk assessment.

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Nutritional Profiling and Elemental Analysis of Citrus Peel Extract by UV- Spectroscopy collected from Uttarakhand, India

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ABSTRACT

Citrus fruit residues, which are generally discarded as waste in the environment, can act as potential nutraceutical resources. Due to their low cost and easy availability such wastes are capable of offering significant low-cost nutritional dietary supplements. The utilization of these bioactive rich citrus residues can provide an efficient, inexpensive, and environment friendly platform for the production of novel nutraceuticals or for the improvement of older ones. Nutrient, phytochemical composition of some citrus species likes *Citrus jambhiri, Citrus aurentifolia, Citrus lemon* and *Citrus sinensis* were determined by UV spectroscopy. The peel extract was weighed and stored in a plastic container until needed. Mineral, vitamins, antinutrient, and phytochemical composition of the peel extract were determined using standard procedures. *Citrus* peel extract contains significantly (p < 0.05). The mineral composition revealed the order Na>Fe>Ca>Zn>Mn>Cu>Ni>Co Vitamin-C content of the peel extract of citrus lemon is 21.45mg/100 g which is higher in Rudraprayag.

Keywords: UV spectroscopy, Citrus residues, Vitamin-C, Nutraceuticals.

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Suitability of treated wastewater as a substitute for irrigation on agricultural land – A sustainable approach

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ABSTRACT

To meet the sustainable *goal 2 of Zero Hunger* with an Indian population of 1.39 billion, put more stress on agricultural sector. The projected water demand for irrigation practices will increase from 688 BCM in 2010 to 910 BCM for the year 2025. To overcome the water scarcity problem, we have to look for an alternate source of irrigation. Present scenario demands for the usage of treated effluent of industries in agricultural sector. Approximately a total of 44 million m³/day wastewater is produced every day. The use of treated wastewater could be a sustainable solution for land irrigation.

The literature revealed that quality of treated industrial wastewater is meeting the standards except the increased BOD, dissolved salts and few trace metal concentration for some industrial sector. The wastewater is enriched with essential nutrients and some toxicants respectively. The usages of treated wastewater increased the organic carbon content, N, P, K and essential macro and major elements that improve the soil quality and enhance the plant growth. Some industrial wastewater has increased ions and metal concentration that intervene the soil water relationship. The wastewater quality must meet the irrigation water suitability standards such as EC, RSC, SAR and boron content.

Therefore it becomes essential to judiciously utilize the industrial wastewater as an alternate source for irrigation. Depending on the water quality characteristics, the effluent can be used directly or after treatment ensuring irrigation norms. A reliable treatment approach can be followed to meet the irrigation suitability and to limit the human health risk and environment protection.

Keywords: Irrigation, Industrial wastewater, Water pollution, Nutrients, Soil quality.

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Assessment of Natural Radioactivity Present in Soil at Emerging Urban Centre of Panipat District, Haryana, India and Its Associated Health Risk

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ABSTRACT

The study was conducted to assess the natural radionuclides present in soil at hotspot location of Panipat district of Harvana state in India and its associated health risk to the inhabitant in that particular area. The Panipat district is divided into 28 grids and from each grid; samples were collected once in the month of November for two consecutive years 2014 and 2015. The natural radionuclides viz, uranium (²³⁸U), throrium (²³²Th) and potassium (⁴⁰K) of soil were analysed by using High-purity Germanium (HPGe) detector. The activity of 40 K, 232 Thand 238 U of soil samples ranged from 439.4–750.6 Bq kg⁻¹, 28.6–43.9 Bq kg⁻¹ and 32.2 – 63.6 Bq kg⁻¹ respectively. The associated health risk was calculated of above mentioned three radionuclides. Air Absorb dose (AAD) and annual effective dose equivalent (AEDE)were calculated and ranged from 55.2–87.2 nGyh⁻¹ and 0.067–0.107 µSvy⁻¹ respectively. The concentration of AEDE in the selected study area was observed much lower as compared to world average concentration of 70.0µSvy⁻¹ (UNSCEAR, 2000). The cancer risk associated due to exposure of natural radioactivity present in soil to the inhabitant of the surrounding area is also evaluated and observed that potential cancer risk varied from 0.220×10⁻³ to 0.348×10⁻³. The exposures of natural radionuclides were low, indicating lower cancer risk during the study period. This study is generated the baseline data of potential emission of natural radionuclides from soil and its associated radiological risk.

