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Assessment Of Pollution Load In Terms Of Water Quality Index Of Salandi River In The Command Area Of Hadagada Dam And Its Downstream, Bhadrak, Odisha

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The river Salandi receives the untreated mining effluents, agricultural discharges, mining effluent discharges of Ferro Alloys Corporation, Orissa Mining Corporation, IMPHA, etc., and urban discharges as well as industrial discharges at Randia, discharges due to number of picnic spots which are the prime causes of increasing pollution load in the Salandi river nearby Hadagada dam and its downstream areas. In the present study, the water quality index (WQI) from different locations of Salandi river of Hadagada dam and its nearby area alongwith its downstream are analyzed by using standard procedure available in the literature for the year 2016 and found that the water quality of the river Salandi is contaminated both physically, chemically and most of the parameters are beyond the standard value. The analyzed data of water quality index in different sampling locations indicates that the quality of the water is very poor and in some sampling station, it was found that water is even unfit for human use.

KEYWORDS

Water quality index, Physico-chemical parameter, Biological oxygen demand, Total dissolved solids, Dissolved oxygen

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Reduction Of Urea Transformation In Soil Using Aqueous Extracted Leaves Of Neem (*Azadirachta indica*) And Olive (*Olea europaea* L)

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The aim of this study was to evaluate the relative performance of two plant leaf extracts, namely neem (*Azadirachta indica*) and olive (*Olea europaea* L) in regulating nitrogen transformations, inhibiting nitrification, improving nitrogen recovery in the soil-plant systems and alleviating negative environmental impacts through two experiments. In the first one, the soil was treated with three levels of either neem or olive leaves extract (1, 3 and 5 mL/100 g soil), all treatments were incubated for 40 days under controlled condition. Greenhouse (pot) experiment was the second one. Vegetable plant radish was grown for 45 days in soil fertilized with 75% or 100% of the recommended nitrogen as urea either combined or not with biofertilizer *(Azotobacter chroococcoum) at a* rate of 47.6 L/ha in addition to control (not treated). In general, under incubation experiment, the level of nitrate in soil treated with leaves extracts surpassed with a different magnitude than untreated. However, there was no obvious in the inhibition rate under different leaves extracts treatment, in addition, the level of nitrification inhibition under incubation condition surpassed that of the greenhouse experiment. Results of the greenhouse experiment revealed that plant extracts minimize nitrate content in plant tissue, without a negative effect on soil biological activity. In addition, positive significant responses existed for radish weight.

KEYWORDS

Plant extracts, Nitrification, Inhibitors, Soil microbial activity, Radish

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Parametric Optimization Of Flood Prediction Model Based On Synthetic Unit Hydrograph In Meso-Scale Watershed

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One of the most important parts of flood risk management is flood forecasting analysis. This analysis plays a role in providing flood potential prediction related to flood mitigation and flood proofing in a vulnerable area. The most commonly used method for estimating flood magnitude especially at ungauged sites is a synthetic unit hydrograph model because of its many advantages, one of which is Snyder. However, the performance of this method depends heavily on the watershed characteristics and generally, the model parameters consisting of storage coefficient (C_p), the coefficient for representing differences in types and locations of the stream (C_t) and constant (n) are difficult to estimate accurately. Consequently, in most cases, this model often produces low performance. This study aims to improve the performance of synthetic unit hydrograph model based on observed hydrologic and hydrometric data in Wuno watershed, one of the mesoscale watersheds which are the part of Palu watershed in central Sulawesi, Indonesia. Surface run-off from Wuno watershed has contributed to the flood that has occurred several times in downstream reach of Palu river. In the initial step of the analysis, the performance of the synthetic unit hydrograph model is evaluated using the Nash-Sutcliffe efficiency coefficient (NSE). If the model tested shows low performance, then it can be improved by performing parameter optimization using QM for Windows. The results of the analysis show that Snyder has low performance in Wuno watershed with NSE number of 0.61. Furthermore, parameter optimization can increase the NSE coefficient to 0.99, where C_p, C_t and n parameters change from 1.1-0.80, 1.0-1.3, 0.25-0.20, respectively. Finally, it can be seen that the optimization procedure is very effective to improve the performance of the synthetic unit hydrograph model.

