

## Evaluation Of Hydrochemical Quality Of Groundwater In North Coastal Districts Of Andhra Pradesh

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In the present study, an attempt has been made to assess the hydrochemical quality of groundwater alongwith the north coastal districts of Andhra Pradesh. For this study, a total number of 77 groundwater samples were collected from the bore wells in selected places of the three coastal districts of Andhra Pradesh. The hydrochemical facies of the groundwater samples was studied with reference to drinking purpose by constructing Piper trilinear diagrams. The results indicated that most of the groundwater is Ca-Mg-HCO<sub>3</sub> and Ca-Mg-Cl-SO<sub>4</sub> type. The physico-chemical analysis was carried out using standard methods suggested by the American Public Health Association. The pH, total alkalinity (TA), electrical conductivity (EC), total dissolved solids (TDS), total hardness (TH), Ca<sup>2+</sup>, Mg<sup>2+</sup>, Na<sup>2+</sup>, K<sup>+</sup>, Cl<sup>-</sup>, SO<sub>4</sub><sup>2-</sup>, CO<sub>3</sub><sup>2-</sup>, HCO<sub>3</sub><sup>-</sup>, NO<sub>3</sub><sup>2-</sup> were determined. Sodium adsorption ratio (SAR), residual sodium carbonate (RSC), sodium percent (Na%) were also measured. 2.6% of the samples exceeded the SAR value, 9.1% of the samples exceeded the RSC value and 5.2% of the samples exceeded the Na% value specified for the water suitable for irrigation.

### KEYWORDS

Groundwater quality, Physico - chemical analysis, Piper diagram, Irrigation water quality

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## Experimental Analysis Of Biodiesel B30 With Nano Additives

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Biodiesel is a better and effective alternative for conventional when produced in larger quantities with minimum cost but there are barriers, like the high emission rate in the biodiesel due to the chemical properties of their bio - oil. To overcome this many researchers found the various blends of biodiesel to achieve the best solution for reducing the drawbacks. In this experimental work, the combination of the rice husk nanoparticles as additives with the biodiesel. Authors tested the fuel sample B30 blend of corn biodiesel and B30 blend of corn biodiesel blended with RH nano-additives. Authors believe that the mixture of the nano-additives reduces the emission of nitrous oxide into the environment and also enhances the engine performance by comparing the variations in the two blends.

### KEYWORDS

B30 corn oil, Rice husk, Nano additive, Bio-oil

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## Assessment of Landuse / Land Cover Change Dynamics and Its Impact On Lucknow Using Geospatial Techniques

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Assessment of landuse/land cover change analysis has been carried out for the last 16 years of Lucknow district, Uttar Pradesh using satellite images. Advance hybrid image classification techniques were used for classification and finalization of landuse (LU) classes by following accuracy assessment. The major landuse change observed in a built-up area and horticulture land whereas negative change observed in vegetation and agriculture area. Horticulture land and built-up area showed major growth around 7.5% change was observed from 2000-2016 and 7.4% from 2000-2016, respectively. Both the above classes are mainly responsible for degradation in the quantity and quality of the water resources and other environmental parameters. In 2000, the built-up area was 93 km<sup>2</sup> (4%) of the total area were covered and it increased in 2016 with an area of 280 km<sup>2</sup> (11%) of the total area. Changes of 15% were observed in vegetation cover from 2000 - 2016 and agriculture showed around 4% changes from 2000 - 2016. Agriculture land decrease about 1444 km<sup>2</sup> (57%) in 2000 to 1408 km<sup>2</sup> (56%) in 2008 and reached to 1349 km<sup>2</sup> (53%) in 2016. Based on the result observed from the assessment of landuse/land cover change, unplanned urban growth, population growth and extensive agricultural practices in last two decades make a serious impact on water resources and human health.