Keywords: Radioactive Materials, Air Absorb Dose, Exposure, Health Risk.

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Assessment of Land Use/Land Cover Changes from 2001 to 2021 Using Google Earth Engine in Ramagundam Mining Area, Pranhita-Godavari Valley, Southern India

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Coal is one of the important primary sources of energy in India, which are generally extracted through open cast mining. However, coal mining activities, particularly open cast mining method are known to result in adverse environmental impacts such as vegetation loss, air pollution, ground water contamination along with changes in land use land cover (LULC) features. Hence, reliable temporal data on the impact of mining activities are required to aid in mine reclamation and management efforts. Assessment of LULC changes over the last two decades was carried out in this study in Ramagundam coal field, a part of the Pranhita-Godavari valley using Google Earth Engine (GEE) integrated with Geographical Information System (GIS). Landsat 5 and Landsat 8 multispectral satellite data of 2001 and 2021 with <5% cloud cover were used to classify LULC classes. The different land use classes mainly water body, vegetation and mining area in Ramagundam coal field are classified in GEE through supervised classification using Classification And Regression Tree (CART) classifier. The study reveals that the mining operations increased dramatically between 2001 and 2021. On the other hand, agriculture land has also risen as barren land has been turned to productive land as a result of some effective environmental policies. This study will aid policy makers and environmentalists in understanding nature of change in LULC features in the area so as to plan accordingly.

Keywords: Ramagundam Coal Field, GEE, GIS, CART, LULC.

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Study of impact of vehicular emissions on air quality at Bareilly city, Uttar Pradesh

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ABSTRACT

Vehicular emission is the major cause of particulate and gaseous pollutant in air. Bareilly city do not have too much of industrialization but vehicular emission could not be ruled out which could be a potential cause of PM2.5 in air. Use of shared and electric vehicles is less popular. Air monitoring of PM2.5 was done at Bareilly city as per CPCB guidelines from different monitoring stations based on vehicular frequency for a period of two years (2019-2020) to analyze the seasonal and annual trends of PM2.5. During pre-monsoon season (2019) PM2.5 exceeded the specified limits of $60\mu g/m^3$. During lockdown period due to outbreak of pandemic COVID19 there was a sharp cut in PM2.5 at Bareilly city. Presently, citizens are avoiding shared transport in order to maintain social distancing resulting in large number of vehicles on road. This paper focuses on the monitoring, analysis and interpretation of PM2.5 at Bareilly city.

Keywords: Bareilly, vehicular emissions, shared, electric vehicles, PM2.5, pre-monsoon, lockdown, COVID19.

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CLIMATE CHANGE

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ABSTRACT

Since the period of industrial revolution, greenhouse gases emissions by human from deforestation, fossil fuel combustion and agricultural activities leads to climate change and results in global warming. Various changes observed in the climate such as changes in rainfall patterns, rise in temperature, changes in weather events like floods, heat waves, landslides, droughts, etc., sea level rises, impacts on natural environment and also on the human. Researcher reveals that change in climate affects human and natural environment and threaten the human civilization also. Action to respond or recover the climate change is less.Climate change makes attention between society and science, starts new social movements and challenges global governance institutions. Collaboration with climate change by scientists prompts renewal in areas like transformation and transition studies and theory of social practices. Climate change is a big issue for the well being of nature and human, corrective action must be taken to improve it.

Keywords: Climate change, Greenhouse gases, Global warming, Industrial revolution.

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Environmental Sustainability vs Renewable Energy Resources

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ABSTRACT

If we talk about environmental sustainability, it means that use energy resources by considering the need of future generations. In other words, we should minimize the use of conventional sources of energy and find out the new resources to meet the need of energy requirements for the future generation. Although we have already found out some renewable energy resources like wind energy, solar energy, tidal energy, hydro energy, etc. still I think that they are not enough as there are other issues that we have witnessed in recent past like floods in some areas due to dam construction for generating hydro energy or issue of recycling of solar panels used in generating solar energy or the arrangement used to generate energy from wind and tides cause trouble to birds and aquatic animals respectively. So there are not one or two issues that need to be resolved but there are thousands of others also which are impacting the environment adversely. We should also think about using the heat generated from vehicles and other electronic appliances so that users can save maximum energy and waste minimum that not only save energy but also help in saving the environment and helps us to keep it clean.