KEYWORDS

Flood risk management, Hydrology model, Optimization, Tropical river basin

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Performance Of E-Plastic Waste In Concrete For Sustainable Built Environment

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In the coming of present day innovation, specialized advancements and expanded rate of outdated nature in the hardware business prompts the fast development of waste streams over the globe, essentially called electronic plastic waste. These days in the concrete industry are made to utilize non-biodegradable segments of electronic plastic waste as a fractional substitution of the coarse or fine aggregate. Utilization of these materials, not just aides in getting them used in cement, concrete and other construction materials, it additionally clears approach to diminish the cost of concrete and concrete manufacturing and furthermore have various backhanded advantages which incorporates decrease in landfill cost, vitality preservation and shielding the earth from sick impacts caused because of contamination. This report displays the performance of concrete prepared with electronic plastic waste as a partial replacement of fine aggregate. A point by point exploratory examination is attempted by throwing examples with the usage of electronic plastic waste particles in replacement with fine aggregate in concrete with a rate substitution from 0-6% and compared with control specimens with a mix design for M25 grade of concrete by Indian standard method. The correlation expression was also developed between compressive strength and percentage replacement of electronic plastic waste in concrete. From this study, it has been concluded that 2% of replacement of electronic plastic waste can be incorporated without any long term detrimental effects alongwith acceptable strength development properties.

KEYWORDS

Electronic-plastic waste, Partial replacement, Compressive strength, Flexural strength, Durability

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Design Studies And Analysis Of 50 kWp Rooftop Solar Photovoltaic Plant

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Green energy is a sustainable substitute to cope with increasing energy need. Recognizing this fact, the Government of India is expecting 40% of the demand to be fulfilled through rooftop solar plants by 2022. The ICFAI University, Jaipur had taken a minuscule but significant step by deploying a 50 kWp rooftop solar power plant in the University campus. The present paper discusses the design, life cycle and economic assessments which support the feasibility of the plant. The annual average energy payback time, electricity production factor and availability factor are 8.05 years, 0.13 and 0.33, respectively. According to the economic investigation, capital recovery factor (CRF), net present value (NPV), uncost and cost per unit electricity are computed with different discount rates which support the viability of the plant for life span of 25 years. Carbon credits are also calculated for the studied period

KEYWORDS

Solar, Rooftop, Ecological analysis, Mitigation, Carbon credits

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Assessment Of Heavy Metal Contamination In Groundwater Aquifer From Urbanized Catchment Area Of Salem City

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Presence of heavy metals in drinking water is considered as a major threat to human health. The present study aimed to investigate the concentration of the heavy metals including Cd, Cu, Cr, Pb and Zn in the groundwater samples collected from the urbanized area of Salem along the catchment of Thirumanimutharu river basin. The spatial distribution and source of heavy metal contamination of groundwater were evaluated. Fifteen groundwater samples were collected during the period of April 2017 and the heavy metals (Zn, Cu, Cr, Pb and Cd) concentration was analyzed. The mean concentration of heavy metals in groundwater reveals in the descending order as Zn > Cr > Pb > Cu > Cd. More than 60% of groundwater samples in the urban catchment exceeding the desirable limit of WHO standard. Out of five, the heavy metals Zn, Cr and Pb are invariably shown high concentration than the permissible limit. Heavy metal pollution index (HPI) and statistical analysis were carried out to assess the level of contamination in the groundwater. Spatial distribution of heavy metal pollution index shows the medium to a high level of quality deterioration in the urban area. Correlation and factor analysis specify the nature and association of heavy metals contamination in groundwater. The result reveals that the highest concentration of metals observed in the northern part of the study area due to the influence of industrial sewage waste, urbanization and anthropogenic sources. The present level of contamination in the groundwater aquifer is a serious threat and health concerns.

