

Risk Analysis Of Heavy Metal Concentration In Surface Soil Around The Dyeing Industrial Areas In Kondalampatti Of Salem

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Soil is the base for all the biological activity in the ecosystem but it faces many undesirable effects due to the development of mankind. The discharge of toxic effluents from various industries destructively affects water resources, soil fertility, aquatic organisms and ecosystem integrity. The present work assesses the heavy metal concentration in soil and also the risk of heavy metals through contaminated sites having long term exposure around dyeing industries in Kondalampatti region of Salem district, Tamil Nadu. Nine polluted areas were identified and samples were collected from the surface 0–15 cm in each area. Electrical conductivity, pH, alkalinity, chloride, phosphate, sulphate, total organic carbon, available nitrogen, lead, arsenic, copper and iron were analysed. The pH of the samples was within the permissible limit whereas electrical conductivity of soil was significantly high, which is due to the ions present in the effluent. The alkalinity exceeds the Indian standard due to the purification agents used in the dyeing process. Concentration of major and minor trace elements were calculated, its concentration ordered as total organic content (174444 ppm) > available nitrogen (11052 ppm) > phosphate (952 ppm) > chloride (338 ppm) > phosphate (294 ppm). Atomic absorption spectrometry (AAS) studies showed that copper was predominantly present and the concentration of heavy metals was compared as copper (327.45 ppm) > iron (16.43 ppm) > lead (7.20 ppm) > arsenic (0.27 ppm). In addition, geoaccumulation index (Igeo) values signify that the soil in these study area is extremely contaminated with copper heavy metal. Assessment of contamination factor (CF) of lead (0.23) and arsenic (0.026) indicates that the area is not significantly polluted with those heavy metals. Whereas the higher CF value of copper (10.53) denotes that the area is extensively polluted with copper due to the dyeing effluent. Copper in excess reduces plant growth mineral nutrient uptake and photosynthetic activity. The assessed pollution load index (PLI) revealed that the study area is polluted significantly with the heavy metals from the dyeing effluents.

KEYWORDS

Heavy metal, Geoaccumulation index, Contamination factor, Pollution load index

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Kinetic Modelling Of Organic Removal From Municipal Wastewater Using Membrane Bioreactor Technology

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In this study, a lab-scale membrane bioreactor was operated for a period of more than 6 months to determine the biokinetic coefficients of the membrane bioreactor (MBR) system. The experimental data obtained from varying hydraulic retention time and mixed liquor suspended solids (MLSS) concentrations were used for kinetic modelling of the process. In order to obtain the bioprocess kinetic coefficients, Monod and Stover–Kincannon models were employed. The kinetic coefficients, according to the Monod model, studied were growth yield (0.381-0.579 mg/mg COD), the microbial decay rate (0.010-0.070/day), maximum specific biomass growth rate (0.031-2.033/day) and half-velocity constant (12.24-996.20 mg-COD/L). From Stover–Kincannon model, the maximum substrate utilization rate constant and saturation value constant were determined as 5.08–40.277 g/L-day and 4.644-39.993 g/L-day, respectively for COD removal.

KEYWORDS

Biokinetic coefficients, Monod and Stover–Kincannon models

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Comparative Analysis Of Anthropogenic Impact On Surface Waters In Kharkiv Region

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Compared to other types of water, surface waters are under the most anthropogenic pressure. The paper analyzes the state of a number of bodies of surface water of the Kharkiv region (Ukraine), which are under various types of anthropogenic impact. Total dissolved solids (TDS) and conductivity indicators are used as parameters of comparison. The impact of agricultural activities and the urban run-off on the state of the water bodies have been studied. There is more influence of the urban run-off from more built-up areas of the city compared to detached house areas. The obtained total dissolved solids values of the bodies of water of Kharkiv region vary in the range of 190–700 mg/L and the conductivity is 280–1070 $\mu\text{S}/\text{cm}$ with a measurement error of 2% max for the conductivity and TDS.