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Decentralised WastewaterTreatment For Bindapur Water Body Revival(S-W Delhi): Using Phytorid Treatment Technology

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ABSTRACT

Delhi the capital city, has witnessed rapid urbanization and human activities, leading to generation of enormous wastewater, which in the absence of proper treatment and disposal is causing environmental pollution. Total installed treatment capacity of Sewage Treatment Plants (STPs) is 617 Million Gallon per Day (MGD)in Delhi, against approximately 740 MGD of sewage generated. To address the issue of untreated sewage polluting the environment, there are certain green sustainable technologies available that provides an alternate to the conventional Sewage Treatment Plants (STPs). Phytorid technology is a patented and a very effective Constructed Wetland(CW) technology for sustainable, eco-friendly treatment of wastewater. Wastewater treatment is also necessary to prevent contamination of surface waterbodies by discharge of untreated sewage and industrial effluents.

Water bodies have traditionally played an important role in providing water for various household uses and in recharging the groundwater. Rejuvenating the water bodies with treated wastewater will not only solve the pollution problem but also augment the underground water reserves, while promoting rain water harvesting to ensure sustainable water security, as part of go green policy of the government. The running and maintenance cost is very low as compared to conventional sewage treatment plants. One such project is now operational at Bindapur, in South West Delhi. Area of the water body is 8107.2 meter square and current status is dry. This paper aims to highlight efficiency of the phytorid technology for the revival of Bindapur Water Body by analyzing various physico-chemical and microbiological parameters.

Keywords: Constructed Wetlands, Phytorid, Systainable technologies, waste water treatment.

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Estimation of bioaerosols and observation of SBS symptoms within office premises in Delhi

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Introduction: Bioaerosols play a significant role in indoor air pollution as they can be pathogenic or cause an allergic reaction following inhalation. Bioaerosols concentrations in the offices' environment and their roles in causing sick building syndrome (SBS) raise more concern as an issue under "occupational health hazards".

Methods: The concentrations of bioaerosols (as a marker of SBS) were monitored by Anderson's Six stages cascade impactor using enriched blood agar media in both indoor and outdoor environment of two tagged offices of similar size and activities but having different footfalls per day (footfalls in Office I=320 person/day and Office II=180 person/day) within a Delhi's university campus. We had conducted bioaerosols sampling once a week in one year covering four seasons (December 2018 to November 2019), and also recorded onsite relative humidity and temperature.We had also surveyed staff members using the formulated questionnaire to understand prevalence of SBS symptoms in office workers.

Results: The comparative high bioaerosols concentration were reported in office I ($3296 \pm 345.94 \text{ CFU/M}^3$) thanoffice II ($2205 \pm 424.86 \text{ CFU/M}^3$). The indoor/outdoor (I/O) ratio was maximum in the winter season (I/O ratio: 2.1) and least in the post monsoon season (I/O ratio: 1.1). Interestingly in office I, staff reported more complaints (26.66 %) on health issues compared to office II (20%). The most commons symptoms were eye infection, upper respiratory illness, and eye dryness.

Conclusion: Overall, the seasonal differences in terms of total bioaerosols counts were distinct in the outdoor environment compare to that found indoors.SBS symptoms within offices premises establishes a positive correlation with bioaerosols concentration within the indoor environment and raises more concern for public health in Delhi.

Keywords: Indoor air pollution, bioaerosols, public health, indoor environment, andSick Building Syndrome.

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Waste Water Remediation using agrowaste based Iron nanomaterial

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ABSTRACT

Organic dyes released in the industrial effluents have recently emerged as a major threat to the environment. It has been estimated that every year such dyes are released into the water body, posing a serious threat to the living organisms that depend on water for their daily needs. Though a number of traditional treatment strategies such as electrochemical oxidation, biodegradation have been deployed for waste water treatment, but they all have proved out to be expensive along with causing secondary pollution. Hence there is a need to develop sustainable, cost effective and efficient method for waste water treatment. Due to its unique physical and chemical properties Nano particles have attracted attention as a potential catalyst for waste water remediation. The current study deals with the green synthesis of iron nano particles, which are then used for the degradation of Fuchsin basic dye which is widely used in paper and printing industry. Based on principles of green chemistry iron nano particle (Fe-NPS)were synthesized using waste such as fruit and vegetable peels, and leaf litter. These wastes have antioxidants and polyphenols, which act as strong reducing and capping agent, required for the synthesis of nanoparticles.

