

## **Time Series And Distribution Functions For The Concentration Of Elements In The Surface Layer Of The Atmosphere Of Cities In The Zeravshan Valley**

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**Time series and distribution functions of element concentrations in atmospheric aerosols of large cities of the Zeravshan valley were studied. It is established that the time series and functions of dust and element distributions show peaks due to the influence of meteorological conditions, anthropogenic sources and their interactions. Time series and distribution functions of urban atmosphere aerosols of Samarkand, Bukhara and Navoi were investigated. The effect of meteorological conditions, industrial sources and their interactions was found as pikes on the time series and distribution functions of dust and elements.**

### **KEYWORDS**

Atmospheric aerosols, Time series, Distribution functions, Variation span, Standard deviation, Probabilistic and statistical processing, Log-normal distribution, histogram of frequency distributions, Risk of contamination

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## Evaluating Water Supply Risk In The Middle Reaches Of Subarnarekha River Basin By Using WEAP Model

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The allocation of limited water resources poses a challenge when demand from different stakeholders are gradually increasing. Demand supply analysis for different scenarios can help the planners for better allocation of these precious natural resources. In the present study, the Water Evaluation and Planning System (WEAP) model was applied to analyse water demand and supply potential in the middle reach of the Subarnarekha river basin, Jharkhand. Demand sites used were classified as an industrial area, institutional water demands area, agricultural land and human and livestock settlement. Annual water use rate per person, per hectare and per head of livestock were determined and used as input alongwith other hydrological input parameters to the WEAP model. For WEAP modelling framework, the year 2010 was chosen as a current year. It has observed dry conditions with an annual rainfall of nearly 624.8 mm whereas, the years 2011 and 2013 experienced high rainfall (1836.4 and 1779.8 mm) resulting in wet conditions. The maximum flow to the groundwater storage was found in the monsoon months compared to the non-monsoon months as an obvious phenomenon. It was noticed that the year 2010 showed the lowest surface runoff because the year 2010 observed the minimum rainfall and the years 2011 and 2013 showed the highest surface runoff. It can be seen that rainwater is available to meet the crop water demand in monsoon months. The agriculture demand gradually increases from November end, highest in May (approximately 430000 m<sup>3</sup>) and decreases June onwards. Unmet demands were high in the very dry years, that is 2010, 2016 and 2017. The unmet water demand for agricultural use was found to be highest in the year 2010 because it receives minimum rainfall.

### KEYWORDS

Water availability, Demand, Water supply, Water evaluation and planning system (WEAP) model, Subarnarekha

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## Monitoring And Assessment Of Landuse / Land Cover Change Analysis Using Geospatial Approach

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Environmental managers are interested to know landuse/land cover types and their change detection in time series for sustainable land management. Remote sensing (RS) and geographic information system (GIS) are now providing new tools for advanced ecosystem management. This paper describes the use of remote sensing and GIS in mapping landuse/land cover (LU/LC) in the Gagas river basin between 2000 and 2015, to detect the changes that have taken place in this status between these periods. Subsequently, an attempt was made at projecting the observed landuse/land cover in the next 15 years. In achieving this, land utilization rate and land absorption coefficient were generated to aid in the quantitative assessment of the change. The result of the work shows rapid growth in built-up land between 2000 and 2015. LANDSAT satellite data of the Gagas river basin area is used to detect LU/LC changes between 2000 and 2015 during the period of 15 years the change in land resources utilization and absorption is detected. LU/LC changes occur due to either natural or anthropogenic reasons.

### KEYWORDS

NDVI, Inventory, Change detection

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## Standalone Hybrid System For A Micro-Grid

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The constant rise in energy demand due to continuous population rise and industrial growth is putting extreme pressure on conventional energy sources. To meet the demand there is no other option but to fall on renewable energy sources. In this context with the Indian Government promoting lots of schemes for encouragement of green power generation, the use of hybrid energy for micro-grids is also a highly viable and potent solution. The present paper reports on the designing of economic, optimal hybrid micro-grid standalone energy system models including PV and biodiesel generators. The optimization technique employed is based on the technical and economic analysis of renewable hybrid systems in IHOGA (2.4 EDU) software. The paper has also tried to present a comparative study based on the per-unit cost of electrical energy production, operating cost of conventional fossil fuel-based energy sources and a corresponding reduction in greenhouse gases.