### KEYWORDS

Landuse / land cover, Remote sensing, GIS, Lucknow district

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## Performance Study Of Micro-Porous Adsorbent From *Aegle marmelos* Fruit Shell On Malachite Green Removal

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The adsorption of malachite green (MG) dye onto micro-porous activated carbon prepared from *Aegle marmelos* (bael tree) was carried out in this work. The physico-chemical characteristics of the sulphuric acid activated (SAAC) bael tree fruit shell adsorbent were assessed. The effects of different reaction parameters, such as adsorbent dose, adsorbate concentration, contact time, pH and temperature were investigated. The percentage of adsorption increases with increase in contact time, temperature and carbon dosage. It decreases with an increase in pH and initial dye concentration. The adsorption equilibrium data were best represented by the Freundlich model. Adsorption kinetics was found to follow the Elovich kinetic model. The mechanism of the adsorption process was determined from the intraparticle diffusion model. Langmuir adsorption isotherm provides a good model of the sorption system of malachite green onto sulphuric acid activated carbon of *Aegle marmelos* (SAAM) fruit shell indicated monolayer adsorption on a surface, that is homogeneous in surface affinity.

### KEYWORDS

*Aegle marmelos*, Adsorption, Langmuir equilibrium and kinetics

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## **Analysing The Contribution Of Municipal Solid Waste For The Metropolis Mumbai, Hyderabad, Kolkata To Energy Generation**

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The energy crisis and environmental degradation are two vital issues in the present scenario. Rapid industrialization and population explosion in India has led to large scale migration of human resource to cities which leads to a large generation of municipal solid waste (MSW), which is one of the major contributors at the national level. Improper management of solid waste causes hazards to both mankind and Mother Nature. The daily increase in waste generation demands renewable technology to be adopted for proper solid waste management. In the present study, an attempt has been made to calculate the heat values of MSW collected from three metros-Mumbai, Hyderabad and Kolkata. The data for the composition of MSW has been excerpted from reports submitted to the Ministry of Environment, Forest and Climatic Change (MoEFCC). Heat value is calculated on the basis of the composition of municipal solid waste using a modified Dulong Petit formula. The scope of different renewable technologies for three metros is also studied taking into effect their climatic features. The energy potential for three metros is calculated corresponding to the heat values obtained. Studies related to how much percentage of daily electrical energy requirements can be met by this energy is also presented.

### **KEYWORDS**

Municipal solid waste, Ultimate analysis, Modified Dulong formula, Heat value, Energy potential, Energy requirement

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## Occurrence Of Indoor Air Pollution And Health Symptoms In Households Of Nanpara (Bahraich)-A Survey Based Study

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The study was conducted in seventy households in Nanpara town of Bahraich district from February-March 2019 to study the house characteristics, energy choices and health symptoms faced by the dwellers. The aim of the study was to identify probable occurrences of indoor air pollution (IAP) and health status of the occupants alongwith their socio-demographic profile. 50% of the sampled population was employed. 40.15% of the houses had a closed cooking space. In 77.74% of households, the kitchen had improper ventilation conditions whereas only 22% of households had adequate ventilation in the kitchen. The overall sanitary condition of the houses was very poor. Usage of LPG was frequent, still, 50% of households had traditional cooking stoves used for cooking and other heating purposes. Although the households had an electricity connection, showing their progression, yet they relied on crude fuel (44%) for cooking their meals due to easy availability and affordability. Educational status has a direct influence on the choices we make in day to day life. Majority of the inhabitants had secondary educational status (54.71%) and a meagre percentage of people went for higher education (11%). The correlation was further made with the willingness of the people to change their energy source. Eye irritation (81.13%), chest tightness (56.60%), shortness of breath (41.5%), headache (92.4%), heartburn (50.9%), dizziness (39%) and fatigue (79.24%) and phlegm (86.79%) were some of the common symptoms reported by the dwellers which were more frequent in the winter season. These symptoms are usually linked to the increased inhalation of particulates and CO<sub>2</sub> originating from smoke and due to inadequate ventilation.

