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Foreword



Assalamualaikum Warahmatullahi Wabarakatuh and greeting of peace

The establishment of South East Asia Sustainability Network (SEASN) has provided a platform to support higher education institutions and other related sustainability organisations in South East Asian countries for exchanging ideas, findings, information, and good practices in teaching, research, community engagement and institutional arrangement that relate to their work. In order to expedite this process the SEASN Secretariat at Universiti Sains Malaysia has taken the initiative to publish a compendium entitled '*A Selected Compendium of SEASN Members' Research Publications on WEHAB+3*', in order to share information and best practices in sustainability studies.



This publication will be a medium to exchange research findings in sustainability and to promote sustainability at the global level for the benefit of the wider community of higher educational institutions.

The focus of this book is on the sectors, Water, Energy, Health, Agriculture, Biodiversity (WEHAB); and cross-sectors, Climate Change and Disaster Risk Management, Consumption and Production, and Population and Poverty; collectively represented as WEHAB+3. The full coverage is expected to contain eight volumes, starting with Water (W) and followed by the rest in the WEHAB+3 areas in that order. Incidentally, WEHAB was launched at the World Summit on Sustainable Development by Kofi Annan in 2002 as a priority set of sectors for sustainability implementation. When we add the three cross sectoral issues, the approach becomes very comprehensive and a broad treatment WEHAB+3 would cover almost all major sustainability challenges.

In this sense, the current compendium will help promote better understanding of sustainable management of Water and create knowledge societies that ensure improved quality of life for the present and future generations.

I would like to extend my deepest appreciation and gratitude to all the contributors, authors and editors for their hard work in materializing this compendium. The dedication and tireless efforts of the CGSS staff for the success of the compendium is fully recognized and acknowledged.

Professor Dato' Dr. Omar Osman

**Chairman
South East Asia Sustainability Network (SEASN)**



Preface

Assalamualaikum Warahmatullahi Wabarakatuh and greeting of peace

The South East Asia Sustainability Network (SEASN) is an alliance of higher education institutions and other related sustainability institution in South East Asian countries committed to promote, engage and integrate sustainability in their mission areas in a systematic way. In this regards, '*A Selected Compendium of SEASN Members' Research Publications on WEHAB+3*' and is in line with the vision and objectives of SEASN.



This book is seen mainly as a means to build a platform for the sharing of research findings in the form of abstracts of published papers. Our survey has revealed that there is enough scope for eight volumes of valuable information that has already been published in the eight areas of WEHAB+3. We have selected the abstract, including reference details, in the hope that it will make life easier for prospective researchers to focus on critical sustainability issues that matter most to their respective countries or the global community at large.

In compiling the abstracts we are mindful of the Intellectual Property Rights of original authors, and in properly acknowledging them CGSS declares that we do not make any claim on IP issues whatsoever.

We do hope that this effort will provide a tangible and inspiring example of publication to address sustainability challenges quickly and more cost effectively. It is also hoped that this book will contribute towards development and progress that is best for the environment, individuals and the economy without compromising the ability of future generations to meet their needs and ultimately ensuring a sustainable future for all.

Professor Dr. Kamarulazizi Ibrahim

**Secretary
South East Asia Sustainability Network (SEASN)**

Introduction



Presenting sobering statistics, the United Nations Secretary-General Ban Ki-moon urged the World Water Summit in Budapest, October 2013, to take firm steps to promote sustainable water management across the world because “By 2030 nearly half the global population could be facing water scarcity” and “demand could outstrip supply by 40%.” The same sentiment is expressed by Secretary Clinton during her World Water Day Speech, March 22, 2010, “It’s not every day you find an issue where effective diplomacy and development will allow you to save millions of lives, feed the hungry, empower women, advance our national security interests, protect the environment, and demonstrate to billions of people that the United States cares, cares about you and your welfare. Water is that issue”.

According to World Health Organization, more than 1 billion people are without safe drinking water. Twice that number lack adequate sanitation. And more than 3 million people die every year from diseases caused by unsafe water. Unless we take swift and decisive action, by 2025 as much as two thirds of the world’s population may be living in countries that face serious water shortage. We need to improve access. We need to improve the efficiency of water use, for example by getting more “crop per drop” in agriculture, which is the largest consumer of water. And we need better watershed management, and to reduce leakage, especially in the many cities where water losses are an astonishing 40 percent or more of total water supplied. The need for a multi-sectoral, people-centered, integrated water resource management approach, and the importance of regional management of major water resources, access to clean water, the linkage between sanitation and poverty reduction, capacity-building and awareness programs, and appropriate pricing based on end-users’ financial resources are critical issues in sustainable water management.

Clean water supply can be ranked a great success in Malaysia, as 98 per cent of urban and 87 per cent of rural populations are now served with clean piped water. There are still challenges, though, of water pollution in some districts, mainly attributable to opening up of land for housing development, rural development (especially large-scale land settlement schemes), active logging & mining activities, and general infrastructure development.

