IJEP 39 (5) : 395-404 (2019)

Seasonable And Spatial Deviation Of Groundwater Quality In Tannery Villages Of Ambur, Vellore

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The present study regulates the richness of heavy metals (Cr, Cu, Zn, Fe, Ni, Al, Co, Mn and Pb) and study of physico-chemical parameters in the groundwater (pre and post-monsoon) of the Ambur region and estimates the pollution indices and risk assessment to assess the correctness of groundwater for human consumption. The suitability of groundwater for drinking and irrigation has been measured in north and eastern part of Vellore district. In two different seasons (pre and post-monsoon), 7 groundwater samples collected in the same location during March 2017 and October 2017 near tanneries in different villages in Ambur taluk, Vellore district, Tamil Nadu. In the majority of the groundwater samples, the concentration of heavy metals exceeds the desirable limits of Bureau of Indian Standards (BIS), 2012, whereas average Cr concentration is 0.759 and 0.675 mg/L during pre and post-monsoon season, respectively, which is above the BIS permissible limit (0.05 mg/L) perhaps due to chromium rich salts. The calculated pollution indices, namely contamination index (CI) and index of environmental risk (IER) for the heavy metals propose that the majority of the studied groundwater samples are in the highly contaminated zone. Though, all the samples close to tannery and followings fall in the highly contaminated zone indicating their unsuitability for drinking and agricultural activity purposes.

KEYWORDS

Heavy metals, Groundwater, Tannery, Ambur, Pollution indices, Risk assessment

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IJEP 39 (5) : 405-409 (2019)

Removal Of Nickel From Electroplating Effluent Treatment Plant Sludge Using *Helianthus annuus* L.

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Pollutants from the industries are a major concern rather than those from regular human activities. In particular, non-degradable pollutants and heavy metals are released into the environment through untreated wastewater and effluents. There are 70% of nickels present in electroplating sludge. The current work proves that *H. annuus* is able to remove nickel from the pretreated electroplating sludge. Different concentrations of electroplating effluent treatment plant (ETP) sludge and chelating agent (EDTA) were mixed with red soil. The pH, nitrogen, potassium, phosphate and heavy metals of raw sludge, red soil and ETP treated sludge was analysed. Phytoremediation studies were carried using *H. annuus* on pre-treated sludge. The moderate shoot, root length and dry and fresh weight of *H. annuus* were observed. Nickel level and other physico-chemical properties were analysed in post-harvested pre-treated sludge. A significant level of nickel reduction was observed from this investigation. Thus, the research work concluded that *H. annuus* was the best server in the removal of heavy metal (nickel) from the sludge.

KEYWORDS

Helianthus annuus, Nickel, Phytoremediation, Sludge

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IJEP 39 (5) :410 -414 (2019)

Diagnostic Approach Of Air Pollution Using Statistical Prediction Analysis: Case Of Kenitra City

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The present study focuses on the air quality of Kenitra city (northwest of Morocco). Eight sites with different conditions were chosen. The targeted parameters were: the suspended particulate matter (SPM), lead (Pb), cadmium (Cd), nitrogen dioxide (NO_2), sulphur dioxide (SO_2) which represent the independent variables (IV) and the vehicular traffic intensity which represents the dependent variable (DV). In addition to the evaluation of concentrations of each pollutant in the studied sites, correlations between the explanatory factors (IV) and the DV were calculated. The diagnosis of the used approach- multiple linear regression, Pearson correlation, significance level, analysis of variance (ANOVA), correlation coefficient R, the value of (t) and the determination coefficient R^2. The results demonstrated that NO_2 is strongly correlated with traffic intensity, consequently, it could be considered as a pollution indicator of urban air linked to vehicle traffic. The interest of such analysis and interpretation methodology lies in the possibility to predict and, therefore, to prevent air pollution by targeting the means required to reduce or stop it.

KEYWORDS

Air quality, Characterization, Pollution, Suspended particulate matter, Pb, Cd, NO_2, SO_2, Multiple regression, Correlation, Indicator, Kenitra, Morocco.