### KEYWORDS

Questionnaire, Indoor, Health, Pollutants, Eye irritation

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## Comparison Of Nutrient Solution And Substrate In A Hydroponic System For Increasing Tomato Crop Yield And Preventing Pollution

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An experiment was conducted as a factorial design in a randomized complete block design, the three different formulas were selected as main plots. And the three different substrates were selected as subplots which included: perlite, coco peat and their mixture of 50:50 in order with 4 replications. Every 12 pots were controlled with one formula by a separate pump from the source tank. Each tank had two (A and B) stock solutions. Every week, these stock solutions, which were formed from three different formulas, were diluted ten times in 3 different tanks with separate pumps. They were regulated automatically, which was turned on 1 min every hour during the 24 hr period. The main objective was to find out the best optimum use of fertilizers as a formula and the best substrate. We also reduced other cultural practices to obtain healthy and good quality tomato crop for human health and prevent pollution in the province. The final results showed that the maximum tomato yield was from the mix substrate treatment with 4709.3 g in each pot and from the nutrient solution no.1 with 4571.3 g in each pot.

### KEYWORDS

Substrate, Tomato nutrition, Nutrient solution, Pollution prevention

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## Microbial Bioremediation Of Soil Contaminated With Heavy Metals Using Activated Carbon As An Amendment

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Bioremediation is an eco-friendly process for the treatment of pollutants that converts most harmful and highly toxic components into less toxic and harmless components. Though the process of bioremediation possesses a number of advantages over the other conventional treatment methodologies, there exists a major demerit in it. Since it involves the biological metabolic process, a huge amount of time is consumed. The amendments, such as organic waste, inorganic fertilizers and activated carbon reduce the toxicity of the pollutants in the media and enhance the degradation rate of the pollutants. The objective of this study was to examine the combined effect of the microbial degradation and activated carbon amendment in heavy metals removal from the contaminated soil. The study was carried out for a various combination of the microbial concentration and the activated carbon dosage. As the concentration of this combination increased, the degradation efficiency of heavy metals accelerated logarithmically. The heavy metals removal efficiency was found to be 80.74% for chromium and 76.70% for nickel.

### KEYWORDS

Bioremediation, Activated carbon, Heavy metals, Microbes, Soil

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## A Perspective On Energy Cycling From Waste To Biofuel - Rendering Of Non-Edible Chicken Fat And Conversion Of Chicken Oil Into Biodiesel Through Transesterification

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A novel approach in producing biodiesel from non-edible chicken fat using alkali catalysed transesterification process. The efficiency of rendering operation was determined during the oil production from non-edible chicken fat. During the oil production stage, optimization was done with respect to oil production rate. The formed oil was converted into biodiesel using alkali catalysed transesterification process. The oil produced from the chicken fat had triglycerides and free fatty acid content of  $84 \pm 2$  and  $10 \pm 4\%$ . The major unsaturated fatty acids were found to oleic acid, eicosadiene, pentanoic acid and 1-octadecene oleic acid, respectively. Transesterification efficiency was found to 95% at alcohol:oil molar ratio of 6:1 and a catalyst concentration of 1.5%. The ethyl esters of fatty acids (FAEE) was determined by gas chromatography which confirmed the presence of C14 to C22. The characteristics of biodiesel were evaluated in terms of its fuel value, which had a calorific value of 39 MJ/kg and cetane number 50. The solid waste generated from the non-edible chicken fat was proved to an alternate source of renewable energy. The residue left over after the oil extraction shall serve as a source for supplementary feedstock additive in the case of fowls and pets.

### KEYWORDS

Biodiesel, Biofuel, Chicken fat, Chicken oil, Alkali transesterification, Poultry solid waste

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## An Experimental Study Of Dye Removal Using TiO<sub>2</sub> Coated Coconut Husk

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This research aimed at synthesis of a novel adsorbent by combining highly porous coconut husk with a surface coating of nano TiO<sub>2</sub> and its application for adsorption and photocatalytic degradation of malachite green dyes from wastewater. Characterization of the synthesized adsorbent has been done by SEM, XRD and FTIR spectroscopy analysis. From batch experiments, it has been observed that at pH 5.5 and 30°C for 10 ppm of initial dye concentration with 0.1 mg/L adsorbent dose can achieve upto 90% of removal efficiency. 60 mins mixing time at 1000 rpm followed by 30 min UV light exposure found sufficient to attain equilibrium. Best fitting with the Langmuir isotherm model attribute to the monolayer adsorption process. Kinetics of dye removal found to be satisfying pseudo second order model which explain the enhanced removal efficiency and the process to be diffusion controlled as it reaches equilibrium. Removal efficiency reduced significantly from 84.94% at 30°C to 60.40% at 60°C. Change in enthalpy and standard Gibbs free energy which was found negative for each temperature explain the process to be exothermic and spontaneous in nature. Whereas the positive values of entropy change show the randomness of adsorbing molecules at the solid-liquid interface.