This book entitled *A Selected Compendium of SEASN Members’ Research Publications on WEHAB+3* consists of compilation of abstract of SEASN’s sustainability research output and the resulting publications from member of South East Asia Sustainability Network (SEASN)



which includes of South East Asia higher education institutions, other related sustainability organisations, agencies, NGOs and industries in South East Asia countries with an interest in sustainability. This book aims to share information and best practices in sustainability studies, to exchange ideas, concepts and research findings in sustainability and to promote sustainability at the global level for the benefit of the wider higher educational community. The first book published will focus on sustainability research on Water (W) and this will be followed by books on sustainability research on Energy (E), Health (H), Agriculture (A), Biodiversity (B) as well as three major cross-sectoral areas, which include Climate Change and Disaster Risk Management (CC+DRM), Production and Consumption (PC) and Population and Poverty (PP) which is called as WEHAB+3.

This first book is compendium which combines knowledge on Water in the form of abstracts of published articles by many primary authors belonging to institutions that are members of SEASN. Direct submission by authors and from Sciencedirect, Scopus and Thomson Reuters ISI sources provided the materials for this publication. It is hoped that this book will provide a quick and relatively easy to understand overview regarding sustainability research output on Water. Thus, the book will be a great boost to knowledge on water both for researchers and policy makers alike.



1.0

Chulalongkorn University, Thailand

1.1

Separation and Purification Technology, Volume 83, 15 November 2011, Pages 100-105

Effect of operating parameters on the decolorization and oxidation of textile wastewater by the fluidized-bed Fenton process

Chia-Chi Su, Massakul Pukdee-Asa, Chavalit Ratanatamskul, Ming-Chun Lu

This study investigated the treatment of textile industrial wastewater from a dyeing and finishing mill by the fluidized-bed Fenton process. Operating variables, such as the pH, concentrations of H_2O_2 and Fe^{2+} , are used to explore the respective effects on the oxidation and decolorization of the textile wastewater. The experimental results were estimated in terms of chemical oxygen demand (COD) and color reductions to examine the treatment efficiency. The optimum pH was observed to be around 3. The decolorization and the oxidation efficiencies could achieve 92% and 49%, respectively, in only 2 min of reaction under the concentration ratio of $[COD]:[Fe^{2+}]:[H_2O_2] = 1:0.95:3.17$. By using this process, the oxidation of textile wastewater increased with increasing H_2O_2 dosage. The highest level of oxidation was 87%.

Keywords

The treatment of real textile wastewater was explored by fluidized-bed Fenton process; this process provides a high COD removal efficiency and also reduces the amount of iron sludge; the decolorization and oxidation efficiency in 2 min were 92% and 49%, respectively.



1.2 Journal of Environmental Management, Volume 113, 30 December 2012, Pages 399-406

Treatment of wastewater from pulp and paper mill industry by electrochemical methods in membrane reactor

Kanjana Chanworrawoot, Mali Hunsom

The treatment of wastewater from a pulp and paper mill plant using electrochemical methods was performed at a laboratory bench-scale at ambient temperature ($\sim 30^{\circ}\text{C}$). The effects of wastewater dilution (10- to 100-fold), circulating water flow rate (0–3.95 l/min), current density (1.90–3.80 mA/cm²) and sodium chloride concentration (0–3.75 g/l) were ascertained. The results demonstrated that this methods can facilitate the disappearance of the oxidative coupling unit of lignin as well as other organic and inorganic compounds, measured in terms of the removal of color, total biological- and total chemical oxygen demand (BOD and COD), and the total suspended and dissolved solids (TSS and TSD). In addition, the electrochemical method was more effective at reducing the pollutant levels, produced a smaller quantity of low-density sludge and had a low operating cost per unit quantity of COD. After optimization, the electrochemical method operating in a batch mode enhanced the removal of color, BOD and COD at around 98%, 98% and 97%, respectively, whilst in a continuous mode at the steady state condition (8 h after the start-up time) the color, BOD and COD levels were reduced by around 91%, 83% and 86%, respectively.

Keywords

A study of electrochemical wastewater treatments was carried out in membrane reactor; Greater than 98% of color, 98% of BOD, and 97% of COD were removed by electrochemical method; the continuous mode was more effective at treating wastewater at a low feed rate.



1.3 **Journal of Environmental Management, Volume 92, Issue 10, October 2011, Pages 2454-2460**

Remediation of biodiesel wastewater by chemical and electro-coagulation: A comparative study

Krit Ngamlerdpokin, Sasipan Kumjadpai, Preeya Chatanon, Ungsika Tungmanee, Sulalit Chuenchuanom, Pattaraluk Jaruwat, Prarinya Lertsathitphongs, Mali Hunsom

The remediation of biodiesel wastewater was carried out using chemical and electrochemical techniques. Initially the fatty acid methyl esters (FAME or biodiesel) and free fatty acids (FFA) were chemically removed from the wastewater using three types of mineral acids, H_2SO_4 , HNO_3 and HCl , at different pH values within the range of 1.0–8.0. Optimally, approximately 24.3 ml/l of FAME/FFA were removed from the wastewater when using H_2SO_4 to set a final pH of 2.5 for 7 min. All pollutant levels were markedly reduced during this step. That is, approximately 38.94%, 76.32% and 99.36% of COD, BOD₅ and oil & grease were respectively removed. The acidic aqueous phase left after the removal of the FAME/FFA phase was then treated by chemical- and electro-coagulation processes. The results demonstrated that both investigated treatment processes were effective for treating wastewater from a biodiesel production plant. The chemical coagulation provided a lower operating cost (1.11 USD/m³) compared with the electro-coagulation process (1.78 USD/m³). However, the latter process provided a better quality of wastewater compared with the former process, with the exception of the BOD levels.

