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The Influence of Tide on Distribution of Pollutants from Outfalls of River Ganga in West Bengal, India

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ABSTRACT

The tidal nature of River Ganga has an influence on distributing contamination of pollutants releasing into the river. Through the outfalls which are directly connected to the river Ganga alongside of its bank. Dakhineswar which is very famous for Kali Temple and pilgrimage activity, has been selected for this study. Dakhineswar canal (N22°39'08.75" E088°21'27.60") which is situated just next to Dakhineswar Ghat is chosen for this study. The distance wise changes of water quality parameters (WQP) like pH, Temperature, DO, BOD, Hardness, Conductivity, Nitrate Nitrogen, Phosphate, Chloride are analyzed at different sampling points from the outfall considering its position. Another attempt is made to measure the discharge by Hydrographic Survey of River Ganga at Dakhineswar by the instrument called ADCP (Acoustic Doppler current profiler). The ultimate concentration of water quality parameters (WQP) of a mixture of main stream water and wastewater are estimated by using Plug flow model. All the measured values have been verified with the Model also. The influence of tide is assessed by using GIS tool. The concentration of two major parameter like DO and BOD have been used to generate seasonal map during low tide and high tide period and compared. Low tide and high tide data clearly depict high concentration during low tide period but the effect of high tide keeps the level more of less same with distances. During monsoon, the concentration remains stable throughout the stretches on Ganga in all three directions (Across the river from the outfalls, diagonally from the outfall and along the bank from the outfall). The changes are more prominent during premonsoon. The kind of GIS based mapping has given support by many workers as well.

Keywords: Acoustic Doppler current profiler; GIS; Plug flow model.

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Adsorption of Methylene blue dye from aqueous solution using Husk of *Lathyrus sativus* and its modified forms

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ABSTRACT

Husk of *Lathyrus sativus* (particle size 500-300 μm) has been established to be a promising low cost biosorbent for removal of methylene blue dye from aqueous solution. Batch study is conducted in the laboratory to remove toxic methylene blue dye more than 99 percent using untreated and acid treated husk (treatment with 1 N H2SO4 and 1 N H3PO4 separately). Optimisation of adsorption process has been done by varying physico-chemical parameters like dye concentration, solution pH, contact time and temperature. Adsorption process is favourable for untreated and H2SO4 treated husk at pH 4 and pH 6 respectively, where as a wide range of pH favours adsorption process for H3PO4 treated husk. Initial dye concentration has been chosen as 50 mg/L for initial pH, adsorption kinetics and adsorption doses study, where as adsorption is conducted for adsorption isotherm experiments with methylene blue dye solution (25-500 mg/L) at 300C,400C and 500C respectively. Adsorption capacity as well as removal percentage is increased with acid treated husk. Adsorption process is very fast and it reaches close to equilibrium within 60 min. Percentage of removal is increased with elevated temperature, where as it is decreased with higher concentration of methylene blue dye. Adsorption isotherm data are well fitted in the Langmuir, Freundlich and Temkin isotherm model with high correlation coefficients using untreated and acid treated biosorbents. Adsorption kinetics data are best fitted in the Pseudo second-order kinetic model with highest correlation coefficients (r2 = 0.9999-1). Rate limiting step determines that both film diffusion and intraparticle diffusion involves in adsorption process. Modified forms of husk of Lathyrus sativus removes methylene blue dye better than untreated forms. Recovery of methylene blue dye is performed using diluted glacial acetic acid, lactic acid and methanol from dye loaded biomass. Dilute glacial acetic acid becomes the most potent desorbing agent to recover methylene blue dye.

Keywords: Adsorption, Methylene blue dye removal, Husk of Lathyrus sativus, Acid treatment, Desorption

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Safranin dye adsorption from aqueous medium by various forms of coconut coir: isotherm, kinetics and regeneration studies

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ABSTRACT

Safranin is a cationic dye that is widely used in textile industry to colour its own products, staining and food processing. Instead of its wide application, sometimes this dye shows toxicity, mutagenicity as well as carcinogenicity. Safranin dye is very hard to biodegradable due to its structural complexity and stability. Biosorption technique is a promising alternative method instead of conventional physical and chemical methods to remove safranin dye from aqueous medium.

Coconut coir (*Cocos nucifera* L.), particle size 850-300 µm, has been identified as a potent biosorbent for removal of safranin dye from aqueous solution. Adsorption efficiency is improved with sulphuric acid and phosphoric acid treatment of coconut coir to remove more than 99 percent dye from aqueous solution. Adsorption process is optimized by analysing effects of physico-chemical conditions like initial pH, initial adsorbate concentration, incubation time, adsorbent doses and adsorption isotherm at different temperatures. Adsorption process is optimum at pH 4 for untreated coconut coir, where as a wide range of pH favours adsorption process for acid treated coconut coir. Initial dye concentration is selected as 50 mg/L for effect of pH, kinetics study and adsorption doses study, where as adsorption isotherm study is conducted between 25 mg/L and 500 mg/L for 3hr of contact time in a thermostatic shaker with a rotation speed of 100-115 strokes/minutes at 300C, 400C and 500C for untreated and acid treated adsorbents. Equilibrium isotherm indicates that the adsorption process follows both Langmuir and Freundlich isotherm models. Adsorption process is initially rapid and it reaches equilibrium within 1hr following pseudo-second order rate kinetics. Removal percentage is greater at higher temperature that indicates the endothermic and spontaneous condition for adsorption process. Removal percentage as well as adsorption capacity are enhanced by using acid treated coconut coir than untreated coconut coir. Regeneration of safranin dye is performed from dye-loaded biomass using three potent desorbents such as glacial acetic acid, methanol and ethanol. Among these desorbing agents, glacial acetic acid becomes the most potent agent to recover safranin dye.