KEYWORDS

Water quality, Urban run-off, Agriculture, Electrical conductivity, Total dissolved solids

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Mapping Landfill Suitable Sites For Ranchi City Using GIS And Multi-Criteria Decision Making Approach

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Open dumping of solid waste across many Indian cities reflects the status of environmental infrastructure, the inclination of the government, societal mindsets and common responsibilities of Indian citizens. Engineered sanitary landfill sites are negligible even in metropolitan cities, such as New Delhi and Mumbai and smaller cities, like Ranchi (state capital of Jharkhand) have none. In this article, the authors have used multi-criteria analysis, pairwise comparison method ($\lambda_{\max} = 7.37802$, CR= 0.05) and geographical information system (GIS) to identify the landfill sites for disposal of solid waste for Ranchi. Criteria, such as landuse (roads, railways, airport, barren land, agriculture, urban centres), surface water bodies, groundwater table, sensitive zones, slope and soil have been used in the study. Raster and vector database created in a GIS platform. Buffering operations and weighted overlay analysis tools have been used to identify the suitability of landfill sites. A comparison matrix has been generated between the existing site and the proposed site. Results show that the current disposal site at Jhiri is less suitable than the proposed site. Based on the prediction of waste generation within Ranchi city two sites have been identified for disposal till 2036 are Hardag and Dundu.

KEYWORDS

Landfill, MCDM, Pairwise comparison, Weighted overlay analysis, GIS, Ranchi

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Assessment Of Physico-Chemical Properties Of Soils Around Pesticides Industrial Area

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Since the period after the second world war, pesticides have become a vital component of modern agriculture and are widely used for the control of weeds, diseases and pests of cultivated plants all over the world. The worldwide use of pesticides for pest control in agriculture to improve food and goods production has enhanced the market of pesticides industries. But their persistent nature has posed a serious problem to biological diversity. The pesticide soil pollution in Gujarat is a serious concern due to the higher number of industries, which are affecting the characteristics of the soil. The present study was conducted for analysis of physico-chemical properties of soil around pesticides industries in three different regions of Gujarat, that is north, south and central region. The results obtained from these regions show significant difference in their observed characteristics (temperature, pH, electrical conductivity, moisture contents, water holding capacity, bulk density, hardness, chloride, alkalinity, sulphate, available phosphorus, total phosphorus, nitrate, nitrite, ammonium, total organic carbon and total organic matter) depending on the contaminants or waste deposited around the pesticides industrial area. The soil at all the three regions is alkaline in nature having higher pH at GIDC Naroda in respect to the other two regions. Same results were found in the case of chloride, alkalinity, nitrate and hardness. From this study, it could be stated that the physico-chemical changes and further variations associated with soil have a greater influence on the fertility of the soil.

KEYWORDS

Physico-chemical properties, Pesticides, Soil, Gujarat

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Assessment Of Human Health Risk Associated With The Imidacloprid Pesticide

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Imidacloprid is a neurotoxic insecticide, which belongs to the class of the neonicotinoid pesticides. The aim of this study is to quantify the imidacloprid residual in cucumber growing under greenhouse conditions. The extraction of pesticide residual based on the FaPEX kits. Agilent Technologies 1260 infinity high performance liquid chromatography having UV-visible detector was used for the identification and quantification of pesticide. The results of the analysis showed a high quantity of pesticide residue (24.09 mg/kg). The estimation of daily intake indicates the possibility of potential health risk associated with exposure to detected pesticide and the highest mean values of hazard quotient (HQ) of 4.01 suggest clearly the greatest health risk for the consumer. Many studies have shown high clinical toxicity of imidacloprid in human suicidal attempts. In fact, the principal toxicological finding by imidacloprid in sub-chronic and chronic oral testing was the reduction in body weight. It is concluded that the high quantity of imidacloprid detected in cucumber has the highest human health risk for the consumer.

KEYWORDS

Pesticides, Imidacloprid, High performance liquid chromatography, Estimated daily intake, Acceptable daily intake, Algeria

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GIS Based Assessment Of Water Quality In Periyakulam Lake Of Coimbatore City

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Periyakulam lake is the largest water body having a complete built-up catchment area with the developed area with packets of vegetal cover, open land and inlet nala from Noyyal river. It falls under core corporation limits of Coimbatore city and main bunds of the lake are attached to Pallakad main road from north-eastern portion of the lake to the south-western portion of the lake. The study area is facing surface water contamination by the discharge of sewage and industrial effluent. In this study, the quality of water for its suitability for living organisms and domestic purpose was assessed by its hydrochemical parameters. The flow measurements and sampling were done in the inlets of the lake. The samples were tested for physical and chemical parameters. Geographic information system (GIS) based analysis has been carried out to find out the quality of water for its suitability for living organisms and domestic purposes. Chloride concentration was found to be exceeding the permissible limit in samples near to the first inlet. Based on the study, it was found that most of the samples are suitable for irrigation purpose.