Keywords

We use acid protonation and treatment to remediate biodiesel wastewater; 24.3 ml/l of FAME / FFA were removed when using H_2SO_4 to set a final pH of 2.5 for 7 min; The chemical coagulation provided lower operating cost than that of electro-coagulation process; A better quality of wastewater was obtained by using the electro-coagulation process, except BOD.



1.4 Journal of Hazardous Materials, Volumes 213–214, 30 April 2012, Pages 466-473

Airlift bioreactor containing chitosan-immobilized *Sphingobium* sp. P2 for treatment of lubricants in wastewater

Nichakorn Khondee, Sitti Tathong, Onruthai Pinyakong, Sorawit Powtongsook, Thawach Chatchupong, Chalermchai Ruangchainikom, Ekawan Luepromchai

An internal loop airlift bioreactor containing chitosan-immobilized *Sphingobium* sp. P2 was applied for the removal of automotive lubricants from emulsified wastewater. The chitosan-immobilized bacteria had higher lubricant removal efficiency than free and killed-immobilized cells because they were able to sorp and degrade the lubricants simultaneously. In a semi-continuous batch experiment, the immobilized bacteria were able to remove 80–90% of the 200 mg L⁻¹ total petroleum hydrocarbons (TPH) from both synthetic and carwash wastewater. The internal loop airlift bioreactor, containing 4 g L⁻¹ immobilized bacteria, was later designed and operated at 2.0 h HRT (hydraulic retention time) for over 70 days. At a steady state, the reactor continuously removed 85 ± 5% TPH and 73 ± 11% chemical oxygen demand (COD) from the carwash wastewater with 25–200 mg L⁻¹ amended lubricant. The internal loop airlift reactor's simple operation and high stability demonstrate its high potential for use in treating lubricants in emulsified wastewater from carwashes and other industries.

Keywords

Sphingobium sp. P2 effectively degraded various lubricant samples; Efficiency of *Sphingobium* sp. P2 increased after immobilization on chitosan; High removal efficiency was due to both sorption and degradation processes; The immobilized bacteria (4 g L⁻¹) were applied in internal loop airlift bioreactor; The bioreactor continuously removed lubricant from emulsified wastewater.



1.5 Separation and Purification Technology, Volume 116, 15 September 2013, Pages 405-414

Enantioseparation of (S)-amlodipine from pharmaceutical industry wastewater by stripping phase recovery via HFSLM: Polarity of diluent and membrane stability investigation

Niti Sunsandee, Prakorn Ramakul, Ura Pancharoen, Natchanun Leepipatpiboon

Pharmaceutical wastewater may contain high-value pharmaceutically active compounds such as amlodipine. A hollow-fiber supported liquid membrane (HFSLM) process was developed and applied in the pretreatment of pharmaceutical wastewater for (S)-amlodipine recovery. The HFSLM system contained O,O'-dibenzoyl-(2S,3S)-tartaric acid ((+)-DBTA) in the liquid membrane phase and β -cyclodextrin in the stripping phase. The effects of various chemical parameters, including the concentration of the chiral selector in the stripping phase, as well as the type of organic diluent and the carrier concentration in the membrane, were also investigated. Several diluents – hexane, 1-decanol, chlorobenzene, benzene, dichloromethane, ethylene dichloride, and chloroform – with different polarity indexes, from 0.1 to 4.1, were used. The results found that the polarity of the diluents was the main factor influencing the extraction performance and stability of the liquid membrane. Decreasing the polarity of the diluent could prolong membrane stability, but the percentages of extraction and stripping decreased as well. The longest lifetime (150 min) was obtained by using 1-decanol, with a polarity index of 1.8, as a diluent.



1.6 Colloids and Surfaces A: Physicochemical and Engineering Aspects, Volume 384, Issues 1–3, 5 July 2011, Pages 519-528

Photocatalytic degradation of mixed azo dyes in aqueous wastewater using mesoporous-assembled TiO₂ nanocrystal synthesized by a modified sol-gel process

Patladda Wongkalasin, Sumaeth Chavadej, Thammanoon Sreethawong

In this work, several operational parameters affecting the photocatalytic degradation of mixtures of two azo dyes – Acid Yellow (AY) monoazo dye and Acid Black (AB) diazo dye – including types of dye, initial dye concentration, photocatalyst dosage, dissolved oxygen, initial solution pH, and water hardness concentration, were investigated by using a mesoporous-assembled TiO₂ nanocrystal photocatalyst. The experimental results showed that the initial concentration of both azo dyes in the dye mixture greatly affected the degradation efficiency. It was interestingly found that the degradation efficiency of one azo dye could be improved by the presence of the other with suitable concentrations. At AY and AB concentrations of 2.5 and 5 mg/l, the optimum conditions for the highest degradation efficiency of both azo dyes were a photocatalyst dosage of 10 g/l, a dissolved oxygen of 7.5 mg/l, and an initial solution pH of 4.5. Moreover, even though water hardness negatively affected the degradation efficiency, the pH adjustment could be applied for enhancing the degradation of the dyes present in the extremely hard solution.