KEYWORDS

Groundwater, Heavy metals, Spatial distribution, Heavy metal pollution index

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Study For Extraction Of Pyro-Oil From Multi-Layered Plastic Waste Through Pyrolysis Process

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Multi-layered packaging is generally used to store fruit juices, wines and other food items, etc., for keeping the same for extended periods of time at room temperature. But handling and disposal of plastic waste especially the multi-layered plastic (MLP) is one of the great environmental challenges of this time. A lot of multi-layered packaging material are found littered in every nook and corner of every city/town becoming a visual nuisance. Sometimes such type of waste finds its way to city sewerage system resulting in choking the sewer and sometimes it finds its way to water bodies resulting in serious effects on the aquatic life. The milch cattle and other stray animals are often seen eating this plastic waste leading to various diseases and sometimes causes mortality of such animals. All this happens to owe to non-clearance of this MLP waste by the local scavengers/rag-pickers since it has no significant resale value. Keeping in view this fact, an exercise was undertaken in Patiala city and rag pickers/waste contractors were called for discussion, wherein, it has been noted that the rag pickers do not pick multi-layered plastic (MLP) sachet, pouches and packaging material due to its non-recyclability and light weight. The Punjab Pollution Control Board thus devised a mechanism for collection, sorting, compaction, weighing and storage of MLP waste in Patiala city through rag pickers for its further use for the production of fuel oil (pyro-oil) through the pyrolysis process. The oil extracted from the MLP waste was got analyzed from M/s SAI Labs, Patiala, which a subsidiary of Thapar University, Patiala and is found to be having gross calorific value (GCV) of 9500-10000 Kcal/kg. Thereupon, it was tried to use as fuel in a heating furnace of an industrial plant, namely M/s Kisco Castings India Ltd., Mandi, Gobindgarh, district Fatehgarh Sahib, as a substitute of furnace oil and found as good as furnace oil.

KEYWORDS

Multi-layered plastic, Rag pickers, Brand owners, Pyro-oil, Pyrolysis plant, Furnace oil, Light diesel oil, Gross calorific value

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A Critical Review Of Haul Road Opencast Mines Fugitive Dust - Genesis, Characteristics And Impact

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The objective of this review is to explore the causes and effects of dust emission from the haul roads of opencast mines. Coal production from opencast mining is continuously increasing in comparison to underground mining. At the same time, opencast mining activities produce more dust as compared to underground mining system. Dust emission of opencast mine in which multiple operations take place simultaneously, like drilling, blasting, coal extraction, coal handling and stockpiling, screening plant, topsoil handling, overburden removal, haul road transportation system and other ancillary activities. Haul road system plays a crucial role as the backbone of opencast mines. Coarse suspended particulate matters having a size greater than 30 μm settle very quickly at the point of emission whereas particulate matters below it and especially less than 10 μm are more likely to be suspended in the atmosphere for a long time. Dust generation from haul tracks shows that if the dust emissions are uncontrolled, there is a high risk of safety hazard by reducing the operator's visibility. Therefore, the probability of haul road accidents might increase leading to a high fatality rate. However, inhalation of respirable dust is far more dangerous for long term health hazard.

KEYWORDS

Haul road, Opencast mining, Dust generation, Suspended particulate matter, Health hazard

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A Comparison Of Raw And Treated Plant Debris In The Chelation Of Anion From Aqueous Media

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Utilization of tea plant stems, *Camellia sinensis* (CSS), discarded as litter, collected from Ooty was employed for phosphate removal. The material was broken into small pieces, washed, dried, pulverized into different mesh sizes using scientific test molecular sieves, labelled as raw *Camellia sinensis* dust (RCSSD). Sorption efficiency of the categorized sizes was tested by applying the batch verification technique, where 85 BSS exhibits better sorptive nature. The particle size of 85 BSS was determined (0.18 mm) using binocular microscope (Optika make), treated with 0.1 N H_2SO_4, washed, dried, named as treated *Camellia sinensis* dust (TCSSD). Characterization studies are supported by FTIR, SEM and EDAX methods. Sorption efficiency of TCSSD was experimentally verified under varying adsorption parameters. Absorbance values were recorded using UV/VIS spectrophotometer (LABINDIA®-UV3000+) by molybdenum blue complexation method for phosphate ions. Maximum removal was registered as 48.3% and 99.7% for RCSSD and TCSSD, respectively under optimized conditions of 0.18 mm particle size, 10 mg/L initial concentration, 9 min agitation time interval, 0.25 g dose, pH 5 at room temperature. Experimental data were validated using Langmuir and Freundlich isotherms wherein Freundlich plots recorded a better linear fit. Results imply that the selected material possesses excellent anion removal capability from aqueous media.