KEYWORDS

Coimbatore district, Hydrochemical, Irrigation, Surface water

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Electrocoagulation Reactor And Process For Defluoridation Of Drinking Water

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Electrocoagulation, an efficient water treatment process in removing high fluoride concentration, heavy metals, water turbidity, colloidal particles from drinking water. Fluoride ion gets transformed into solid forms through coagulation and is then separated by filtration. The present study is focused on filtration, flow rate, fluoride concentration, pH, accumulation of aluminium and other basic parameters for maintaining water quality. In order to study all these, a laboratory scale reactor of volume 20 L was designed, containing filter of wool and nylon cloth in which groundwater was used for experimentation. The reactor scales 90% elimination of fluoride during 10-20 min hydraulic retention time. Here the total flow rate was maintained at 40 mL/min having an area of filter 0.04 m² and concentration of aluminium residue was found to be 0.16-0.45 ppm and solid suspension level was less than 0.1 g/L. The reactor obtained good sludge that showed that the sludge quantity retained is lower than the other techniques.

KEYWORDS

Defluoridation, Electro-coagulation, Electrodes, Filter, Fluoride reactor

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Evaluation Of Physico-Chemical Parameters Of Textile Effluents With Special Reference To Bhilwara City

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Environmental pollution is becoming the worldwide quandary and deterioration of water quality is now a major problem. The major source of water pollution is industrial effluent and textile industries are the chief cause of water pollution in Bhilwara (Rajasthan). The effluents from these units not only pollute the nearby water resources but also contaminate the surrounding soils and to toxic to human beings and aquatic life. The aim of the present study is to know the pollution implications of textile operations in the city. Effluents from two major textile industrial sites (S₁- 25°16' 19.44"N, 74° 38' 07.74"E and S₂- 25° 16' 59.96"N, 74° 31' 22.62"E) in Bhilwara were characterized. The results for the textile effluents showed the range of temperature (25.6-43.4°C), pH (6.3-7.3), alkalinity (316-1386 mg/L), free CO₂ (48-351 mg/L), chlorides (832-7714 mg/L) and dissolved oxygen were negligible during study period in both the sites which was a very shocking experience. It was concluded that textile effluents were highly polluted and have hazardous effects. It is observed during the study that effluents are being discharged without any proper treatment.

KEYWORDS

Textile industry, Textile effluent, Water pollution, Physico-chemical parameters

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Knowledge And Practice Of Domestic Waste Disposal Management Among Female Residents In Ayapakkam, Tamil Nadu

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World cities generate about 1.3 billion tonnes of solid waste every year. In India, the volume of waste is projected to increase from 64-72 million tonnes to 125 million tonnes/day. As per 2016 details, 14,600 tonnes/day of waste is generated in Tamil Nadu. Chennai generates around 5500 tonnes of waste/day, the highest in Tamil Nadu. The objective of the study was to find the residents' knowledge about the household waste management, their household waste disposal practices and to identify the factors that were influencing improper waste disposal. There were about 13,000 households in the Ayapakkam study area as per enumeration in the year 2016. The entire study area's line listing of the households was available. The current study was a cross-sectional analytical survey using simple random sampling methodology. A random sample of 274 households was selected. One female respondent aged above 18 years from each of the selected household was interviewed using a questionnaire consisting of seven broad sections, namely demographic profile, waste generation, waste segregation, waste storage, waste collection and disposal and awareness regarding waste disposal. Data was collected using Epicollect5 and analyzed using SPSS software. Descriptive analysis was performed to understand about the socio-demographic characteristics of the respondents and their domestic waste disposal methods. Binary logistic regression was used to determine the factors associated with improper waste disposal. Out of 274 respondents, 191(69.8%) were aware of proper waste disposal and 174 (63.5%) were practising waste disposal properly. Literacy, collection of waste by waste lifters and awareness among the respondents turned out to be the significant factors influencing waste disposal practices. Education plays a vital role in determining waste disposal practices. Awareness and health education programmes need to be conducted for the public as well as for the waste lifters for effective waste management.