1.7 Bioresource Technology, Volume 102, Issue 9, May 2011, Pages 5381-5388

Removal of pollutants and reduction of bio-toxicity in a full scale chemical coagulation and reverse osmosis leachate treatment system

S. Theepharaksapan, C. Chiemchaisri, W. Chiemchaisri, K. Yamamoto

Removals of pollutants and toxic organic compounds and reduction in bio-toxicity of leachate along an operating full-scale leachate treatment system utilizing chemical coagulation, sand filtration, microfiltration (MF) and reverse osmosis (RO) membrane were evaluated. High pollutant removals were achieved mainly by coagulation and sand filtration. Major toxic organic pollutants, i.e. DEHP, DBP and bisphenol A were removed by 100%, 99.6% and 98.0%. Acute toxicity test using water flea, Nile Tilapia and common carp and genotoxicity (Comet assay) were conducted to determine toxicity reduction in leachate along the treatment. Ammonia was found to be the main acute toxic compounds in leachate as determined by LC50 but the effect of organic substances was also observed. DNA damage in fish exposed to diluted raw leachate (10% of LC50) was found to be 8.9–24.3% and it was subsequently decreased along the treatment. Correlation between pollutants and its bio-toxicity was established using multivariable analyses.



1.8 APCBEE Procedia, Volume 3, 2012, Pages 60-64

Equilibrium and Kinetic Studies of Biosorption of Zn(II) Ions from Wastewater Using Modified Corn Cob

Achanai Buasri, Nattawut Chaiyut, Kessarinn Tapang, Supparoeek Jaroensin,
Sutheera Panphrom

The objective of this study was to convert corn cob to heavy metal ion biosorbent for wastewater treatment. Corn cob was modified with phosphoric acid (PA) to help improve their natural biosorption capacity. The influence of various parameters such as initial solution concentration, initial biomass concentration and temperature on biosorption potential of agricultural waste material was studied in detail. The adsorption equilibrium data were adequately characterized by Langmuir, Freundlich and Temkin equations. The equilibrium biosorption isotherms showed that modified corn cob possess high affinity, with sorption capacities of 79.21 mg Zn(II) per 1 g biomass. Analysis indicated that pseudo-second-order kinetics controlled the adsorption rate. All results showed that corn cob is an alternative low cost biosorbent for removal of heavy metal ions from aqueous media.



1.9 Bioresource Technology, Volume 102, Issue 4, February 2011, Pages 3694-3701

Abundance of amoA genes of ammonia-oxidizing archaea and bacteria in activated sludge of full-scale wastewater treatment plants

Tawan Limpiyakorn, Puntipar Sonthiphand, Chaiwat Rongsayamanont,
Chongrak Polprasert

In this study, the abundance and sequences of amoA genes of ammonia-oxidizing archaea (AOA) and bacteria (AOB) were determined in seven wastewater treatment plants (WWTPs) whose ammonium concentrations in influent and effluent wastewaters varied considerably ($5.6\text{--}422.3\text{ mgN l}^{-1}$ and $0.2\text{--}29.2\text{ mgN l}^{-1}$, respectively). Quantitative real-time PCR showed that the comparative abundance of AOA and AOB amoA genes differed among the WWTPs. In all three industrial WWTPs, where the influent and effluent contained the higher levels of ammonium ($36.1\text{--}422.3\text{ mgN l}^{-1}$ and $5.3\text{--}29.2\text{ mgN l}^{-1}$, respectively), more than four orders of magnitude higher numbers of AOB amoA genes than AOA amoA genes arose (with less than the limit of detection of AOA amoA genes). In contrast, significant numbers of AOA amoA genes occurred in all municipal WWTPs (with ammonium levels in the influent and effluent of $5.6\text{--}11.0\text{ mgN l}^{-1}$ and $0.2\text{--}3.0\text{ mgN l}^{-1}$, respectively). Statistical analysis suggested that compared to other plants' parameters, the ammonium levels in the plants' effluent showed correlation with the highest p value to the abundance of AOA amoA genes.



1.10 Journal of Hazardous Materials, Volume 186, Issue 1, 15 February 2011, Pages 502- 507

Removal of heavy metal ions by iron oxide coated sewage sludge

Thapanapong Phuengprasop, Jarinya Sittiwong, Fuangfa Unob

The municipal sewage sludge was modified with iron oxide employed in metal ions removal. The surface modification method was proposed and the effect of parameters in the preparation was studied. The iron oxide coated sludge had higher surface area, pore volume and iron content, compared to uncoated sludge. The suitable conditions for removal of Cu(II), Cd(II), Ni(II) and Pb(II) ions from solutions were investigated using batch method. The suitable pH value in the extraction was 7 for adsorption of Cd(II) and Ni(II), 6 for Cu(II) and 5 for Pb(II) ions. The presence of NaNO_3 , $\text{Ca}(\text{NO}_3)_2$ and Na_2SO_4 in metal solution in the concentration of 0.01 M and 0.50 M could reduce the removal efficiency. The adsorption isotherms for the adsorption of the metal ions were defined by Langmuir relation. The maximum adsorption capacity of the iron oxide coated sludge for Cu(II), Cd(II), Ni(II) and Pb(II) was 17.3, 14.7, 7.8 and 42.4 mg g^{-1} , respectively. The adsorption kinetics for every metal ions followed pseudo-second order model. The metal removal from wastewater by iron oxide coated sludge was also demonstrated.