### KEYWORDS

Dye removal, Adsorbent, TiO<sub>2</sub>, Coconut husk, Malachite green

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## Energy Potential Of Municipal Solid Waste Of Roorkee City

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Solid waste management has become a major issue in every country. In India, with an increase in economic development, there is a significant increase in waste generation which increases the environmental hazard and affect public health. The present study has been done to assess municipal solid waste of Roorkee city which is currently being dumped uncontrollably in Saliyar open dumpsite and study the energy potential of municipal solid waste (MSW) giving a suitable treatment option to manage the waste of the city. Physico-chemical analysis of MSW are performed and results reveal that maximum moisture content of 52%, high content of biodegradable waste (49.33%) and carbon/nitrogen ratio (2 : 3) shows the property which supports anaerobic digestion. Roorkee city generates 104 metric tonnes of solid waste every day which can generate biogas of 0.978 m<sup>3</sup>/kg of biomass and has potential to generate 1.88 megawatt of electricity provided waste are immediately handled properly after its generation. This result shows that the waste generated from a small city like Roorkee can have enough energy potential which could be used for good and minimize the waste accumulation at the city level.

### KEYWORDS

Municipal solid waste, Anaerobic digestion, Biogas, Energy potential, Biomass

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## Overexploitation Of Groundwater Causing Seawater Intrusion In The Coastal Aquifer Of Egra In West Bengal

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The coastline of India is very large with a length of 7530 km. District Purba Medinipur is located in the east coastline of India. Egra block is located within Purba Medinipur. The population of Egra as of the year 2019 is 30148. It is increasing day by day. Due to increased population, meeting the water demand of industry groundwater becomes highly stressed. So from the data got from Egra, it is observed that groundwater level is at a considerable distance from the ground surface. So the area under study is more likely to be affected by seawater intrusion. Chemical analyses were carried out from the 51 locations of Egra. Clear evidence of seawater intrusion did not find from chloride, fluoride and nitrate. Although these analyses provide hints of seawater invasion at Egra in near future yet from iron concentration in groundwater analysis, it becomes clear about seawater intrusion in Egra. Arsenic is not found in the study area. Preventive measures can be taken to make the groundwater safe for drinking, industrial and other usages.

### KEYWORDS

Seawater intrusion, Groundwater level, Chloride concentration, Fluoride concentration, Iron concentration

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## Physico-Chemical Investigation And Variation Of The Parameters Prevailing In Groundwater At Matigara Block, West Bengal

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Awareness of drinking water contagion and its management has now turned out to be the primary concern because of direct or indirect long term effect on human health. Groundwater is the decisive and most apposite unsullied water storage for utilization of human beings in the rural as well as urban regions of India. In the present study, the groundwater quality has been assessed in terms of drinking purpose based on different areas and months. Hence some physico-chemical parameters, like pH, temperature, electrical conductivity, total dissolved solids have been determined based on the concentration of various cations and anions, namely  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{CO}_3^{2-}$ ,  $\text{HCO}_3^-$ ,  $\text{Cl}^-$ ,  $\text{SO}_4^{2-}$  etc. Alongwith it, several more water quality index, such as DO, COD, BOD have also been examined to judge the amount of oxygen present in the water in the month of January, May and September 2018. The outcome of the study points towards that the experimental physico-chemical parameters were more or less within the permissible boundaries except very few.

