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Assessment And Characterization Of Dust Particles From Tree Leaves As An Indicator Of Air Pollution In Urban Local Bodies : A Case Study On Barrackpore Sub-Division, West Bengal

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Urban growth in terms of population and areal expansion, changing scenario of landscape, conversion of non-built-up land to impervious land has been an increasing trend in worldwide. The gradual increase of concrete roads, cementation of imperviousness in urban extent, rapid growth of motor vehicles, domestic and industrial emissions are becoming a serious issue for the environment which degrade the urban health quality. To access the level of air pollution in urban areas, environmental monitoring is needed. Environmental monitoring can be done by active and passive processes. Active monitoring is having several limitations, so passive monitoring is being given much importance to monitor air pollution in recent days. The dust deposited over the roadside tree leaves are one of the indicators of environmental air pollution. In the present study tree leaves (*Polyalthia longifolia*) with dust from 4 selected sample sites were taken considering the urban characteristics, traffic junctions and industrial areas of Barrackpore subdivisions of West Bengal, India to characterize and analyze the size distribution, presence of different elements in the dust which are responsible for air pollution in the atmosphere. Scanning electron microscope (SEM) analysis was used to detect the size distribution of dust particles and SEM attached to an energy dispersive x-ray spectrometer (SEM-EDX) was used to analyze the elemental distribution of the dust. Elemental analysis has displayed the presence of elements, like Mg, Al, Si, Cl, K, Ca, S, C, Fe, Zn, Pb and Ti in the collected samples that indicates the air pollution concentration in the different urban unit. The mineral composition in the elements was observed by x-ray diffraction analysis (XRD). The phase identification from XRD has identified quartz, potassium, magnetite, carbon, feldspar, scrutinyite, cristobalite, silicon, oxide, etc., are present in the samples. The size variation and frequency of the particulates have also been categorized in each sample site. The results show that below 2.5 mm particles are dominants everywhere that indicate the air quality is poor.

KEYWORDS

Urban areas, Air pollution, Scanning electron microscopy-energy dispersive X-ray, X-ray diffraction analysis

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Immobilization Of *Bacillus subtilis* For Improved Decolourization Of Congo Red Compared To Free Cells

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A large amount of Congo Red (CR) has been discharged into the environment, mostly from the textile industries. The current study aims to find out the potential approach of Congo Red (CR) dye decolourization using suspended and immobilized *B. subtilis*. The effect of parameters (dye concentration, pH and temperature) on dye decolourization using suspended cells was studied. The corresponding cell mass (OD_{600}) alongwith the decolourization profile, was considered to understand the effect of cell mass. *B. subtilis* immobilized on polyurethane foam (PUF) cubes (size: 1 cm^3) have chosen to investigate the decolourization efficiency. SEM results revealed the porous structure of PUF and layer formation. The FTIR analysis was employed to confirm the decolourization. The maximum decolourization of 92% was achieved by immobilization method within 6 hr, whereas suspended cell assisted decolourization showed 82% within 12 hr. The data confirmed the second-order decolourization kinetics. We have found that the reaction rate and reaction rate constant (k) was found to be higher for immobilized cell assisted decolourization. The characteristic azo peaks have not found in FTIR samples of immobilized decolourization. The results confirmed that immobilization of *B. subtilis* is an efficient method for CR decolourization compared to the suspended cells.

KEYWORDS

Bacillus subtilis, Congo Red, Immobilization on polyurethane foam, Microbial assisted decolourization

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Waste To Energy Conversion Through Biodiesel Production From Waste Cooking Oil And Its Optimization

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The study comprises one of the methods of waste management by conversion of waste cooking oil to a sustainable form of energy. It carries out the production of biodiesel from waste oil which is disposed of in such a manner that it can be a serious threat to the environment in near future. Large scale production of biodiesel from this waste oil can be a permanent solution of waste to energy conversion. In this study, the operating parameters, namely catalyst concentration, methanol: oil ratio and reaction temperature were varied at three different levels using response surface methodology (RSM). The R^2 value is 0.9771 which indicates that there is a good fit between the given model and the experimental data. Based on the experimental results, the optimum operating parameters from transesterification of waste soybean oil at a stirring rate of 1000 rpm and 2 hr reaction time at a temperature of 52^{0}C, the molar ratio of 7.7:1 and catalyst concentration of 1.157% w/w of oil. Biodiesel production has been carried out with the optimized parameters to obtain the corresponding laboratory yield. The predicted and laboratory yields were 93.408% and 93.06%, respectively which denotes that variation is 0.348%. 2D and 3D contour plotting has been done using MINITAB17 for the prediction of optimized yield. The physical and the chemical properties have been compared and the relationship has been studied.