1.11

Separation and Purification Technology, Volume 77, Issue 3, 4 March 2011, Pages 382-388

Deterministic model of open-space dust removal system using water spray nozzle: Effects of polydispersity of water droplet and dust particle

Tawatchi Charinpanitkul, Wiwut Tanthapanichakoon

A deterministic model to predict the inertia-interceptional dust removal efficiency of open-space water spraying is developed based on momentum and mass balances of water droplets and dust particles. The effect of polydisperse dust particles and water droplets generated by different nozzles on the total removal efficiency (η_{total}) is examined. The small water droplets with narrower distribution could provide the acceptable removal of dust particles while the relatively large dust particles also provide the large η_{total} value. The η_{total} predicted by the developed model is in the range of 19.6–23.8% with a relative error of 2% when compared with the measuring data. The η_{total} with the use of polydispersity of water droplets and dust particles is more accurate than that with the use of average size of water droplets and dust particles.

Keywords

We developed a deterministic model to predict the inertia-interceptional dust removal efficiency of open-space water spraying; The effect of polydisperse dust particles and water droplets generated by different nozzles on the total removal efficiency is examined; The total removal efficiency predicted by the developed model is in the range of 19.6 to 23.8% with a relative error of 2% when compared with the measuring data.



1.12

Chinese Journal of Chemical Engineering, Volume 19, Issue 1, February 2011, Pages 76-82

Adsorption and Ozonation Kinetic Model for Phenolic Wastewater Treatment

Wongsarivej Pratarn, Tongprem Pornsiri, Swasdisevi Thanit,
Charinpanitkul Tawatchai, Tanthapanichakoon Wiwut

A three phase fluidized bed reactor was used to investigate the combined effect of adsorption and oxidation for phenolic wastewater treatment. Aqueous solutions containing $10 \text{ mg} \cdot \text{L}^{-1}$ of phenol and ozone were continuously fed co-currently as upward flow into the reactor at constant flow rate of 2 and $1 \text{ L} \cdot \text{min}^{-1}$, respectively. The phenolic treatment results in seven cases were compared: (a) O_3 only, (b) fresh granular activated carbon (GAC), (c) 1st reused GAC, (d) 2nd reused GAC, (e) fresh GAC enhanced with O_3 , (f) 1st reused GAC enhanced with O_3 , and (g) 2nd reused GAC enhanced with O_3 . The phenolic wastewater was re-circulated through the reactor and its concentration was measured with respect to time. The experimental results revealed that the phenolic degradation using GAC enhanced with O_3 provided the best result. The effect of adsorption by activated carbon was stronger than the effect of oxidation by ozone. Fresh GAC could adsorb phenol better than reused GAC. All cases of adsorption on GAC followed the Langmuir isotherm and displayed pseudo second order adsorption kinetics. Finally, a differential equation for the fluidized bed reactor model was used to describe the phenol concentration with respect to time for GAC enhanced with O_3 . The calculated results agree reasonably well with the experimental results.



1.13

Journal of Environmental Sciences, Volume 25, Issue 8, 1 August 2013, Pages 1557-1564

Optimization and evaluation of a bottom substrate denitrification tank for nitrate removal from a recirculating aquaculture system

Wiboonluk Pungrasmi, Cholticha Playchoom, Sorawit Powtongsook

A bottom substrate denitrification tank for a recirculating aquaculture system was developed. The laboratory scale denitrification tank was an 8 L tank (0.04 m² tank surface area), packed to a depth of 5 cm with a bottom substrate for natural denitrifying bacteria. An aquarium pump was used for gentle water mixing in the tank; the dissolved oxygen in the water was maintained in aerobic conditions (e.g. > 2 mg/L) while anoxic conditions predominated only at the bottom substrate layer. The results showed that, among the four substrates tested (soil, sand, pumice stone and vermiculite), pumice was the most preferable material. Comparing carbon supplementation using methanol and molasses, methanol was chosen as the carbon source because it provided a higher denitrification rate than molasses. When methanol was applied at the optimal COD:N ratio of 5:1, a nitrate removal rate of 4591 ± 133 mg-N/m² tank bottom area/day was achieved. Finally, nitrate removal using an 80 L denitrification tank was evaluated with a 610 L recirculating tilapia culture system. Nitrate treatment was performed by batch transferring high nitrate water from the nitrification tank into the denitrification tank and mixing with methanol at a COD:N ratio of 5:1. The results from five batches of nitrate treatment revealed that nitrate was successfully removed from water without the accumulation of nitrite and ammonia. The average nitrate removal efficiency was 85.17% and the average denitrification rate of the denitrification tank was 6311 ± 945 mg-N/m² tank bottom area/day or 126 ± 18 mg-N/L of pumice packing volume/day.