### KEYWORDS

Groundwater, Physico-chemical properties, Electrical conductivity, Dissolved oxygen, Cations, Anions

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## Market For Household Solar Energy Systems In India

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The Paris Agreement, 2015 has provided a boost for countries to promote policy incentives for clean energy development. The policy measures are taken by India to reduce the dependence on fossil fuel based energy generation and to increase the renewable energy based energy generation created a positive wave in the world. India allows 100% foreign direct investment for renewable energy generation and distribution projects through automatic route and fiscal concessions to reduce the dependence on fossil fuel based energy generation and associated emissions. The household renewable energy systems, like rooftop solar systems, solar heaters and solar lighting system also contribute to reducing the dependence on fossil fuel based energy and associated emissions and in India the solar rooftop systems to be treated as a part of home loans with subsequent tax benefits. It is essential to increase the household application of solar energy which is one among the potential renewable energy source for household application in India to achieve the target of reduction in emissions by 33-35% of GDP by 2030. In this context, this paper examines the market conditions for household solar energy systems in India including the drivers of demand and supply side factors. The study is conducted in Chennai – one of the metropolitan cities of India, through a well structured survey questionnaire among 330 randomly selected sample respondents.

### KEYWORDS

Household solar systems, Renewable energy, Solar, Energy policy, India

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## Nexus Between The Carbon Dioxide Emission And Economic Growth: Evidence From India

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Increase in economic activities contributes to the economic growth of a country. It is evident that emerging economies have recorded higher economic growth and significant increase in coal consumption, energy consumption and electricity consumption. On the other hand, the emission of greenhouse gases (GHG) generating consequences in the atmosphere. In this context, this study tries to analyse the association between GDP per capita, FDI, population, trade openness and CO<sub>2</sub> emissions per capita in India. The study is based on secondary data, which has been collected from the World Bank database. The time period under consideration is from 1960 to 2017. Augmented Dickey Fuller test has been used to test the unit root. VAR lag order criteria have been used for lag selection of the model. Since the variables are integrated at I (1) and I (0), the ARDL model has been used for the purpose of analysis. Furthermore, for checking the stability of the model, the CUSUM test has been used. The results show that in the long run, GDP per capita and FDI has a positive impact on CO<sub>2</sub> emission whereas, in the short run coal consumption, FDI, GDP per capita and trade openness appears to have a significant and positive impact towards CO<sub>2</sub> emission.

### KEYWORDS

Environment, GDP, FDI, Coal consumption, CO<sub>2</sub>, JEL classification: C50, O110, Q56, Q58

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## Role Of Municipal Solid Waste In Water And Soil Pollution - A Case Study From Thirunallar Temple Town, Pondicherry

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Heavy metal pollution in water, soils and eventually in food crops is a great environmental concern. We, possibly, first time explored the heavy metal infiltration from municipal solid waste (MSW) into the water resources and agricultural soil. Thirunallar temple town (TTT) in Pondicherry, South India is one of the several largest Hindu faith religious places. Annual attendance of devotees at Thirunallar temple town has crossed 5 million in the year 2018, a 50% increase from the year 2013. This throughout the year affair is responsible for the generation of tonnes of solid waste and with no proper mechanism and regulations at a place; these religious rituals may become a great threat to the environment. Further unregulated and unscientific MSW handling practices has enormously impacted the water and soil quality in and around Thirunallar temple town. It was found that unorganized and mass scale religious rituals are directly responsible for water and soil pollution. Cu was found beyond recommended limits in both soil and water samples.

### KEYWORDS

Municipal solid waste, Water quality, Soil quality, Heavy metal pollution, Religious rituals

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## Effect Of pH On Removal Of Chromium (VI) From Aqueous Solution By Polyphenols From Coconut Husk

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Hexavalent chromium (Cr(VI)) is a toxic metal ion found mainly in industrial wastewaters and its improper discharge into the environment is a serious health concern. Several adsorbents have been evaluated for removal of Cr(VI) from wastewaters but have been found to be expensive. Also, many low cost adsorbents were also used in the recent past for their efficacy to remove Cr(VI) from wastewaters. In this study, natural polyphenols from coconut husk have been used for removal of Cr(VI) and the rate of removal of Cr(VI) was found to be pH dependant. The displacement of Cr(VI) onto the polyphenols from coconut husk took place very effectively at lower pH. The study reveals that maximum removal of Cr(VI) by the polyphenols has taken place at pH 1.

### KEYWORDS

Polyphenols, Coconut husk, Coir fibre, Removal, Hexavalent chromium

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