KEYWORDS

Biodiesel, Waste, Energy, Response surface methodology, Transesterification, Used soybean oil

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Assessment Of Air Quality And Its Impact In And Around Jharsuguda, Odisha And Prediction Modelling By Using Regression Analysis

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The air quality assessment is carried out in different residential, commercial and industrial areas in and around Jharsuguda town, Odisha, India. The PM_{10}, oxides of sulphur (SOx), oxides of nitrogen (NOx), are measured by the high volume sampler and it was found that not only in industrial areas but also in all residential and commercial areas the air quality is very poor as compared to the permissible limit and the quality of air is gradually decreasing in a rapid rate causing massive pollution load in the air in the command area of Jharsuguda town. The average value of PM_{10} varies from 549.6 ± 84.5 to 317.5 ± 50.4. The average value of NOx varies from 83.6 ± 16.5 to 46.8 ± 11.3 and that of SOx varies from 122.8 ± 22.7 to 71.4 ± 12.4. Rapid industrialization is the cause of a negative relationship in-between the ambient air quality of the sampling areas and other biochemical parameters, especially PM_{10} is very high and even much more beyond the tolerance limit because of rapid industrialization. Hence people are facing problem in respiration and suffering from cardiovascular and respiratory diseases. The optimal regression analysis estimates the prediction of air pollutant concentration in and around Jharsuguda town. The prediction is made from the data of different time intervals, meteorological and topographical conditions. Hence, proper planning and mechanism must have to be developed to minimize the excessive air pollutants in and around Jharsuguda town.

KEYWORDS

Suspended particulate matter, Pollutants, Air quality, Permissible limit, Pollution load, PM_{10}

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Scenario Of Speed Humps In Kurnool City, Andhra Pradesh, India - A Case Study

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The speed breakers are laid across the road to control the speed of the vehicle thereby reducing the number of accidents. Unscientific and improper speed humps result in additional fuel consumption for the vehicle and causing inconvenience to the vehicle rider. In the present study three road stretches in Kurnool city in Andhra Pradesh state is selected where there is maximum vehicular traffic and has more number of speed breakers. The width and elevation of the speed breakers are analysed and the velocity of the vehicles, before and after crossing the speed breakers are studied. From the loss in kinetic energy of the vehicle, the additional fuel consumption issues are calculated. The health aspect of the vehicle rider and the possibilities of injuries is also discussed. The results show that all the speed breakers are deviating from the standard specifications and there is wastage of a huge amount of fuel every day. Due to unscientific and improper speed humps, there is an increase in spine and neck injuries for the vehicle rider in crossing these speed humps. The objective of the present investigation is to study the dimensions of the speed breakers in the city limits and the impact of unscientific speed breakers in terms of additional fuel consumption. In this study, the health aspect of the vehicle rider has been discussed and viable solutions have been proposed.

KEYWORDS

Speed-breakers, Kinetic energy, Traffic volume, Wastage of fuel

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Bacterial Biofilms And Bioremediation

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In this review, the importance of biofilm formation in promoting greater survival, adaptation and propagation is explored. The focus will be given to the mechanisms of bacterial biofilm in the bioremediation of hydrocarbons, such as polycyclic aromatic hydrocarbons (PAHs), as bacteria is known to be one of the top degraders. Due to the increasing population utilizing petroleum and its products, the demand for petroleum increases. As a result, petroleum is slowly turning into the most widespread pollutants to the environment. Using biofilms as a tool may enhance the biodegradation processes as the communities developed structures for protection from harsh surrounding environments, quorum sensing (QS), horizontal gene transfer (HGT), availability of nutrients (from the environment and within the communities) and the persistence in metabolic rates to increase the cells' stability and resilience. A major limitation to successful bioremediation is the bioavailability of contaminant to the degradative cells. However, this is not a problem for the biofilm communities as the development of strategy such as chemotaxis allows the movement of the cells towards the contaminants. This paper also discussed the use of biofilms for wastewater treatment, acid-mine drains (AMD) treatment and bioremediation of heavy metals.