KEYWORDS

Domestic waste disposal, Ayapakkam, Chennai, Binary logistic regression

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Win-Win Strategy Of Cleaner Technology - Environmental And Economic Scores Of Sugar Industry In Tamil Nadu

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The sugar industry has unequivocally been discharging effluents into the water as an off shoot of sugar production. The present study of the sugar industry, Erode, Tamil Nadu was taken for the purpose to compare the economic and physico-chemical parameters of these two technologies - conventional technology with cleaner technology, between untreated and treated water samples were tested using standard methodology. Cleaner technology has more efficiency and environmental sustainability on management perspective compared with conventional treatment technology, the result shows physico-chemical parameters of conventional and cleaner technology treatment, like colourless, pH (7.8 and 7.6), BOD (71.4 and 5.04 mg/L), COD (63.4 and 25 mg/L), TDS (610.8 and 295 mg/L), TSS (192.6 and 4.5 mg/L), chloride (40.1 and 3.8 mg/L), sulphide (2.86 and 2.3 mg/L), nitrogen (2.64 and 7.6 mg/L), sulphate (4.1 and 3.8 mg/L), sodium (46 and 18 mg/L), phosphate (1.88 and 1.6 mg/L) are within permissible limits of industrial water standards by Tamil Nadu Pollution Control Board. This shows cleaner technology is more efficient than conventional technology. In an economic perspective, the results show the total operational benefited cost for 1 L of water in cleaner technology is 0.4473 and of conventional technology is 0.06943. Therefore, conventional technology is economically viable than cleaner with a difference of 0.37787. For more efficiency, this two are used as an add-on technology. In this sugar industry water is re-circulated to achieve zero liquid discharge in the process as per the norms by the Central Pollution Control Board.

KEYWORDS

Cleaner technology, Zero liquid discharge, Reverse osmosis, Activated sludge process

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Spatial Variation Of Biological Contamination Of Soil From Najaf City

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The study is focused on the soil as an important element of the environment and the person who exercises all its various activities and the fact that the study area is part of the province of Najaf. The biological characteristics of the soil and their spatial variation were studied because the soil is the basis for all activities, whether agricultural, industrial or service. The bacteria and fungus grow significantly within the areas affected by waste blood and slaughter in the soil, the wastewater used in agriculture as well as agricultural fertilizers, which are a suitable environment for the growth and multiplication of them. Bacteria and fungi in the soils affected by industrial activities, especially brick factories and the accumulation of elements and chemical compounds in the soil, which kills bacteria and fungi, despite the presence of moisture and other nutrients help in their growth. It was found that the most common types of bacteria in the soil are *Bacillus* and *Pseudomonas* bacteria. *Aeromonas* is concentrated in soil contaminated with meat and sewage waste. *Alternaria alternate* and *Cladosporium* have the lowest incidence in the soil area of the study compared with other types of fungus and their presence in the affected soil was concentrated by the slaughter of cattle and sewage waste, which is a suitable environment for growth.

KEYWORDS

Biological contamination, Spatial variation, Soil

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A GIS Based Groundwater Vulnerability Mapping And Assessment In Berrechid Plain, Using DRASTIC, SINTACS And GOD Models

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Groundwater protection is vital for human evolution and ecological diversity. Agricultural and industrial activities have contributed to the degradation of Berrechid's groundwater quality. In this study, we attempted to assess the vulnerability of the Berrechid aquifer and to identify and classify vulnerable and non-vulnerable areas of contamination in order to provide zoning for the protection of groundwater and the implementation of effective management strategies for these waters. In this context, this study aims to assess, map and generate vulnerability zoning maps in this region using a GIS and the GOD method and to compare the resulting map with the DRASTIC and SINTACS maps we obtained in our previous work. The obtained GOD vulnerability map shows two vulnerability classes: medium and high, with respective areas of 1566.5122 and 1.6426 km², while the DRASTIC map has three vulnerability classes: very weak, weak and average with respective areas of 802.767, 766.71 and 1.85 km², the SINTACS map has two vulnerability classes: low and medium with respective areas of 1445.13 and 122.56 km². The most vulnerable areas are located in shallow areas down to the groundwater and non-protected areas and less vulnerable areas are located in areas with deeper water and where clays are important.