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IJEP 39 (5) : 415-424 (2019)

Assessment Of Heavy Metal Contamination And Its Effect On Colonial Wetland Birds - A Review

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The aquatic and terrestrial ecosystems are in threat due to metal pollution and this is the hub of disease for wild species existence. Birds are the most sensitive organism to the environmental contaminants than other vertebrates. Heavy metals enter into the body mainly by food chain and accumulated in various body organs and transferred to the offspring. When the metal concentration exceeds the limit, it harms the organism causing reproduction failure and also kidney toxicity due to the increasing concentration of Zn. The widespread birds, like egrets and herons are used as bioindicators or biomonitors for local contamination due to their high position in the food chain. In the present review, various organs, such as eggs, liver, blood, feathers, eggshells of the birds have been used to estimate heavy metal accumulation. Water birds face many health implications due to the higher concentration of heavy metals in water. The embryogenesis, hatching success and viability is affected by chromium, lead and cadmium. Different concentrations of metals are found in different tissues of the body, so the study of different tissues is necessary for the population level evaluation. It is suggested that the use of feathers are the non-destructive way for assessing the heavy metal contamination. Concentrations of heavy metals in feathers serve as proof of the heavy metal circulation in the blood. Hence, it is very important to assess the heavy metal accumulation from the feathers of the colonial water birds as the effective heavy metal bioindicator.

KEYWORDS

Colonial wetland birds, Heavy metal, Feathers, Review.

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IJEP 39 (5) : 425-431 (2019)

Water Quality Index To Assess Suitability Of Groundwater For Drinking In The Coastal Regions Of East Godavari District

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Water quality index (WQI) is one of the most efficient tools to assess water quality. This study was carried out by subjecting groundwater samples from 82 villages of 12 mandals of coastal habitations in East Godavari district of Andhra Pradesh. Samples were collected during post-monsoon season and analysed for physico-chemical parameters, such as pH, total alkalinity, total hardness, calcium hardness, magnesium hardness, chloride, nitrate, fluoride, total dissolved salts and electrical conductivity. Results showed that almost all parameters are exceeding the permissible limits prescribed by standards of BIS, ICMR and WHO. The WQI values range from 116.6 to 27.4. The computed WQI shows that only 17 sampling sites come under good water category followed by 27, 32 and 6 sampling sites for poor, very poor and unsuitable water categories, respectively. Majority of the samples (79.3%) were found to be unsuitable for drinking for the people residing in and around the respective sampling site. The data from this work will be very much useful for the governing bodies and scientific authorities to take immediate action in controlling the impurities in these places by implementing modern and efficient techniques to purify the water and make them portable for the common people.

KEYWORDS

Groundwater quality, Physico-chemical parameters, Coastal habitations

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IJEP 39 (5) : 432-436 (2019)

Performance Evaluation Of *Moringa oleifera* Seeds For Softening Of Surface And Groundwater

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The softening study was conducted using naturally dried *Moringa oleifera* seed kernel extract, which was found to possess some softening potential. The study was carried out using synthetic water samples of calcium, magnesium and combinations of calcium and magnesium solutions. The *Moringa oleifera* strength study revealed that 0.5-1% extract is suitable and effective for softening. The optimum pH range was found to be 5-8. *Moringa oleifera* seeds were found effective for calcium removal (removal efficiency upto 30%) but are not effective for magnesium removal.