### KEYWORDS

Biogas, IHOGA (2.4 EDU), Renewable energy source, Standalone hybrid system, Greenhouse gas

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## Kinetic Study Of The Modified Gompertz Model On The Production Of Methane From Coffee Waste Through Anaerobic Digestion

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The objective of this study was to carry out laboratory-scale experiments on the anaerobic digestion (AD) of coffee waste (CW) in semi-continuous mode, under mesophilic conditions (37°C) and using digesters infinitely mixed with a litre capacity. The AD of the CW gave a methanogenic potential of the order of 263.71 NmL CH<sub>4</sub>/g SV. Stability parameters affecting digestors, namely the pH and the alkalinity, which were controlled throughout the process, were within the optimal range. The experimental data were fitted by two kinetic models: first-order kinetic model and modified Gompertz model. The values of the correlation coefficient (R) obtained were of the order of 99.508% for the modified Gompertz model and 99.199% for the first order kinetic model. Thus, the modified Gompertz model gave the best fit with the experimental results. The kinetic study results show that CW substrate can be easily biodegraded by anaerobic digestion with a short lag time from 0.49-4.62 hr resulting in biogas production (volume - 13.57 mL CH<sub>4</sub>/g VS). The first-order kinetic and the modified Gompertz model results show that the difference between the predicted and measured methanogenic potentials is higher in the first-order kinetic model (1.79-26.62%) than in the modified Gompertz model (0.37-19.61%) following the applied load value. The modified Gompertz model showed the best fit for the substrate used.

### KEYWORDS

Anaerobic digestion (AD), Coffee waste, Gompertz, Kinetic study, Semi continuous methanogenic potential

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## Assessment And Characterization Of Water Quality Of Imphal River Using Hydrogeochemical And Multivariate Methods, Manipur

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Water quality and hydrogeochemical assessment of Imphal river water within Imphal city were carried out for pre-monsoon and post-monsoon seasons. Significant downstream variations in water quality parameters were observed for pH, temperature, EC, oxidation reduction potential (ORP), turbidity, total hardness, DO,  $\text{NO}_3^-$ ,  $\text{PO}_4^{3-}$ ,  $\text{SO}_4^{2-}$  and more distinct changes were observed during the post-monsoon season. Geochemical evaluation indicates  $\text{Na}^+ - \text{K}^+ - \text{Cl}^- - \text{HCO}_3^-$  and  $\text{Na}^+ - \text{K}^+ - \text{Cl}^- - \text{HCO}_3^- - \text{SO}_4^{2-}$  type of water during pre-monsoon and post-monsoon, respectively. Statistical investigation indicates the factors controlling the Imphal river water quality as well as identifies the source of variation among the samples. Factor analyses were carried out for 4 factors that account for around 82.34% and 77.79% of the variability of the data during pre-monsoon and post-monsoon, respectively. Irrigation water quality was evaluated using an irrigational water quality index that exhibits overall satisfactory to good quality water.

### KEYWORDS

Hydrochemistry, Multivariate analysis, Water quality index, Ecohydrology, Irrigational water, Urban runoff, Sewage disposal

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## Investigation Of The Efficacy Of Water Hyacinth (Aquatic Plant) For The Treatment Of Dairy Effluent

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The disposal of wastewater is one of the most serious problems in the industrial era of the urbanizing world. It affects the quality of land, water and also its surrounding environment significantly. The present study focused on the cost-effective biological treatment of dairy effluent by using aquatic plant (water hyacinth). The major objective of our study is to investigate the filtration potential of water hyacinth (an aquatic plant) in treating wastewater, that is discharged from the small-scale dairy industries. The water quality parameters, such as pH, electrical conductivity (EC), total hardness (TH), alkalinity, total dissolved solids (TDS), chemical oxygen demand (COD), calcium (Ca), magnesium (Mg), sulphate, potassium, sodium and chloride, were tested for the detention period of 15 days and 30 days with varying plant growth density. The results were analyzed and compared with the irrigation standards to evaluate the treatment efficiency. The analysis results show greater efficiency in removal of TH, Ca, Mg, EC and COD as 80, 85, 64, 63 and 73%, respectively and moderate efficiency in removal of Na, K and SO<sub>4</sub> as 43, 57 and 59%, respectively. Thus, the present biological treatment system will provide outlet water of upgraded quality by considering the efficient removal of COD, TH, Na, K and SO<sub>4</sub> that can be discharged directly into the public drains and watercourses without affecting the assimilating capacity of streams. The present study can be continued to analyze the various aquatic plants in order to construct artificial wetland based treatment facilities for uptaking the pollutants from wastewater that can be used for secondary uses, such as gardening and landscaping purposes.