During winter months, fruits and vegetable wastes were collected from vegetable market, Azadpur mandi and the leaf litter was collected within university campus. It was observed that among fruits and vegetables, Kinnowand Cauliflowerwaste was abundantly generated respectively whereas among abundant leaf litter in university area was *Pongamia Piñata*(Indian Beech) and *Kigelia Africana*(sausage tree) during the study period. The synthesized nanoparticles were characterized chemically using various techniques like TEM, SEM, FTIR and XRD. The average size of the nano particles ranged from 40-70 nm, showing the presence of iron oxides. The FeNPs were then utilized as a Fenton-like catalyst for degradation of Fuchsin basic (4 mg/L) dye solution. Dye concentrations for all the samples were traced using UV spectroscopy. It was observed thatthe efficiency of these nanoparticles is as high as 90 -95% in the initial 20 minutes only. Besides highlighting the waste management, the current studies show an efficient way of integrating Green Chemistry with nanotechnology.

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Impact of Municipal Solid waste disposal on water quality of River Jhelum, J&K

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ABSTRACT

The Municipal solid waste generation is directly proportional to the increase in the population. Un scientific dumping of MSW poses a great challenge in the Municpal Solid Waste management(MSWM). One among the various challenges is the dumping of MSW into the surface water bodies.

The present study aims to highlight the impact of municipal solid waste dumping on the water quality of river Jhelum in Baramulla Town, J&K. River Jhelum , with twenty four tributaries , originates in Verinag, is the main water resource of Kashmir valley with immense socioeconomic importance. Open dumping on the banks or into the water streams is the sight one gets in the study area. Five sites of river Jhelum in the Baramulla stretch were selected, the samples were collected and were analysed for various Physico- chemical parameters as per the standard procedures.

The river jhelum in this stretch of baramulla town does not maintain good water quality and thus not confirming to the designated best use criteria[as per CPCB] for drinking purposes and propagation of fisheries.

The scientific and critical management approach is very imperative for the sustainence of this water body.

Keywords: Solid waste, Municipal solid waste management, Jhelum.

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Identifying The Potential Of Tolerant Plant Species To Remediate Deteriorating Air Quality Of Urban Delhi

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ABSTRACT

Delhi, the capital city of India has always been in news for its deteriorating air quality. The major factors that led to the poor air quality are rapid rate of urban population growth, increasing vehicular density, unregulated construction activities, increasing biomass burning etc. Despite various initiatives taken by state and central government to curb the levels of pollution in Delhi, it still holds to be a serious environmental issue that need to be managed properly to minimise its impact on human health and the resources of the city. One of the sustainable approaches to tackle the worsening air quality of Delhi is by planning efficient green cover with tolerant plant species. The present study assess the spatial and temporal pattern of PM₁₀ and PM_{2.5} at five selected sites located in different districts of Delhi for two consecutive year 2019-2020 using secondary data. The selected sites were- Wazirpur (North Delhi), Punjabi Bagh (West Delhi), R.K Puram (South Delhi), Anand Vihar (East Delhi) and Mandir Marg (Central Delhi). The air quality index (AQI) for PM₁₀ and PM_{2.5} was computed and analysed for the selected sites which showed that all the sites showed unhealthy to hazardous air quality during Post-monsoon and winter months and during Monsoon season the air quality was reported to vary from unhealthy for sensitive group to Good category. Anand vihar and wazirpur reported inferior air quality compared to other studied sites. The study also reviewed the Air pollution tolerance index (APTI) of trees to identify tolerant species that can be recommended for plantation as a pollution remediator in attainment areas of Delhi for better air quality management. The studies showed that Mangifera indica (Mango), Azadirachta indica (Neem), Ficus benghalensis (Banyan) etc. are some of the tolerant species that can be grown in polluted areas to improve air quality of Delhi city.

Keywords: AQI, PM₁₀, PM_{2.5}, APTI, Vegetation etc.