1.14 Journal of Asian Earth Sciences, Volume 61, 15 November 2012, Pages 62-77

Identification of an anastomosing river system in the Early Cretaceous Khorat Basin, northeastern Thailand, using stratigraphy and paleosols

Yu Horiuchi, Punya Charusiri, Ken-ichiro Hisada

The Phu Kradung and Phra Wihan formations of the Early Cretaceous Khorat Group were investigated to characterize the depositional system and paleoclimate, based on stratigraphy, paleosol features, paleosol profiles, and reworked deposits. The sediments of both formations are classified into 12 facies on the basis of their primary depositional attributes, such as bedding, grain size, texture, and sedimentary structures. Furthermore, these facies are grouped into eight architectural elements based on stratigraphic relationships and outcrop-scale macroforms. The proportions of each architectural element indicate that the depositional system was that of an anastomosing river. The anastomosing river system in the studied section is characterized by a high rate of vertical floodplain aggradation and the development of a relatively stable crevasse channel. Paleosols are developed mainly in floodplain deposits, and are characterized by the development of calcretes. A semi-arid to sub-humid paleoclimate is deduced from the occurrence of the calcretes. In addition, their microstructures suggest that these calcretes were formed under several different conditions, with micritic carbonate precipitating under relatively arid climates, and alveolar septal structures under semi-arid to sub-humid conditions. Using the thicknesses of the calcrete horizons, we conclude that the difference in the amount of precipitation between the wet and dry periods was highly variable, without any order, during deposition of the studied section. The thicknesses of intervals between successive calcrete horizons indicate that the inflow of fine materials occurred randomly across the floodplain. Partly superimposed, multiple calcrete horizons were developed during periods of low sediment supply. A random deposition of floodplain sediments appears to characterize the anastomosing river system of the Khorat Basin.

Keywords

The depositional environment of the Early Cretaceous Khorat Group was an anastomosing river system; Paleosol profiles indicate random deposition across the floodplain of the Khorat Basin; The paleoclimate of the Khorat Basin was semi-arid to sub-humid, with wet and dry cycle.



1.15 Science of The Total Environment, Volumes 463–464, 1 October 2013, Pages 959-967

Microbiological evaluation of water during the 2011 flood crisis in Thailand

Yuphakhun Chaturongkasumrit, Punnida Techaruvichit,
Hajime Takahashi, Bon Kimura, Suwimon Keeratipibul

In 2011, a severe flood occurred in Thailand, covering nearly half the country in water for several months. The contamination of floodwater and subsequent contamination of water for human consumption could have potentially led to a widespread health crisis. However, to date, no study has been conducted to determine the safety of the waters used for human consumption in Thailand during the severe flood. Therefore, we conducted microbiological analysis of 4 kinds of water (floodwater, river water, tap water, and filtered tap water) collected from industrial and residential areas that were damaged due to flooding. Higher net levels of bacteria were found in water with a higher turbidity. No clear trend was observed in the pH value of all 4 water samples. The level of total bacterial contamination in the water samples was estimated by real-time quantitative polymerase chain reaction (PCR). Eleven of the 12 tap water samples and all of the filtered tap water samples had a total bacterial load that exceeded the Thai water quality standards. One of the tap water samples and one of the filtered tap water samples were found to be positive for *Shigella* sp., although none of the floodwater samples showed detectable levels of this pathogen as determined by PCR analysis. One of the samples of floodwater was also found to be positive for *Leptospira* sp., but none of the tap water or filtered tap water samples were positive. Most of the tap water samples and all filtered tap water samples were found to be contaminated with *Vibrio cholerae*. Bacterial contamination in water samples was also analyzed by denaturing gradient gel electrophoresis (DGGE) analysis. These results revealed that several microorganisms were transferred via floodwater to different areas in the central part of Thailand and cross-contaminated between floodwater and water for human consumption.



2.0

Diponegoro University, Indonesia

2.1

Journal of Mechanical Science and Technology 26 (2), pp. 421-426, 2012

Study on low pressure evaporation of fresh water generation system model

Chung, H., Wibowo, S., Fajar, B., Shin, Y., Jeong, H.

A low pressure evaporation fresh water generation system is designed for converting brackish water or seawater into fresh water by distillation in low pressure and temperature. Distillation through evaporation of feed water and subsequent vapor condensation as evaporation produced fresh water were studied; tap water was employed as feed water. The system uses the ejector as a vacuum creator of the evaporator, which is one of the most important parts in the distillation process. Hence liquid can be evaporated at a lower temperature than at normal or atmospheric conditions. Various operating conditions, i. e. temperature of feed water and different orifice diameters, were applied in the experiment to investigate the characteristics of the system. It was found that these parameters have a significant effect on the performance of fresh water generation systems with low pressure evaporation. © 2012 The Korean Society of Mechanical Engineers and Springer-Verlag Berlin Heidelberg.



2.2 Fisheries and Aquatic Science 14 (4) , pp. 363-369, 2012

Comparison of the nitrification efficiencies of three biofilter media in a freshwater system

Harwanto, D., Oh, S.-Y., Jo, J.-Y.

