

Atmospheric Dispersion Modeling Using AERMOD To Predict The Impact Of PM₁₀ Near Bileipada, Odisha

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Adverse health impacts due to particulate matter pollution are a major concern in mining areas. Regulatory models are very much useful tools for air quality management and evaluation for a specific source and respective climatic conditions of the study area. In the present study, the incremental value of PM₁₀ in an industrial-mining complex has been predicted by using AERMOD model for a study period from March 2015 to February 2016. The annual average PM₁₀ concentration in the study area was found to exceed the Indian prescribed ambient air quality standard of 60 $\mu\text{g}/\text{m}^3$. The model includes all the sources of PM₁₀, such as point source, line source and area source in the study area. The validation of the model is based on emission inventory, requisite meteorological inputs and other technical details required for the modeling. In the study area, the predominant wind direction was from east to west and the average wind speed was 1.17 m/s. The maximum incremental concentrations were 162.32967 $\mu\text{g}/\text{m}^3$, 118.90189 $\mu\text{g}/\text{m}^3$ and 96.85992 $\mu\text{g}/\text{m}^3$ during summer, monsoon and winter, respectively and the overall maximum concentrations were found to be 124.57152 $\mu\text{g}/\text{m}^3$. The observed and predicted results have the potential to provide meaningful as well as valuable information for pollution impact analysis and also it will help decision makers for preparing air quality assessment and management programme in an industrial-mining complex.

KEYWORDS

Ambient air, Dispersion model, AERMOD, PM₁₀, Isopleth

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An Investigation On Green Synthesis, Optimization And Characterization Of Zinc Oxide Nanoparticles Using Rhizomes Extract Of *Curcuma longa* And Evaluation Of Their Phytotoxicity

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The aim of the present investigation is biosynthesis, characterization and optimization for production of *Curcuma longa* rhizome mediated zinc oxide nanoparticles using different parameters and evaluation of their phytotoxicity (seed germination, shoot and root formation) on *Sesamum indicum*. The biosynthesized Zn-oxide nanoparticles are characterized by UV-visible spectroscopy, Fourier transform infrared spectroscopy (FTIR), x-ray diffractometer (XRD), Raman spectroscopy, scanning electron microscopy (SEM) with energy dispersive x-ray spectroscopy (EDX) and transmission electron microscopy (TEM). The functional group of capping agents in extract and metal oxide groups in nanoparticles are confirmed by the FTIR spectrum. The XRD is helpful to analyse the nature of nanoparticles. The synthesized Zn-oxide nanoparticles are spherical with an average size of 25 nm. The treatment (1 mg/100mL synthesized Zn-oxide nanoparticles) shows significant seed germination, shoot and root formation when compared to other treatments (different concentrations). The lowest percentage of seed germination, shoot and root formation are observed in treatment with 4 mg/100mL synthesized Zn-oxide nanoparticles. This study concludes that the high concentration of Zn-oxide nanoparticles causes toxicity in plants.

KEYWORDS

Green synthesis, Zn-oxide nanoparticles, Rhizome, *C. longa*, Phytotoxicity

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Understanding Coal Combustion Residues Leaching Chemistry Under Disposal Environment

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The present study is focused on leaching characteristics of coal combustion residues under the disposal environment. The coal combustion residues collected from a thermal power station of Eastern India were used for the study purpose. Leaching study using open column percolation experiment were carried out for almost three years to understand the long-term effects of disposal of such solid wastes in the disposal environment. Potentiometric parameters, like pH, conductivity and total dissolved solids (TDS) of the samples were studied and was found within the permissible limits for effluent discharge in the inland surface water bodies and on land for irrigation (IS:2490). The leachates pH reflected that coal combustion residues (CCRs) are slightly acidic to alkaline but overall on the long-term basis, these are alkaline in nature. The leachates were also analyzed for 23 elements. The study revealed the elements, like Ca, Mg, Na and K were at a higher concentration as compared to other elements. These elements were found to be leaching throughout the study period although their concentrations reduced considerably with time. The most volatile elements, like B, Hg, Se and others, such as Cr, Ni, Co, Cd, Al, Ag, As, Ba, V, Sb, Mo were reported at BDL level. Elements, like Fe, Mn, Cu and Zn showed intermittent leaching. These were found to leach at significant concentration levels for some time but found to be absent on a long-term basis. Thus, the leaching study conducted on five samples of Burnpur Thermal Power Station clearly shows that coal combustion residue is safe with respect to trace and/or heavy metals leaching in the disposal environment when used as a fill material in bulk.