### KEYWORDS

Water hyacinth, Aquatic plants, Adsorption, Industrial wastewater, Biological treatment

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## Exposure Assessment Of Respirable Dust For Opencast Limestone Mine In India

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Respirable dust is harmful to human beings and can cause silicosis, bronchitis, respiratory problems especially miners all over the world depending upon their concentration, percentage of crystalline silica, nature of the respirable dust and exposure time. The objective of the paper is to assess the exposure of dust and crystalline silica generated during the opencast limestone mine as per the Director General Mining Safety (DGMS). Sidekick 51 MTX gravimetric dust sampler (GDS), UK, approved by Director General of Mines Safety (DGMS), was utilised for personal dust exposure assessment of limestone miners. The presence of crystalline silica was determined by FTIR using Opus software and followed the NIOSH-7602 methodology. A total of 54 airborne respirable dust samples (29 personal dust and 25 area dust samples) were collected from May 2016 to May 2018. It was observed that 8 hr time weighted average (TWA) concentration of airborne respirable dust at all sampled locations of opencast limestone mines were within the permissible limit (that is 3 mg/m<sup>3</sup>) as prescribed under Regulation 124 of Metalliferous Mines Regulation 1961. 31 dust samples analyzed for crystalline silica (SiO<sub>2</sub>) content were below 5% except for one sample near the hopper area was below the permissible limit.

### KEYWORDS

Respirable dust, Crystalline silica, Limestone, Mine regulation

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## Removal Of p,p'-DDT From Aqueous System Using Natural Adsorbents

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p,p'-DDT (1,1,1-trichloro-2,2-bis(4-chlorophenyl)ethane) is a colourless, odourless organochlorine insecticide. WHO recommends DDT as an indoor spray for controlling malaria as a part of integrated vector management. At present, in India, DDT is banned for agricultural purposes but is still used for controlling vector-borne diseases. Widespread and reckless use of DDT caused considerable harm to the wildlife population. In this study, removal of p,p'-DDT from an aqueous system was carried out with four different natural adsorbents. The natural adsorbents employed for the adsorption studies are granular activated carbon, powdered activated carbon, chitosan and carbon-coated chitosan film. The adsorption capacity for the natural adsorbents is in the order of powdered activated carbon (irrespective of pH) (99.63%) > chitosan at pH 7 (95.18%) > granular activated carbon at pH 7 (89.18) > carbon-coated chitosan film at pH 11 (88.3).

### KEYWORDS

p,p'-DDT, Powdered activated carbon, Chitosan, Granular activated carbon, Carbon coated chitosan film

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**Business And Economic Potential From E-waste Resource Recovery In Asia Pacific Region****Sunil Herat\****Griffith University, School of Engineering and Built Environment, Queensland, Australia**\*Corresponding author, Email : s.herat@griffith.edu.au*

Sound management of used electrical and electronic equipment (EEE), known as e-waste, is generated at a higher rate than most other waste streams in many countries. According to the United Nations, the world produced 53 million metric tonnes (Mt) of e-waste in 2019, mostly from the Asian region. E-waste contains many toxic compounds, poorly managed could cause severe environmental and human health issues. E-waste also contains valuable metals for resource recovery. Environmentally sound management (ESM) of e-waste is inadequate in many developing countries due to a lack of financial resources, infrastructure and the informal recycling sector's dominance. Many countries have been developing regulations based on extended producer responsibility (EPR) concepts. This paper aims to review the business and economic potential of e-waste resource recovery in the Asia Pacific countries.