KEYWORDS

Calcium, Hardness, Magnesium, *Moringa oleifera*, Softening

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IJEP 39 (5) : 437-444 (2019)

Adsorption Potential Of Water Hyacinth On Removal Of Direct Blue 2 Dye From Aqueous Solution: Isotherm, Kinetics And Thermodynamics Studies

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The adsorption potential of water hyacinth on the removal of direct blue 2 (DB2) dye from aqueous solution was investigated. Surface area, morphology and functional groups were identified using Brunauer, Emmett and Teller (BET), scanning electron microscopy (SEM) and Fourier transform infrared (FTIR) analysis, respectively. All the essential process influencing parameters, such as pH (2-4), initial dye concentration (100-300 mg/L), adsorbent dosage (1-5 g/L), contact time of adsorbent with pollutant (15-180 min) and temperature (20-40^{0}C) were studied. The maximum dye removal efficiency of 87.8% was observed at pH 2, the adsorbent dosage of 3 g/L, initial dye concentration of 100 mg/L, 40^{0}C temperature and contact time of 90 min. The experimental isotherm data were analyzed using the Langmuir, Freundlich and Temkin models. Equilibrium and kinetic studies revealed that the Freundlich isotherm and pseudo second order kinetic model were the best fit for the adsorption process. The thermodynamic analysis showed that the adsorption process is spontaneous and endothermic in nature.

KEYWORDS

Adsorption, Water hyacinth, Direct blue 2 dye, Kinetics, Isotherm

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IJEP 39 (5) :445 -448 (2019)

Temple Ponds As A Traditional Water Management Option In Kerala

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Kerala, the southern state of India is blessed with water resources which include a number of rivers, lakes and small ponds. Kerala is also a land of many small and large temples and it has been found that even from the primitive times, water resource conservation and management was considered as a matter of great importance. Temple ponds and tanks in Kerala are visible examples of the community initiative for water management through cultural involvement. Most of these ponds are conserved by the native people of an area, giving them religious respect. But these water bodies still faces problems, like oxygen depletion, eutrophication and pollution. To reduce these problems and to enhance the water quality in the temple tanks and ponds, certain management measures need to be adopted.

KEYWORDS

Deterioration, Ecosystem, Eutrophication, Pollution, Protection, Rainwater harvesting, Religious, Sustainable, Traditional, Water quality

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IJEP 39 (5) : 449-452 (2019)

Real Time And Wireless Groundwater Level Recharging And Monitoring System In Borewell

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Water is a primary resource and plays a significant role in human existence. The rate at which the water being used is exponentially increasing day by day. All living organisms need water for their survival. About 98% of the Earth's fresh water is groundwater. There are many water storage phenomenon where the major among them is groundwater. As water is consumed, naturally subsequent amount of water will be added to the aquifer to reinforce human needs. This recharge capacity if measured will give a new eye-opening to those areas which are facing severe drought conditions. The groundwater level should be monitored continuously, serves essential to predict the water resource availability for the future. So, it's necessary to log the data at regular intervals of time in a database, thus enabling us to check and predict the area scarce of water. A pressure sensor helps in finding the water level. The physical pressure is converted to the level or height of the water column concerned parameter. The water level measurements are acquired during particular intervals of time and are viewed as HTML data.

KEYWORDS

Borewell, Water level, Microcontroller, Pressure sensor, XBee, Mobile app

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IJEP 39 (5) :453 -465 (2019)

Trend Analysis Of Rainfall Over Bihar Region

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The present study aims to examine the long-term changes and short-term fluctuations in annual and seasonal rainfall over the Bihar region of India for the period of 1954-2013. The analysis was carried out to identify trends in the precipitation pattern. It is clear from these results that rainfall yield is increasing in pre-monsoon (MAM) season and monsoon season (JJAS) and the anomaly is (+3.9) mm in decades V, VI, (+4.8) mm in VI decade. In J-F and OND season, decreasing rainfall trend after IV decade is observed. Periodicity is 9-11 years suns pot number (SSN) long term and 2.5 years quasi-biennial oscillation (QBO) short term periodicity observed in wavelet analysis, these relationships are noticed in rainfall by using cross wavelet analysis. Breaks and active periods are identified during the southwest monsoon season (June–September) and active days identified in recent extreme rainfall year in the period July-August month, maximum active and break days in the year 2007 and 2010. Outgoing longwave radiation (OLR) positive anomaly increases when rainfall decreases (break days) in 2010 and when OLR negative anomaly increases with increased rainfall (active days) in 2007. It is also evident that the Indian summer monsoon extremity is strongly associated with equatorial Indian Ocean oscillation (EQUINOO), which is based on the surface zonal wind over the central equatorial Indian Ocean.