KEYWORDS

Flyash, Pond ash, Bottom ash, Solid waste, Waste disposal, Leaching

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An Investigation On Airborne Particulate Radioactivity, Heavy Metals And Polycyclic Aromatic Hydrocarbons Composition In Calabrian Selected Sites, Southern Italy

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This study aims to evaluate the concentration of radionuclides, heavy metals and polycyclic aromatic hydrocarbons in airborne particulate matter (PM) with a diameter lower than 10 μm (PM_{10}), with concentrations in air lower than 100 $\mu\text{g}/\text{m}^3$, deposited on quartz microfiber filters and collected in four selected Calabrian sites of southern Italy during the monitoring campaign performed in 2015-2016. In particular, ^{137}Cs , ^7Be and ^{210}Pb activity concentrations were measured through a positive biased high purity germanium (HPGe) gamma spectrometer; data on the contents of airborne particulate heavy metals As, Cd, Ni and Pb, were obtained through inductively coupled plasma mass spectrometry (ICP-MS) measurements after acid extraction with microwaves and filtration; the benzo[a]pyrene concentration was quantified with a gas chromatography-mass spectrometer (GC-MS) after chemical extraction, purification and concentration.

KEYWORDS

Airborne particulate, Radioactivity, Heavy metals, Polycyclic aromatic hydrocarbons

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A Study On Water Quality Parameters Of Effluent From Plate Washing Unit Of Printing Industry

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Industrial effluents from plate washing unit of the printing industry were collected bimonthly for a period of one year. The physico-chemical parameters were measured. The correlation analysis of water quality parameters (WQP) and multiple linear regression analysis were carried out. They were found to be statistically significant and highly useful in predicting water quality parameters.

KEYWORDS

Physico-chemical parameters, Correlation analysis, Water quality index

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Plant Growth Promoting And Organic Waste Degrading Activities Of A Native Rhizobacterial Strain Of *Alcaligenes faecalis* For Wheat Cultivation

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A native isolate of rhizospheric *Alcaligenes faecalis* was isolated from agricultural soil of peri urban area of Lucknow and characterized by morphological and molecular characteristic using 16s RNA. It showed in-vitro, plant growth promoting activities by producing indole 3-acetic acid (IAA), hydrogen cyanide, siderophore, ammonia and showed phosphate solubilization activities potential. An earthen pot experiment was conducted under net house conditions with the isolated strain (1×10^8 CFU/mL) which increased root length (28, 33 and 67%), shoot length (30, 45 and 55%), fresh weight (54, 67 and 90%), dry weight (55, 77 and 55%), number of root hairs (92, 69 and 38%), number of leaves (46, 63 and 58%) at an interval of 40, 80 and 120 days after sowing (DAS) in wheat (*Triticum aestivum* PBW 343). The weight grain per plant was also increased by 68% over control.

KEYWORDS

Biofertilizer, Plant growth promoting bacteria, Sustainable agriculture, Wheat

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Characterization Of Organophosphate Pesticides In The Agricultural Community - A Qualitative Research

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Organophosphates are widely used as insecticides in agriculture and they are known to be a cause of poisoning. Organophosphates work by blocking the pathway for the enzyme acetyl cholinesterase leading to cause respiratory and nervous disruption or damage which in turns result in the insects' death. These are highly toxic chemicals and they are considered among the Environmental Protection Agency's main priority group to be reviewed under the Food Quality Protection Act. This research review highlights the use of organophosphate pesticides and their link with different toxic effects on human health. The research focused on the contamination in the United Arab Emirates (UAE). The Emirates Ministry of Environment and Water in the UAE analyzed a total number of 8245 commodities samples to test the percentage of organophosphate pesticide they contain. The results showed that samples included organophosphate above the maximum residual level (MRL). Case studies were reviewed and results were discussed. Recommendations from this research review could help to change from chemical activities used in agriculture field to more friendly methods in term of sustainable agriculture.