KEYWORDS

Adsorption, Phosphate, Plant waste, Batch process, Aqueous media, Isotherms

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Economic Feasible Assesment Of Green Power Generation For An Isolated Area

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Powering an isolated area is limited by the barriers like difficult terrains, scattered population and long distance transmission line system, etc. Even the electrified remote areas have poor quality, low availability and irregularity of power supply. This prevailed to search for other options like extending grid or using diesel generators (DG), batteries, etc., to meet the day to day needs of isolated communities. Due to environmental effects, such as greenhouse gas emission, global warming and climate change, etc., has turned our focus on green energy. The purpose of this work is to suggest the feasible hybrid green energy sources for generation of power from a different combination of green sources to fulfil the energy demands of a remote village called Sadivayal, Coimbatore in Southern India. To identify the optimal solution, this paper uses the software called hybrid optimization model for electric renewables (HOMER). The obtained solution shows the hybrid combination of solar-wind-hydro-battery is a sustainable, cost effective and environment friendly alternative source which also mitigates the CO_2 emission and other greenhouse gas emissions.

KEYWORDS

Environmental effects, Greenhouse gas emission, Hybrid renewable energy source, Feasibility, Hybrid optimization model for electric renewables

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Anatomical And Sclerophilic Traits Variation In Two Varieties Of Olive Plants (*Olea europaea* L) Growing Under Climate Changes In Various Seasons

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Changes in anatomy, sclerophilic traits and oxidative stress were examined in leaves for two olive cultivars, *Olea europaea* L. (Qaysi and Sourani). The experiment was conducted at the University of Kufa, Faculty of Science from May to December 2017 to compare the symptoms of water availability variation (drought stress), temperature changes, salinity changes, low water availability (climate changes in various seasons). Leaf measurements included leaf tissue thickness, stomatal density, leaf area, leaf mass per unit area, density of leaf tissue, relative water content, succulence, water saturation deficit. Qaisi showed the lowest leaf area and the highest tissue density under stress conditions. Qaisi showed greater capacity for osmotic adjustment, in contrast, Sourani did not exhibit osmotic adaptations but was able to increase tissue elasticity and total dissolved protein concentration and the results of leaf tests under stress environment factors revealed stress markers, which were reduced in concentrations of chlorophyll, carotene and thiol and increased levels of lipid peroxidation. In addition, studied plants under environmental stress have developed some defence mechanisms against oxidative stress, such as increases in total phenol and total soluble protein concentration. Qaisi plants showed more adaptations to protect against oxidative stress. On the other hand, increased levels of lipid peroxide concentrations and a decrease in total thiol concentration under stress environment factors indicate that the Sourani vs against oxidative stress were less effective than previously demonstrated by Qaisi olive plant which is efficient in responding to and adapting to climatic changes.

KEYWORDS

Olea europaea L., Oxidation stress, Elasticity, Osmosis, Leaf anatomy, Lipid peroxidation

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Effect Of An Extreme Flood On River Morphology In Jhelum River Basin

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The extreme flood occurred in Jammu and Kashmir on 6th and 7th September 2014 due to continuous spell of high intensity rainfall in the first week of September. The flood was aggravated by the geomorphic structure of the Jammu and Kashmir. Tributaries having steep gradient contribute simultaneously to high flood discharge in Jhelum river basin. Majority of the areas in the Jhelum river basin were badly affected by the flood in the year 2014. In this study, operational land imager (OLI) landsat images taken on 25th August (before the flood) and 26th September (after the flood) were employed to analyze the flood-induced morphological changes within the Sangam-Baramulla reach (121 km) of Jhelum river. The results show that the channelling regime was significantly affected by the flooding. The main effect was the increase in channel width at most of the sections. Meandering sections were worst affected due to high mobilization of channel sediments and severe bank erosion. The channel width increased from 8-75 m in the meandering and 20-30 m in the other land cover. The effect on channel width was very less in the residential areas, mainly because of bank protection works. The total erosion and sedimentation in the whole study reach due to flooding were 243 and 2.2 ha, respectively. Meanders 9, 14 and 15 were significantly affected showing maximum widening of 37, 75 and 46 m, respectively. The total flow length of the study reach also showed a decrease of 500 m.