KEYWORDS

Rainfall, Cramer test, Standardized anomaly index, Wavelet transform, Active and break days

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IJEP 39 (5) : 466-471 (2019)

Groundwater Characterization And Treatment Using UV/H_2O_2 Process

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The present study has a connection with the real-life problem of colour and contamination in the groundwater of the Dasuya town in the state of Punjab. An assessment of the groundwater contamination has been carried out in the laboratory. The physico-chemical parameters have been determined. Elemental analysis has been performed using microwave plasma atomic emission spectrometer. The organic compounds present in the groundwater were identified by gas chromatography and mass spectroscopy analysis. Many treatment technologies have been tested for treatment of the organic contamination present in the groundwater. It was observed that the UV/H_2O_2 process showed the potential to treat contaminants of the groundwater. An annular reactor has been used to treat the groundwater by UV/H_2O_2 process. A parametric study has been performed to optimize the dose of H_2O_2 and pH for treatment of the groundwater.

KEYWORDS

UV/H_2O_2 process, Annular reactor, Groundwater treatment, Advanced oxidation processes, Physico chemical parameters

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IJEP 39 (5) : 472-478 (2019)

Design And Implementation Of Stable PID Controller For A Quadruple Tank System

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In many industries, the interaction process is taken only in single loop controls where the multi-input and multi-output (MIMO) systems are difficult to control in the water treatment process. Thus, the proportional integral derivative (PID) controller is used to control the liquid level by adjusting the controller parameters and the variables of flow and level of four tanks.The quadruple tank system is a four interconnected water tank system used to analyze the linear and non-linear effect of interaction process taken in chemical industries and water treatment plant. The design of stable PID controller is done with stability region analysis method for the minimum and non-minimum phase of the tank level provides better disturbance rejection and good setpoint tracking and simulation is done. The MATLAB/Simulink and LabVIEW is used to simulate the stable PID controller and to analyze the stability region.

KEYWORDS

Multi-input and multi-output (MIMO), Proportional integral derivative (PID), Quadruple tank system, Pulse width modulation (PWM), Ziegler-Nichols method

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IJEP 39 (5) : 479-488 (2019)

Solar Residential Rooftop Systems Business Models: SWOT Analysis

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The carbon footprint on earth due to the burning of fossil fuels for generating electricity, running trains, cars and other vehicles throughout the world is increasing day by day. It has reached the stage where if not managed effectively, it would become, like a black hole and suck the life of human beings on this earth hardly in next 50 years. Therefore, the whole world is looking for renewable sources, preferably solar energy to generate power, which is clean with no fuel cost and available in abundance in most of the countries across the globe including India. India has set a target of installation of 100 GW (including 40 GW of solar rooftop systems) of solar power plants by 2022. Residential roofs have huge installation potential and, therefore, it is one of the major target segments for the installation of solar rooftop systems. Presently, CAPEX and RESCO are the two major solar residential rooftop systems (SRRSs) business models existing in the market. Both the models are prevalent and the customers have the choice to go for any of the models for getting SRRS installed on their residential roofs. In order to enable various stakeholders involved in SRRSs, like roof owners, third party, developer, engineering, procurement and construction (EPC) firm to take an informed decision about the selection of a suitable model for particular installations, there is a need to understand the strengths and weaknesses of both the models. At present, SWOT analysis of CAPEX and RESCO models is not readily available and there is visible gap existing in its literature. Therefore, this study has been undertaken for conducting a SWOT analysis of both the business models (CAPEX and RESCO) to help stakeholders identify and adopt a suitable model for respective installations.

KEYWORDS

Solar energy, Solar residential rooftop systems (SRRSs), SWOT analysis, Business models, Renewable energy, Solar policy, Environment

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