KEYWORDS

Organophosphates, Acetyl cholinesterase, MRL

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Air Quality Index of Chennai City – A Case Study

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Air quality index (AQI) is a number communicate the quality of ambient air which can be easily understand by a common man. AQI is calculated based on the concentration of pollutants in the ambient air. AQI varies from 0 to 500. If score is 0, it is the best air quality and if score is 500, it is the worst air quality. Based on AQI value and the corresponding likely health impacts, ambient air quality is classified into six categories, namely good, satisfactory, moderate, poor, very poor and severe. In Chennai City, there are seven continuous ambient air quality monitoring stations (CAAQMS) in operation at different parts of the city. Ambient air quality data (24 hr average) from 1st January 2017 to 31st December 2017 of these stations was collected and AQI is calculated. Majority of the period AQI of all the stations fall under good and satisfactory category. The responsible pollutant for AQI is PM_{2.5}. The sub-index of other parameters SO₂, NO₂, CO, NH₃ fall under good category for all stations.

KEYWORDS

CAAQMS, AQI, Chennai city

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Car Ecoleasing Encouraging Product Service System With Circular Economy To Help Environment

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The Indian car market is growing at a fast speed. The market growth has also pressurized the actors to take inventive steps regarding the reduction of unsustainable burden on the earth. The need for mobility and impact of its use forces the player's worldwide to improve and innovate the traditional business model for a car. This is also being needed for the Indian car market so as to make use of the advantages while reducing the environmental impacts. The study suggests an alternative business model for the Indian car sector which mainly relies on the concept of leasing rather than selling. The traditional business model is followed and an alternate model is suggested which favours a long term leasing achieved through the principles of product service system (PSS) alongwith the approach of a circular economy. The model is assessed on the basis of eco-efficiency by calculating the value of eco-leasing low-carbon effect comparison value (ELCV). The results favour the reduction of carbon effects.

KEYWORDS

Car, Circular economy, Eco-leasing, Product service system (PSS), Sustainability

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Trend Of Heavy Metals In Soil And Vegetable From Industrial Areas Of Bhopal

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Bhopal is a historical city and the capital of Madhya Pradesh state in India. Bhopal is having two industrial areas in its surrounding, namely Govindpura, which comes under Bhopal district and Mandideep, which comes under Raisen district. Both the industrial areas are having a good number of processing units. Heavy metals are naturally present in the earth and have their distinct role over living organism, humans and plants. Due to industrial pollution, these metals are now creating problems for all living beings. The excess amounts of these metals are harmful to all life forms. The present study was undertaken to analyze the contamination profile of heavy metals in vegetables and soil collected from the vicinity of the above mentioned industrial areas of Bhopal. The samples were analyzed to investigate a load of mercury (Hg), copper (Cu), lead (Pb), chromium (Cr), arsenic (As), zinc (Zn), nickel (Ni), cadmium (Cd) and manganese (Mn). All the soil samples showed the presence of Pb, Zn, Cu, and Ni. Two vegetables, namely brinjal, spinach and wheatgrass were collected and analyzed for heavy metals. All the samples showed the presence of Pb, Zn and Cu.

KEYWORDS

Heavy metals, Concentration, Permissible, Pollution, Contamination

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A Study On Water Nutrient Content Of Dhanora Reservoir- An Ecological And Pollution Investigation

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The present study aimed for assessment of some selected physico-chemical (especially nutrients) parameters of Dhanora reservoir to investigate its status pertaining to water quality. Also, it will be co-related among the parameters for the entire water body for generating the baseline data. Our emphasis is to work for water quality maintenance and management. Water quality assessment and its care for drinking, agriculture and other purposes will play a significant role for the healthy aquatic ecosystem as well as its conservation [1]. Water sampling was carried out from four different sampling sites of this dam once in a month and brought in the laboratory for systematic analysis. Nearly two years of continuous investigations were carried out, that is June 2016 to May 2018. Water soluble nutrients play a vital role in aquatic reservoirs. Standard APHA procedures were applied for the water sample analysis. In conclusion, the water quality in regard to nutrients is optimum and within the permissible level, except a few values. The reservoir is well surrounded by hills with good quality of fertile soil. Ecologically, it is a healthy water body and not polluted by means of enriching the nutrients and other sources.