**KEYWORDS**

E-waste, Asia Pacific, Recycling, Resource recovery, Extended producer responsibility, Public-private partnerships

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## Experimental Study On Partial Replacement Of Fine Aggregate By Recycled Polypropylene Plastic Granules In Galvanized Iron Fiber Reinforced Concrete

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Plastic is used as a polymer substitute for natural materials. It has become an essential aspect of our lives and there was a considerable intensification in the production of plastic in the last few decades. This research aims to evaluate the possibility of using granulated plastic waste material to partially substitute for the fine aggregate in the concrete specimen. In this M30 grade, concrete design strength of mix ratio of 1:1.3:2.44 and 0.42 w/c ratio were used. Five different percentages (0%, 10%, 20%, 30%, 40%) of recycled polypropylene plastic granules waste were used to replace the fine aggregate and in addition to this GI wire fibre, 2% by weight of concrete was added to improve the mechanical properties of concrete. GI wire fibre can be used as a low-cost alternative to steel fibre in concrete. The physical properties test was conducted on cement, fine aggregate, coarse aggregate and plastic granules. The workability and density were improved by the addition of plastic granules. The compressive and split tensile strengths for the specimens were determined to find the optimum percentage of recycled polypropylene plastic (PP) granules. The test result revealed that the compressive strength increases upto 20% and tensile strength were increased by 10% compared to the normal concrete.

### KEYWORDS

Galvanized iron wire fibre, Polypropylene plastic granules, Compression, Split tensile strength

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## Biosorption Of Zinc From Industrial Wastewater Using Three Different Algal Species

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The heavy metals discharged into the water bodies are toxic to human beings and other life forms even at low concentrations. Biosorption of heavy metals using dried algal biomass can be an effective process for the removal of zinc ions from industrial wastewater. In this study, the batch removal of zinc ions from electroplating industrial wastewater using dried green algal species (*Chlorella*, *Volvox* and *Zygnema*) are investigated. The zinc uptake by biosorbents was dependent on the contact time, sorbent dosage, initial pH and the initial zinc ion concentration. Langmuir and Freundlich isotherm models were fitted with the equilibrium data. The maximum zinc removal efficiency was found to be 84.7, 79.0 and 69.8% for *Chlorella*, *Volvox* and *Zygnema*, respectively. The zinc uptakes by the three algal species were best described by the Freundlich isotherm model. This study verified the possibility of using green algal species *Chlorella*, *Volvox* and *Zygnema* as valuable biosorbent materials for the removal of zinc from industrial wastewater.

### KEYWORDS

Biosorption, Zinc(II), *Chlorella*, *Volvox*, *Zygnema*

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## Refurbishing Strategies For Fractious Nutrients Addition In A Tropical Freshwater Lake

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A multiplicity of floral and faunal species is an inimitable feature of tropical freshwater lakes. Preservation of the tropical lakes by an understanding of the process is a conservation action for numerous biotic species. Various studies reported that the accumulation of nutrients has been considered as a foremost menace of the inimitable tropical lakes due to bottom sediment and dominant biotic groups. However, the course of action is not clearly established. The study was conducted at Vellode lake, Erode district, that lies between 11°08'04.04" N and 77°03'52.42" E, South India. Characterization of water and sediment analysis was conducted to measure the seasonal changes and variations. The bird populations were surveyed with the assistance of field guides and lake managers. The correlation between the chemical features of the lake sediment and water was calculated. Correlation analysis between biodiversity indices of bird populations (independent) and water quality index (dependent) was calculated to find the impact of bird populations on the water quality of the lake. Role of bottom sediment on the hydrology of the lake, impact of bird droppings on hydrology and seasonal influence on the nutrient additions was tinted. Current research revealed that the high volume of bottom sediment and density of aquatic birds were identified as the major factors for the depletion of water eminence. Based on the annotations appropriate strategies are recommended to manage base sediment by engineering, chemical and physical methods and cultural techniques for other components responsible for the deterioration of the tropical lake quality.