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Rapid biosynthesis of silver, gold& their core-shell nanoparticles, using *Terminaliaarjuna*

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ABSTRACT

The bark broth of Arjuna plant (*Terminaliaarjuna*) has been utilized for the extracellular synthesis of silver, gold and their bimetallic Au/Ag nanoparticles in the presented work. Aqueous solution of silver nitrate &chloroauric acid on treatment with bark broth of Arjuna plant rapidly resulted into the formation of silver and gold nanoparticles. Metal mixtures was reduced simultaneously for synthesizing Core-shell nanoparticles using seed mediated growth synthesis method. Reaction was completed in few minutes at room temperature suggesting that reaction rates for this method were higher than conventional chemical methods which highlights that this method could be a better alternative to other methods (chemical/biological). Synthesized silver and gold nanoparticles were polydisperse, with large fraction of gold particles of being spherical shape along with some triangular shape particles. Size distribution for silver nanoparticles was not uniform. These particles were characterized with scanning electron microscopy (SEM), transmission electron microscopy (TEM), atomic force microscopy (AFM), UV-visible spectroscopy, Fourier-transform infrared spectroscopy(FT-IR), dynamic light scattering (DLS), X-ray diffraction (XRD). These green route synthesized particles were examined for utilization as substrate in vibrational spectroscopy like Raman and IR.

Keywords: Terminaliaarjuna, Green synthesis, Core- shell nanoparticles, SERS, Nanoparticles.

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Gold nanoparticles enhanced molecularly imprinted poly(3-Aminophenylboronic acid) sensor for myo-inositol detection

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ABSTRACT

Alzheimer's disease (AD) is the most common cause of dementia, by the time it is typically diagnosed, substantial neuronal loss and neuropathological lesions can damage many brain regions. Myo-inositol is a sensitive early marker of Alzheimer's disease, or a biomarker for monitoring disease progression and response to treatment (Watanabe, T et al.,). Quantitative analysis of myo-inositol may provide important clues for early diagnosis of Alzheimer's disease (AD). Therefore, an electrochemical sensor for myoinositol based on molecularly imprinted polymer (MIP) on electrode modified with gold nanoparticles was developed in the present work. The MIP was prepared via the electropolymerization of 3-Aminopheylboronic acid (3-APBA) on the surface of the SPCE in the presence of myo-inositol molecule as template. The surface modification with AuNP/SPCE greatly facilitated the charge transfer processes of $[Fe(CN)_6]^{3-/4-}$, which was used as an electrochemical probe. The construction steps of the modified electrode were monitored via Cyclic Voltammetry (CV), Differential Pulse Voltammetry (DPV), Electrochemical Impedance Spectroscopy (EIS), and Scanning Electron Microscope (SEM) for analyzing the morphological changes of electrodes. Important parameters that exert control over the performance of the molecularly imprinted sensor (such as number of cycles, pH, monomer & template concentrations, extraction of template, rebinding conditions and interference study) were investigated and optimized. Under optimized experimental conditions, the imprint-modified AuNPs /SPCE has a linear response in the concentration range from 500 nM to 10 mM in 0.1 M of pH 7.0 phosphate buffer solutions (PBS). The limit of detection was found to be 500 nM. The conducting poly(3-APBA)/AuNPs/SPCE imprinted sensor was successfully applied for the sensitive and selective determination of myo-inositol in human plasma samples and the results agreed well with the literature data.

Keywords: *Myo-inositol, 3-Aminophenyl boronic acid, electropolymerization Au nanoparticles, molecularly imprinted sensor, electrochemical determination.*

Reference

1) Watanabe, T., Shiino, A., & Akiguchi, I. (2012). Hippocampal metabolites and memory performances in patients with amnestic mild cognitive impairment and Alzheimer's disease. Neurobiology of Learning and Memory, 97(3), 289-293.



on

Emerging Trends to Heal the Earth and Environment (ETHEE) 18th September 2021

A healthy environment: luxury or necessity?

Vivek Kumar, Ajay Meena and Deepak Choudhary Regional Ayurveda Research Institute(RARI), Gwalior

Global environmental contamination is regarded as a multi-faceted international public health issue. This is all because of human actions that pollute the water we drink, the air we breathe, and the soil in which plants grow, has a negative impact on the environment. Climate change and the consequences of global warming have a significant impact on numerous ecosystems, generating difficulties such as food safety, iceberg melting, animal extinction, and plant damage. According to my Research findings, I have found various key issues dealing with developing country's policies such as our India. Analyzing the costs and benefits of the environment and health which is highly critical for improving the utility of assessment frameworks. There must be improved access to knowledge about health and environmental concerns and solutions that require interactive dialogue between scientists, policymakers, and stakeholders. We must know that more targeted climate policies and investments are needed to scale up the most effective measures for a healthy environment. Given the source and nature of the emission, as well as its impact on health and the environment, appropriate technological techniques can be employed. It also refers to the theory and practise of assessing, correcting, controlling, and preventing environmental factors that have a negative impact on current and future generations' health. The conclusion of studies is that economic inequality and environmental changes are closely connected to each other.