KEYWORDS

Biofilm, Bioremediation, Biodegradation, Hydrocarbons, Bacterial survival

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Analyzing The Role Of Public Transportation On Environmental Air Pollution In Select Cities

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Amidst growing concern for rising air pollution levels in cities across the globe, this first of its kind research work attempts to study whether the usage of public transportation infrastructure and personal automobiles by citizens has any significant impact on the air pollution levels in a city, taking a sample of 59 urban settlements data points sample from 39 cities across the globe. Variance based structural equation modelling (SEM) procedure is used for estimating a series of relationships among the constructs of public transportation infrastructure, public transportation usage, personal automobiles ownership and environmental air pollution (represented by $PM_{2.5}$, PM_{10} and greenhouse gas (GHG) levels) considered in the study and incorporating them into an integrated model. The results suggest that a significant relationship exists between the availability of public transportation infrastructure and its usage by its citizens on their personal automobiles ownership, which, in turn also impacts environmental air pollution levels in a city.

KEYWORDS

Air pollution, Public transportation, Structural equation modeling, $PM_{2.5}$, PM_{10}, Greenhouse gas

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Physico-Chemical Characterization Of The Products Of Composting And Co-Composting From The Sludge Of The Wastewater Treatment Plant Of Fez And The Pomace From The Region Of Ain Taoujdate (Morocco)

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Sludge disposal is a major challenge in the management of wastewater treatment plant (WWTP) residues. Indeed, sludge is known to be a high-risk source of environmental pollution. The objective of the present work is to research and propose a variant for the elimination and recovery of sludge from Fez WWTP through its co-composting with pomace from the agricultural area of Ain Taoujdate (Morocco). The study thus focused on the production of three composts coming from sludge and pomace in varying proportions. Composting was practised in greenhouses by the method of turned upside down windrows for 105 days. For a better characterization of the final products, the analyses focused on physico-chemical parameters that are of major importance in reasoned fertilization and soil reclamation programmes. The conduct of these analyses allowed a better understanding of the combined effects of composting and doses of substrates tested. This characterisation will ultimately make it possible to classify composts by chosen indicator and also to judge their degree of maturity and stability.

KEYWORDS

Wastewater treatment plant sludge, Pomace, Co-composting, Physico-chemical characterization

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Study Of Heavy Metals In Dust Of Khitouli Village Road Along Highway District, Katni

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In this study, the concentration of the heavy metals was determined in road dust samples of the Khitouli village, district Katni, Madhya Pradesh, India. Samples were acquired from the different upper surface of the road where vehicles were busy on the road during January, February and March 2018. A total of 5 metals were selected for the study area to examine the concentration along the road. Samples were analyzed using inductive coupled plasma-optical emission spectrometry (ICP-OES) (Perkin Elmer). The result showed that the average value of vanadium (V) was found maximum at overall sampling locations. The average value of chromium (Cr) was also found maximum at all sampling locations alongwith the road dust. These values were compared from the prescribed maximum permissible limits of the Environmental Protection Agency. The iron (Fe) was found maximum at sampling locations SL-3, SL-4 and SL-1 with the value of 1029.49, 992.52 and 872.32 ppm, respectively. Metal pollution in road dust was estimated on the basis of contamination factor (CF), degree of contamination (CD) and geoaccumulation index (Igeo). The calculated results of the degree of contamination (CD) showed a low to moderate degree of contamination level. Similarly, the index of geoaccumulation (Igeo) gave values in the range between unpolluted to moderately polluted level. The principal component analysis (PCA) suggests that traffic emission and anthropogenic activity are the main sources of metal pollutants on the road.