KEYWORDS

Reservoir, Nutrient study, Ecological, Pollution

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Groundwater Analysis With Special Emphasis On Arsenic By Using Multivariate Statistical Technique: A Case Of Ballia District

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Arsenic (As) is a metalloid found in the earth crust. There are three main sources of arsenic in the environment, such as geological, anthropogenic and biogenic. Arsenic contamination in groundwater has become a global concern in the 21st century. An excessive amount of arsenic injection causes keratosis on the soles and palms, skin pigmentation, black foot diseases, skin cancer, cardiovascular diseases, lung and liver carcinoma, etc. Ballia district, U.P., falls in the flood plain of Ganga and Ghaghara river. Arsenic contamination in groundwater of Ballia district is very common. Arsenic contamination is found in all blocks of Ballia district. Eastern part of Ballia district is lowland area and the slope is west to east, so the magnitude of arsenic is high in the eastern part in comparison to the western part. The overall objective of this research paper is to find out the magnitude of arsenic in groundwater of Ballia district. In this study, 100 groundwater samples have been collected from different water sources. This situation warrants immediate measures to be taken up for planning and implementation of various management programmes for mitigation of arsenic.

KEYWORDS

Arsenic, Contamination, Groundwater, Health, Physico-chemical parameters

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Innovations In Renewable Jet Fuel In Aviation Industries Towards Cost Optimization And Pollution Prevention

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According to the US Energy Information Administration (EIA), on average, the aviation sector consumes 10% of the total energy required in the transportation sector each year. It produces greenhouse emissions which airline executives and regulators have been working on reducing through alternative fuels – especially biofuel drop-in blended with traditional jet fuels. Years ago, United Airlines, KLM, Lufthansa and several other airlines and governing bodies, became one of the very first commercial sectors to commit to limiting carbon emissions over the next 20 years. The future of deploying sustainable fuels to meet these targets alongwith operational practices to reduce jet fuel consumption and emissions. Some of the effective practices include using more fuel-efficient aeroplanes, optimized flight plans and turning off jet engines while idling on tarmacs. This paper highlights the significance of biofuels in the aviation industries. This paper also highlights various developments in utilizing green fuels by various aviation companies throughout the world.

KEYWORDS

Lignocellulosic biomass, Renewable jet fuel (RJF), Fischer-Tropsch, Pyrolysis, Hydrothermal liquefaction, Alcohol-to-jet

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Pervious Concrete-Construction Methods And Quality Control

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Pervious concrete is becoming one of the solutions for the prevention of stormwater logging and has the potential to produce safer and quieter driving surfaces improving infiltration and groundwater table. In the past, the working of poor pervious concrete and the less experience of the contractor gave rise to labour-intensive construction methods, rising the expense and poorly impacting durability. However, some addressing has to be done in how the mix design process affects fresh and hardened concrete properties during and after placement. The actual mix proportions for pervious concrete should consider the application, the properties of mechanism required and the materials used. This paper explains about the potential of pervious concrete and its properties and focuses on modified methods for the design of the pervious concrete. New admixtures and the advancements of a standard proportioning of the mixture methodology will improve uniformity, strength and effortless arrangement. Normal pervious concrete is with water cement ratio between 0.27-0.4 and void percentage of 15-40% compared to 3-5% of the conventional concrete. The pervious concrete thus derived will have good permeability to drain off the rainwater and thus build up groundwater table. The future of pervious concrete includes self-consolidating slip-form pervious concrete overlay design.

KEYWORDS

Pervious concrete, Permeability, Void ratio, Flexure

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Assessment Of Noise Pollution During Deepawali At Allahabad

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The present paper described the noise pollution levels at different sites of Allahabad city during Deepawali. Noise monitoring data was acquired for the study during and after Deepawali at selected sites of Baharana (residential cum commercial area), Mutthiganj (residential cum commercial area) and Chowk (commercial area) in the city. The observed noise data of the selected sites are compared with the recommended ambient noise standard of Central Pollution Control Board (CPCB), India. The observed noise level was higher than the prescribed level. The major cause of higher noise at these locations are due to the use of firecrackers during Deepawali and post Deepawali. Variations of noise level was influenced by the burning of crackers and traffic movement on a roadside. The present work is helpful to develop strategies for controlling the noise pollution during the festival day.

KEYWORDS

Deepawali, Noise pollution, Firecrackers

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