### KEYWORDS

Nutrient additions, Vellode lake, Sediment, Bird density

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## A Quality Assessment Of The Drinking Water Supplied By Water Treatment Plant Of Tikrit University

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This paper was conducted to evaluate the quality of the drinking water supplied by the Tikrit University water station plant. The study was conducted in March 2019. Several physical and chemical characteristics were used for the assessment purpose. These characteristics included temperature, electrical conductivity, residual chlorine, turbidity, total precipitation, magnesium, calcium, total dissolved solids (TDS), total suspended solids (TSS) and total solids (TS). The obtained results were compared to Iraqi Standard for Drinking Water (no. 417, 2001), which showed an increase in the values of variables, especially turbidity (192 NTU) and residual chlorine. As for chlorine, it (33%) was higher than the allowed limits. The total hardness value within the allowed maximum limit ranged from 309-360 mg/L. TDS, TSS and TS were within the allowed limits. Magnesium values were within the limits. 90% of the calcium was within the normal range.

### KEYWORDS

Evaluate, Supply network, Drinking water, Turbidity, Residual chlorine

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## Use Of Regression Model For Water Parameter Prediction Of Godwar Region

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Water samples were collected from 20 stations of the Godwar region where human and animal activities were elevated. Multiple samples were analyzed for dissolved oxygen (DO), biochemical oxygen demand (BOD), chemical oxygen demand (COD), pH, total dissolved solids (TDS) and temperature (Temp.). The total data points were used to ascertain relationships between the parameters and data were also subjected to statistical analysis. First, a linear regression model was established between DO/BOD, COD/DO, BOD/COD, COD/pH, BOD/pH and DO/pH. A high to moderate correlation coefficient was observed as  $R^2$  ranged from 0.889 to 0.034 for these parameters. Then a multivariate linear regression model was setup for BOD and COD as dependent variables and DO, Temp., TDS and pH as four independent variables. The performance of the multivariate linear regression model was justified with statistical variables like average square root error (ASRE) and universal efficiency (UE). The predicted value of BOD and COD by model and regression analysis was in close agreement with their respective measured value. It was found that the pH parameter has more effect on BOD and COD as compared to predicting another parameter. ASRE was 37.8 mg/L for BOD prediction and 79.6 mg/L for COD prediction in a multivariate linear regression model.

### KEYWORDS

Biological oxygen demand, Dissolved oxygen, Chemical oxygen demand, pH, Total dissolved solids, Temperature, Linear regression, Multivariate linear regression model

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## A Review On Fluoride Concentration In Groundwater From Industrial Cluster - Hard Rock Aquifers Of Tiruppur Taluk

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The intent of the present study is to comprehend the geochemical processes of fluorides in groundwater from Tiruppur taluk of Tiruppur district, Tamil Nadu, India. Geologically, the region has base rocks of Archaean group of charnockite, hornblende biotite gneiss, pink granite, anorthosite and amphibolites. Outstanding fluorides ( $F^-$ ) in groundwater were observed in semi-arid of hard rock areas. This study result posits the groundwater is characterized by sodium ( $Na^+$ ): bicarbonate ( $HCO_3^-$ ) facies. The fluorides of study environ vary from 0.12-2.34 mg/L with an average of 1.2 mg/L. Since the total samples collected 30% of fluoride indicates fluoride concentration surpasses the maximum allowable limit of 1.5 mg/L. This study suggests spatial variation noticed in fluoride substance emerge due to fluoride bearing minerals, grade of weathering of rocks, contact interval of aquifer material with water and the related geochemical process. A correlation attempted has been made between the fluoride concentrations with water type, the relationship of fluoride with  $HCO_3^-$ , fluoride with  $Na^+$  and pH (parts of hydrogen) were studied and proves that  $HCO_3^-$  has a better correlation with fluoride than the other parameters. The weathering of rocks causes the release of  $Na^+$  and  $HCO_3^-$  ions, which controls the water chemistry by strong acid by intensive ion exchange. Hence this correlation reveals  $Na^+$ ,  $Cl^-$  (chloride) and  $Mg^{2+}$  (magnesium) ions play a vital role in controlling water chemistry of this area.

### KEYWORDS

Fluorides, Hard rock, Spatial distribution, Correlation, Tiruppur taluk, Tamil Nadu

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