KEYWORDS

Geoaccumulation index, Contamination factor, Road dust, ICP-OES, Heavy metal, Khitouli village

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Carbon Stock And Carbon Sequestration In Above-Ground Biomass Of Muli Bamboo At Different Altitudes In North-East India

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In the present study, the carbon-stock and rate of carbon-sequestration in the above-ground biomass of the Muli bamboo was estimated in three sites having different altitudes and slope percent in Mizoram, north-east India. The maximum rate of carbon–sequestration with 35.21 MgC/ha/year was recorded in the site Tamdil having highest altitude of 950-1000 m above sea level with a very steep slope percent. The minimum rate of carbon-sequestration with 3.06 MgC/ha/year was found in the site Lengpui having the lowest altitude of 380-435 m above sea level and gentle slope. In Kelsih the site has an altitude of 850-870 m above sea level and a very steep slope of 19.45 MgC/ha/year rate of carbon-sequestration. The study shows that variation in altitude leads to a difference

in above-ground biomass productivity in Muli bamboo, thereby causing variations in the rate of carbon-sequestration.

KEYWORDS

Carbon content, Culm, Gentle slope, Steep slope

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Determinant Factors Causing Symptoms Of Respiratory Disorders With Exposure To Nitrogen Dioxide In Adults Around The Steel Industry

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Air pollution is a health problem that causes many deaths. The respiratory disorder is one of the causes of death due to increased air pollution in the environment. One of the gases that damage the environment is nitrogen dioxide (NO_2). NO_2 can be produced from the combustion process, one of which is the result of combustion in the steel industry. This study was conducted to determine the relationship of factors that influence the respiratory disorders that occur in adults around the steel industry. Variable respiratory disorders, the concentration of NO_2, length of stay, BMI and a history of respiratory disease were tested using the Chi-square test with a p-value$<$0.05. Respiratory disorders have a significant relationship with a history of respiratory disorders having OR (95% CI) value of 3.69 (1.548 - 8.799). Although it turns out that the NO_2 concentration variable does not have a significant relationship with respiratory disorders with OR (95% CI) value of 0.765 (0.329-1.779), other than that, the unrelated variable, is the variable length of stay having OR (95% CI) value of 1.179 (0.523 - 2.655), BMI having OR (95% CI) value of 1.739 (0.754 - 4.01). In this study, it was found that a factor that can cause the respiratory disorder is a history of respiratory disorders in adults.

KEYWORDS

Respiratory disorder, Nitrogen dioxide, Adult population, Steel industry, Determinant factor

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Textile Recycling : A Sustainable Solution To Environmental Pollution

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The growing population combined with the overall improvement in living standard has resulted in a steady increase in global fabric consumption. The fast-fashion culture has greatly influenced the production of textiles over the last few years. Increasing volumes of textiles are being produced, purchased and disposed of in landfill sites which affect the environment. Textiles present particular problems in landfill as synthetic products do not decompose, while woollen garments decompose and produce methane, which contributes to global warming. Data on textile waste products from different countries of the world is very alarming. India generates around 188.5 million tonnes of municipal solid waste per day and 6% of which is textiles. Textiles are nearly 100% recyclable, thus attention needs to be given to their recycling. The present study aims to understand clothing waste disposal practices followed by young consumers in India. For this purpose, a standardized questionnaire was administered on 384 youth residing in Delhi/NCR. The second objective is to investigate the recycling practices followed by Indian industries. For this, visits were made to the industries at Panipat. The results indicate there is a need to create awareness and encourage youth to adopt sustainable disposal habits.