Total ammonia nitrogen (TAN) removal efficiencies of a sand filter (SF), polystyrene microbead filter (PF), and Kaldnes bead filter (KF) media were evaluated under ammonia loading rates of 5, 25, and 50 g m⁻³ day⁻¹. The volume of each filter media tested was 7 L, and the water flow rate for all filter media was 24 L/min. The specific surface areas of the SF, PF, and KF were 7,836, 3,287, and 500 m²/m³, respectively. Sand was fluidized and the other two media were trickle filtered. The volumetric TAN removal rate increased with increasing ammonia loading rate for all filter media. Mean volumetric TAN removal rates under the ammonia loading rates of 5, 25, and 50 g m⁻³ day⁻¹ in SF (39.3, 168.6, and 322.7 g m⁻³ day⁻¹, respectively) were higher than those in PF (35.0, 157.4, and 310.5 g m⁻³ day⁻¹, respectively) and KF (32.1, 142.5, and 288.1 g m⁻³ day⁻¹, respectively). These results were related to differences in the specific surface areas of the filter media. PF was the most economic media for efficiently removing TAN. © The Korean Society of Fisheries and Aquatic Science.



2.3 Desalination 284, pp. 66-76, 2012

Numerical investigation of the effect of inlet skew angle on the performance of mechanical vapor compressor

Labib, M.N., Kim, S.S., Choi, D., Utomo, T., Chung, H., Jeong, H.

Mechanical vapor compressor is an essential component that governs the system performance and stability in the multi-effect desalination (MED) system. The importance of improving mechanical vapor compressor's compressing ability in enhancing the efficiency of multi-effect desalination (MED) system has been stressed for a long time. This study was aimed to investigate the influences of inlet skew angle of the impeller on performance improvement. Four designs of inlet skew angles were attempted at the first stage impeller with 8° , 10° , 15° , and 20° respectively. Three dimensional fluid flows were simplified using periodic model to reduce the computational cost and time required. A good performance was expected as which effectively reduce the losses caused by secondary flow in the flow passage of the impeller. The results show detail flow pattern on decreasing the secondary flow due to incidence angle at the impeller eye and impeller passage. The numerical solutions were performed and allowed the better design. © 2011 Elsevier B.V..



2.4 Applied Mechanics and Materials 110-116, pp. 2043-2048, 2012

Wastewater treatment for a sustainable future: Overview of phosphorus recovery

Muryanto, S., Bayuseno, A.P.

Intensified agriculture in response to the growing population has led to excessive nutrient discharges to natural waters causing environmental problems in the form of eutrophication and its associated risks. Treatment options for this adverse effect include removal and recovery of soluble phosphorus by chemical precipitation, biological uptake, and struvite crystallisation. Chemical precipitation is the most common method due to its simplicity, but the chemical requirements can be prohibitive and the removed phosphorus is less reusable. Biological uptake requires less chemicals but the process is complex and prone to seasonal variations. Phosphorus removal and recovery from wastewater by struvite crystallisation is an attractive option since the crystallisation process converts phosphorus into struvite crystals, i.e. phosphate minerals which have proved to be good fertilizer, hence potentially reduces fertilizer production and the subsequent greenhouse gas emissions. Moreover, struvite crystallisation helps prevent scaling of wastewater treatment facilities. A number of struvite crystallisation projects utilising primarily agricultural wastewater is already operational at industrial scale. © (2012) Trans Tech Publications, Switzerland.



2.5 Journal of Applied Sciences Research 8 (1), pp. 454-457, 2012

Urgent need of wastewater treatment based on BOD footprint for aerobic conditions of receiving water

Samudro, G., Mangkoedihardjo, S.

This paper assessed the potential biochemical oxygen demand (BOD) footprint, which limits number of population to dispose wastewater into receiving water and maintained aerobic conditions. Methods were based on human activities in the form of aerobic respiration process for obtaining BOD footprint due to domestic wastewater. Subsequently, BOD footprint due to wastewater conversion in receiving water was assessed for aerobic and anaerobic processes. Results for the city of Surabaya revealed that complete anaerobic conditions of receiving water would be achieved for the maximum population number of 180,000. In order to maintain aerobic conditions of receiving water, the total population number of 3,000,000 dictated to treat wastewater before disposing into the receiving water. The results suggested to provide wastewater treatment that covers 100% inhabitants. Using the unit BOD production of untreated wastewater of 45 g/person/day and the unit BOD production of treated wastewater of 1.33 g/person/day, then the decrease of the unit BOD represented the treatment efficiency of 97% BOD removal.



2.6 Bioresource Technology, Volume 102, Issue 10, May 2011, Pages 5665-5673

Effect of varying salinity, temperature, ammonia and nitrous acid concentrations on nitrification of saline wastewater in fixed-bed reactors

U. Sudarno, J. Winter, C. Gallert

Nitrification under changing salinities (0–9%), temperatures (6–50 °C), ammonia (0–5 g N L⁻¹) and nitrite concentrations (0–0.4 g N L⁻¹) was investigated in fixed-bed reactors. For all conditions ammonia oxidation rates (AOR) were lower than nitrite oxidation rates (NOR). AORs and NORs increased from 12.5 to 40 °C and were very low at 6 °C and almost zero at 50 °C. No recovery of nitrification was obtained after incubation at 50 °C, whereas nitrification was restorable after incubation at 6 °C. Ammonia concentrations of 5 g N L⁻¹ or nitrite concentrations up to 0.125 g N L⁻¹ decreased AOR to almost zero. AORs and NORs recovered if ammonia or nitrite was removed. At concentrations of 1 and 5 g N L⁻¹ ammonia AOR and NOR were inhibited by 50%, whereas 27 mg N/L nitrite inhibited AOR by 50%.