Keywords: Adsorption, Safranin dye removal, Coconut coir, Sulfuric acid treatment, Phosphoric acid treatment, Regeneration

CP-65 Assessment of Farmers Perception Towards Soil Erosion Problem and SWC Measures: The Case of Chambal Basin

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Soil erosion by water is a severe threat and continuous ecological problem in the Chambal basin of Morena District. Soil is a finite natural resource, Serious soil loss due to erosion leads to gullies & ravines formation & causing land degradation in the district. This severe topsoil loss further leading to decline in the agricultural productivity of the soil of the study area. The research study focusses on the farmers perception towards the factors responsible for the problem of soil erosion and ravines formation in Chambal basin and to determine farmers knowledge & willingness towards adaptation of soil & water conservation measures on their farmlands in the district. The study of farmers perception assessment has been carried out through primary questionnaire surveys of a sample size of ninety farmer households & six focus group discussions through primary site visit in five selected villages (Khurd, Lahar, Esah, Jakhona, Hargawan). For detailed study and perception survey analysis on micro level a cluster of sixteen Micro-watershed has been delineated from the selected villages based on different drainage basins of three rivers Chambal, Kwari & Asan which were accelerating soil erosion & ravine formation in the district. Collected data were analysed through descriptive and qualitative methods using various tools and techniques and Spatial-temporal changes in ravine area has been analysed through Land use/ Landcover (LULC) analysis using Arc-GIS tools. The study concluded that the identified soil erosion & ravine issues were related to the lack of farmers participatory approach. Thus, understanding of constraints that impact farmer's perception is very vital while planning and implementing Soil & water conservation measures while adopting these technological measures.

Keywords: Soil Erosion, Soil & water conservation (SWC), Farmer's Perception

CP-66 Tidal Influence on Distribution of Pollutants from Outfalls of River Ganga In West Bengal, India

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The tidal nature of River Ganga has an influence on distributing contamination of pollutants releasing into the river. Through the outfalls which are directly connected to the river Ganga alongside of its bank. Dakhineswar which is very famous for Kali Temple and pilgrimage activity, has been selected for this study. Dakhineswar canal (N22°39'08.75'' E088°21'27.60'') which is situated just next to Dakhineswar Ghat is chosen for this study. The distance wise changes of water quality parameters (WQP) like pH, Temperature, DO, BOD, Hardness, Conductivity, Nitrate Nitrogen, Phosphate, Chloride are analyzed at different sampling points from the outfall

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CP-36 Biosorption of Safranin – O Dye from Aqueous Solution using Coconut Coir and its Acid Treated Forms

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Safranin- O dye is widely used in textile industry for colouring its own products as well as staining and food processing units. Instead of its wide application, this dye may show toxicity, mutagenicity as well as carcinogenicity. It is very hard to biodegradable for its structural complexity and stability. Biosorption technique is a promising alternative method instead of conventional physical and chemical methods to remove safranin dye from aqueous solution.

Coconut coir (particle size 300-850 μm) has been found as a potent low cost easily available biosorbent for removal of safranin dye from aqueous solution. Coconut coir is further treated with 1 N H_2SO_4 and 1 N H_3PO_4 separately for improvement of adsorption efficiency. Batch study is conducted in the laboratory as pilot scale to investigate potentiality of untreated and acid treated biosorbent for adsorption process that assures a management tool of water pollution from toxic safranin dye. Adsorption process is optimized by analysing effects of physico-chemical conditions like initial pH, initial adsorbate concentration, incubation time, adsorbent doses and adsorption isotherm at different temperatures. Adsorption process is optimum at pH 4 for untreated coconut coir, where as a wide range of pH favours adsorption process for acid treated coconut coir. Initial dye concentration is selected as 50 mg/L for this study and more than 99% dye is removed within 60 min of contact time in a thermostatic shaker with a rotation speed of 100-115 strokes/minutes at 300C for untreated and acid treated adsorbents. Adsorption isotherm data shows that removal percentage is greater at higher temperature. Equilibrium isotherm indicates that the adsorption process follows both Langmuir and Freundlich isotherm models. Adsorption process is initially rapid and it reaches equilibrium within 1hr following pseudo-second order rate kinetics. Removal percentage as well as adsorption capacity are enhanced by using acid treated coconut coir than untreated coconut coir. Regeneration of safranin dye is performed from dye-loaded biomass using three potent desorbents such as glacial acetic acid, methanol and ethanol. Among these desorbing agents, glacial acetic acid becomes the most potent agent to recover safranin dye.

Keywords: Biosorption, Safranin-O dye, Removal, Coconut coir, Acid treatment, Regeneration.