KEYWORDS

Groundwater vulnerability, SINTACS, DRASTIC, GOD, GIS, Berrechid plain, Morocco

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Efficient Removal Of Hexavalent Chromium From Industrial Automobile Solid Waste Using Bioremediation Technique

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Conventional methods for the removal of metal ions from the industrial effluents proving very expensive due to its high initial capital investment and high regenerative expenses. Hence in the present study a simple and economical technique, that is bioremediation technique was applied for the removal of hexavalent chromium using automobile industrial waste. Bioremediation is emerging as one of the simple, economic and efficient method for the removal of metal ions from the industrial effluents. In the present study, bacteria are isolated from the root rhizosphere of *Eichhornia crassipes* and estimated their capacity to grow in chromium containing effluents. Further, its ability to remove chromium ions from industrial effluents was determined. The results revealed that bacteria can survive and multiply in both synthetic solutions and industrial waste effluents. The results revealed that the observed *Pseudomonas* bacteria can remove both trivalent and hexavalent chromium ions from the solutions efficiently.

KEYWORDS

Adsorption, Bioremediation, Automobile waste, Industrial effluents, Metal ion removal

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Off-Grid Hybrid Renewable Energy System - A Solution To The Problem Of Increasing Particulate Pollution Scenario In The Mangrove Ecosystem Of Sundarbans

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The susceptibility of the mangrove ecosystem of the Sundarbans to increased pollution burden is undoubtedly a matter of concern. Over the years, there has been a considerable rise in the atmospheric pollution scenario in the Sundarbans particularly with respect to the particulate fractions (PM₁₀ and PM_{2.5}). The different types of anthropogenic activities to meet the daily energy demand happens to be the major contributor to the pollution burden in the area. Thus the most important objective seems to find an alternative energy source to cater to the needs of the locals in the Sundarbans to protect the unique biodiversity. In this context, the present paper presents the particulate pollution scenario and feasibility analysis of off-grid hybrid energy system for the mangrove ecosystem of the Sundarbans, India which is one of the world's largest mangroves and an area infested with a host of rare and endangered species. The hybrid system is modelled focusing on the viability of the different components of a hybrid energy system, like a wind turbine, solar PV alongwith fuel cell. Different parameters, such as net present cost (NPC), cost of energy (COE) and generation cost (GC) have been considered during the optimization of the system. The analysis shows encouraging results related to the use of off-grid hybrid energy to reduce the increased atmospheric pollution generated from the conventional energy sources prevailing in the Sundarbans.

KEYWORDS

Mangrove ecosystem, Fine particulate pollution, Sundarbans, Off-grid hybrid energy system, Renewable resources

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Environmental Analysis Of Industrial Rotating Air Preheater Using Computational Fluid Dynamics

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Air preheater is one of the important devices in the thermal power plant which helps in recovering the heat energy from flue gas which is let out to the environment through the chimney. It is basically a heat exchanger where the heat recovered from flue gas is exchanged to the atmospheric air which is taken into the boiler. Since the air preheater plays a major role in the efficiency of the power plant. This work is to optimize and improve the design of air preheater so as to increase the overall efficiency of the power plant. The model of the air preheater, alongwith the inlet and outlet duct, is modelled using solid works and meshed in Gambit with suitable dimensions. The thermal behaviour of the model was analyzed by using Ansys Fluent. The three models were simulated at different duct angles, such as 0°, 15° and 30°, resulting in 0° turns out to be the most efficient.

KEYWORDS

Ansys Fluent, Efficiency, Gambit, Meshing, Optimization, Rotating air, Solid works

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Preparation Of Activated Carbon From Waste Material Source

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Adsorption is the widely used unit operation in wastewater treatment. Activated carbon is used as adsorbent material as it has a porous structure. There are many findings and research is going on to produce activated carbon (AC) from a variety of waste material sources in this work tailoring waste clothes are taken as the source for producing activated carbon. It was carried out by carbonization in a high temperature in the absence of oxygen and the carbon was made into powdered form. Then it was subjected to chemical activation with $ZnCl_2$, NaOH and KCl. The total organic carbon (TOC) was found to be 50.74%. High iodine value was obtained about 1325 for 2N $ZnCl_2$ activated sample, 1020 for 2N KOH activated sample and 1205 for 3N KCl activated sample. In adsorption studies of methylene blue, 90%, 80% and 50% adsorption efficiency were found for $ZnCl_2$, KOH and KCl activated carbon, respectively.

KEYWORDS

Wastewater, Activated carbon, Iodine value, Total carbon content, Porosity

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