KEYWORDS

Morphological changes, Jhelum river, Channel width, Erosion, Extreme flood, Meanders

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Sensitivity Analysis For Micro Community

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Too much dependency on conventional sources of energy is proving quite detrimental to the global environment. As a mitigation tool, in this context, renewable energy sources in combination with energy from municipal solid waste provide a technically improved, efficient and sustainable solution. A case study was carried out for a micro community in Rajarhat, New Town, West Bengal. The present article tries to incorporate astutely the use of the best combination of renewable energy sources alongwith an alternative energy source in the form of generator run by biodiesel (from MSW) to meet a peak load of 64.29 kWh/day based on the proposed model. The hybrid system has been formulated on the basis of hourly availability of renewable sources and load demand alongwith the insertion of energy storage as a parametric categorization of cost and efficiency. A projected hybrid model is simulated by HOMER PRO software. As a supplement to the performance parameters of the different systems, initial cost, net present cost (NPC), cost of energy (COE) have been also calculated in the paper. Moreover, an attempt has been also made in the paper to find the most optimum solution comparing the characteristics graph between COE and sensitivity variables.

KEYWORDS

Hybrid system, HOMER, MSW, NPC, Optimization, COE

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Heavy Metal Residues In Tail Feathers Of Indian Peafowl (*Pavo cristatus*) And Used As Bioindicator Of Metal Pollution In Jaipur

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Peacock feathers as a bioindicator are used to determine the presence of heavy metals in areas of the city of Jaipur. Zinc, copper and lead were analyzed by atomic absorption spectrophotometer on peacock tail feathers randomly selected at six different sites, namely Galta gate, Jawahar Circle garden, Central garden, Govind Dev Ji temple, Ram Niwas garden and Ghat Ki Guni. Results showed different affinities to feathers. The concentration of zinc (177±0.31 to 256.5±0.49 ppm), copper (69±0.25 to 145±0.22 ppm) and lead (26.5±0.47 to 53.5±0.68 ppm) were significantly higher ($P = 0.0047$) among the six study sites. Also showed significant ($P<0.0001$) relationship among zinc, copper and lead concentration in feathers. Heavy metals in feathers show the body burden of birds which varies in the different locations of Jaipur. Analysis of food, water and soil reflected high concentrations of metals in the environment also confirmed the sources of exposure in birds. In general, this study shows that peacock shedded tail feathers are the convenient and non-invasive sampling tool for heavy metal contamination in the environment.

KEYWORDS

Heavy metal, Peacock tail feathers, Bioindicator, Non-invasive tool

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Physico-Chemical Analysis Of Mendhar Nallah - A Tributary Of Poonch River Of Jammu And Kashmir

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The present study was conducted on Mendhar nallah, an important tributary of the Poonch river of Jammu and Kashmir to assess the physico-chemical nature of its water in order to ascertain its suitability for agricultural and human consumption. The present study was conducted during the summer season of 2017. In order to assess the physico-chemical characteristics of the river water samples were collected from ten different sites from Mendhar nallah and analyzed for various parameters, such as temperature, pH, total hardness, turbidity, total alkalinity, phosphate, chloride, dissolved oxygen, conductivity, total dissolved solids, fluoride and biological oxygen demand. During the study, the value of pH, turbidity, hardness, dissolved oxygen and biological oxygen demand was found to be above the permissible limits as prescribed by WHO and BIS [1,2]. Therefore, the water quality of Mendhar nallah is deteriorated and is not fit for domestic purposes and need proper treatment.

KEYWORDS

Water, Physico-chemical, Mendhar nallah, Quality

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Performance Evaluation Of Variable Compression Ratio Engine Fueled With Biodiesel From Waste Cooking Oil

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This present experimental investigation is intended to illustrate the significance of biodiesel derived from waste cooking oil (WCO) with 1% dihydroxy fatty acid (DHFA) as an additive in the fuel samples on the performance and emission studies on variable compression ratio (VCR) engine in comparison with complete diesel fuel. The different fuel combinations tested were pure diesel, B5, B10, B10, B15, B20 and B25. The experiments were conducted on a single cylinder, 4 stroke diesel engine with compression ratio of 17.5:1. From the experimental evidence, there was an increase in 14.6% of thermal efficiency, 6% of brake power and lower exhaust gas temperature for VCR fueled with waste cooking oil (WCO) as compared to diesel in the aspects of performance study.

KEYWORDS

Variable compression ratio, Waste cooking oil, Thermal efficiency

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