KEYWORDS

Fast fashion, Consumers, Disposal, Landfill, Textile recycling

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Assessment Of Groundwater Vulnerability To Pollution In The Urbanized Environment In Hoskote Taluk Of Bengaluru District

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The main objective of this study was to assess aquifer vulnerability usinga modified DRASTIC model (DRASTICA) to develop vulnerability mapping in Hoskote taluk, Bengaluru. Here, ERDAS IMAGINE software and ArcGIS software are used. The DRASTIC parameters, such as depth of water level (D), recharge (R), aquifer media (A), soil media (S), topography (T), impact of vadose zone (I), hydraulic conductivity (C) were all referred. In 'DRASTICA' 'A' refers to a new parameter called impact of anthropogenic activities (A) to access the human impact on the groundwater resources in the study area. Step by step basic data was collected, that is satellite data, population density, water level, recharge, borehole data, soil data and digital elevation model (DEM). The original 'DRASTIC' model was altered by including anthropogenic impact (A) using analytical hierarchy process (AHP) which is used for determining the ratings of each parameter in the modified-DRASTIC method and was processed in GIS to generate groundwater vulnerable zones. As GIS enables the visual interpretation of data, this has given specific maps for specific analysis and as a result, 80% of the study lies under very high vulnerable zone while in other areas, the potential for pollution is comparatively less. Spatial analysis indicated that anthropogenic impact influenced pollution, thereby human activities has to be addressed. It was observed that the modified 'DRASTICA' model is more suitable and precise for the present study.

KEYWORDS

Groundwater vulnerability, DRASTICA model, ARC GIS, Hoskote taluk

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A Review On Sorbents Used For Heavy Metal Removal

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The reduction of water resources due to the growing population in the ecosystem leads to an increase in the need for freshwater. Wastewater released from various industries contains many pollutants, like heavy metals which are hazardous not only for humans but also affects other species which makes the water unsuitable for use. Due to lack of water, we are in need for emerging methods to remove contaminants from wastewater to make it less hazardous. One such advanced method is a sorption method used to remove heavy metals in an effective manner. This article will briefly overview the different sorbents used for removing heavy metals and their capacities, advantages and disadvantages of their usage.

KEYWORDS

Wastewater, Heavy metals, Hazardous, Sorption method

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The Evolution Of Environmental Education As A Driver For Improving The Technologies Of Managing The Use Of Natural Resources

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The aim of the article is to develop proposals for improving environmental education management technology. Analysis of the approaches used in the theory and practice of environmental education management has shown that it is most appropriate to form the development, consistency and self organisation principles, as well as data of modern natural science and individual areas of ecology, namely general ecology, human ecology, global ecology and social ecology. It is revealed that additional important sources of environmental education should include geological ecology, engineering ecology, agro-ecology and some other environmental disciplines. It is proved that the introduction of special courses at various levels of education, which interactively reflect the content of new environmental disciplines, becomes a mandatory requirement. In this context, distinguishing the key concepts, which reflect the invariant phenomena and processes in different areas of ecology, in environmental education is quite essential. This allows justifying the internal unity of environmental disciplines and determining the optimal form of presentation of educational information. It is revealed that environmental education should be aimed at the development of environmental consciousness and education of the individual with an environmental outlook. Accordingly, environmental education should be continuous, systematic and interdisciplinary. It should be supplemented by various sources of up-to-date information.

KEYWORDS

Technology, Management, Ecological education, Water biological resources, Society, Orientation, Nature, Activity

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Comparative Analysis Of Soil Quality Of Surface Mined Land In Allipura, Ballari District, Karnataka

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Agriculture and mining practices have been the earliest endeavours of humankind. It is the extraction of mineral wealth from the earth. An indiscriminate mining activity causes massive damage to land fertility and biological communities. The study was conducted to evaluate the soil quality and impact of surface mining activities on different physico-chemical parameters of soils of agricultural land in Allipura which is located outside Ballari town, Karnataka. During the present study, the sand composition was found to be high at study sites, 66% and 64%, respectively. The silt proportion was less than clay at both sites. The moisture content was high station II than station I whereas the bulk density did not vary in both sites. The other chemical parameters, such as pH (6.5 ±0.126), organic matter (2.8±0.346), phosphorus (3.53±0.30), calcium (1.14±0.188) and magnesium (0.37±0.092) were high at station II. The total nitrogen (0.17 ±0.011) and potassium (0.36 ±0.18) values were comparatively high in the station I than at station II. Soil analyses demonstrated that there is a distinct variation in the level of nutrient elements of the surface soil. The possible reasons and reclamation measures are discussed.

KEYWORDS

Surface mining, Soil texture, Soil moisture, Bulk density, Nutrients

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