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Emerging Trends to Heal the Earth and Environment (ETHEE) on 18th September, 2021

jointly organized by School of Interdisciplinary and Trans-disciplinary Studies, IGNOU, New Delhi & Save The Environment, Kolkata

SESSION I

[Coordinator: Dr. Sushmitha Baskar, Assistant Professor, SOITS, IGNOU & Organizing Secretary, ETHEE]

| 10:30 - 10: 40 AM | Welcome address by Prof. Shachi Shah, Director, SOITS, & Organizing Secretary, ETHEE |
|----------------------|---|
| 10:40 - 10: 50 AM | About the conference by Prof. B. Rupini, Professor, SOITS, IGNOU & Convener, ETHEE |
| 10:50 – 11:00 AM | Address about STE by Dr. Kshipra Misra . Former Additional Director, DIPAS (DRDO), Delhi, President, STE & Convener, ETHEE |
| 11:00 - 11:15 AM | Address by Prof. Sumitra Kukreti, Pro-Vice Chancellor, IGNOU & Co-Patron, ETHEE |
| 11:15 - 11:45 AM | Inaugural Lecture by The Guest of Honor- Prof. Arunabha Majumder, Chairman, Indian Water Works Association (IWWA); Emeritus Professor, School of Water ResourcesEngineering, Jadavpur University & Ex Director, Professor & Head, Department of Sanitary Engineering, AIIH&PH, Kolkata & Patron, STE |
| 11:45 AM - 12:10 PM | Keynote Lecture by Dr. P.G. Dastidat, Scientist 'G' and Adviser, Ministry of Earth Sciences, New Delh |
| 12:10 -12:35 PM | Keynote Lecture by Dr. Kishor Amin, Co-investigator and Scientific Officer, ACTREC, Mumbai |
| 12:35 PM - 12:55 PM | Address by The Chief Guest- Prof. Nageshwar, Rao. Hon'ble Vice-Chancellor, IGNOU & Patron, ETHEE |
| 12:55 - 01:00 PM | Vote of thanks by Dr. Jigui Mishra , Project Associate, IARI, New Delhi, E.C.member, STE & Organizing Secretary, ETHEE |
| 01:00 - 01:30 PM | Poster presentation session [Chairpersons: Prof. Shachi Shah & Prof. R. Baskar, SOS , IGNOU] |
| 01:30 PM - 02: 00 PM | Lunch Break |

| ssion [Co-ordinator: Dr. Sushmitha Baskar] ah, Director, SOITS, IGNOU and Prof. R. Baskar, Professor, SOS, IGNOU Participants will be allowed 5 mins for presentation and 2 mins for the Q&A | Declaration of results by Prof. B. Rupini and Dr. Kshipra Misra Concluding remarks by Dr. Sushmitha Baskar National Anthem | Link for the event: | ational Conference ETHEE 2021 18 September · 10:00 – 16:30 hours IST | <u>ps://meet.google.com/koa-trig-uft</u> | I Protocol - Keeping us, our food and vaccines cool |
|--|---|---------------------|---|--|---|
| SESSION II: Oral Presentation Set Chairpersons: Prof. Shachi Sh 02:00 – 04:00 PM | SESSION II: Valedictory Function 04:00 – 04:15 PM 04:15 – 04:25 PM 04:25 – 04:30 PM | | Ná Saturday, | Ptt | Montreal |



SAVE THE ENVIRONMENT (STE) was founded and registered on 19th November 1990. In 1992 with the collaboration of WWF (India), the organization started working to combat arsenic poisoning problem of water in the arsenic prone areas of West Bengal. Since then STE has been involved in various projects related to combat arsenic problem in India.

Our Vision

To protect present and future generations from various environmental hazards.

Our Mission

To create awareness and motivation among rural communities & provide cost effective, energy efficient & environment friendly technologies.

Our Activities

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Conducting interactive sessions, workshops/ seminars, awareness programs, field operations through projects, science fairs, posters & quiz competitions.

Please join us and become part of our family by enrolling yourself as Life Member of STE Family

> Mail us at info@stenvironment.org save1990env@yahoo.co.in

Know about us at www.stenvironment.org