3.0

Kampus ITS Surabaya, Indonesia

3.1

JAPANESE JOURNAL OF APPLIED PHYSICS Volume: 52 Issue: 11 Special Issue: SI Article Number: UNSP 11NE02 Part: 2 Published: NOV 2013

Removal of Water Pollutants by Pulsed Discharge Plasma and Observation of Its Optical Emission Intensity at Atmospheric Pressure

Hayashi, Yui; Wahyudiono; Machmudah, Siti

Pulsed discharge plasma over the liquid surface was observed in the needle electrode configuration. The characteristics of streamer propagation including its optical emission intensity were investigated by using the intensified charge coupled device (ICCD) camera. The experiment was conducted at 313 K, 0.1 MPa argon in a batch-type reactor with methyl orange as a starting material. The characteristic of pulsed streamers were started from the electrode placed above the methyl orange liquid surface and then reached the methyl orange liquid surface, where they propagated on it. The propagation of pulsed streamers and their progression distance increased with the increase in peak voltage value. The optical emission intensity increased immediately after the breakdown; and it increased to its peak value when the applied voltage reached its peak value. After pulsed discharge plasma treatment, methyl orange degraded into its derived compounds with the appearance of light color. UV-vis spectrophotometer analyzed that the intermediate compounds from the degradation of methyl orange consist primarily of aromatic compounds which contain nitrogen functional groups. The degradation of methyl orange is 99% when the number of discharge plasma was 20000x. With increasing the pulse discharge numbers, the pH and the conductivity of methyl orange solution changed clearly. (C) 2013 The Japan Society of Applied Physics



3.2

SIMULTECH 2013 - Proceedings of the 3rd International Conference on Simulation and Modeling Methodologies, Technologies and Applications, 2013

Simulation of collision avoidance by considering potential area of water for maneuvering based on MMG model and AIS data

I.P.S., Kobayashi, E., Pitana, T.

A vessel should follow a planned route. However, when a target ship deviates from its original track, the subject ship should maneuver to avoid a ship-to-ship collision. This paper presents a trial maneuver-based method for collision avoidance that considers the potential area of water (PAW) for maneuvering that is available to the target ship. The initial conditions, including the position, speed, rudder angle, drift angle, and yaw rate of the target ship, are derived from automatic identification system (AIS) data. AIS data from Madura Strait were used to simulate collision avoidance. The PAW of the target ship was predicted based on a probability distribution of the initial conditions using a mathematical maneuvering group (MMG) model. Finally, a trial maneuver method for the subject ship was simulated to avoid a ship-to-ship collision. The MMG model for the simulation was developed to consider the effects of shallow water and wind and current disturbances.



3.3 Far East Journal of Mathematical Sciences, Vol 76, No 2, Pages 223-233, 2013 © 2013 Pushpa Publishing House

Numerical simulation on calculating volume sedimentation on two rivers confluences

Laksito Wibowo, I., Widodo, B.

The process of sedimentation in streams can cause siltation of rivers resulting in the overflow of water to the surface. Sedimentation is occurred in huge quantity at the confluence of two rivers. Meanwhile, mathematical modeling using the meshless local Petrov-Galerkin.

Keywords

Sedimentation; river confluence; MLPG method



3.4 Proceedings of 33rd International Conference of Coastal Engineering, 2012 (ICCE 2012), ASCE, Santander, SPAIN

Application of video images for monitoring coastal zone in Hasaki beach, Japan, 2012

Zikra, M., Hashimoto, N., Yamashiro, M., Yokota, M., Suzuki, K. 2012

The video image analysis methods are used for monitoring the phenomena at the coastal zone. A digital video camera which is mounted in the HORS research building is used to estimate directional wave spectra and bathymetry in shallow water areas. The Bayesian Directional Method is used to estimate directional wave spectra using the group of pixels brightness and non-linear bathymetry inversion is used to estimate shallow water bathymetry using time series of pixel brightness intensity at cross-shore and longshore array. The results are compared with a numerical model and field measurements. The results indicate that video image data could be used to estimate bathymetry and directional wave spectra in shallow water areas.

Keywords

bathymetry; directional wave spectra; wave number; video images



3.5 2013 IEEE International Underwater Technology Symposium, UT 2013. © 2013 IEEE.

Soft acoustic modem development for shallow water environment

Santoso, T.B., Widjiati, E., Wirawan, Hendrantoro, G.

Development of an underwater acoustic communication system is a necessity for the majority of the nation as a sea area of Indonesia. Most areas of the ocean in Indonesia is shallow; the environment has unique characteristics compared to other countries. It is a challenge in the research underwater acoustic communication system. This paper presented a preliminary study of the developing of soft acoustic modem testbed for underwater acoustic communication system with OFDM technique. Modem has been implemented on a PC with Matlab, with the objective to evaluate the algorithm development. Image file in JPEG format is encoded with a discrete cosine transform (DCT). To improve performance, information is encoded with a forward error correction, FEC-Hamming. The system uses BPSK modulation, OFDM transmission techniques, and using acoustic signal as carrier wave. In this system, the occupation bandwidth is 5.3 kHz, transmission rate of 3.7 k sps, and center frequency at 13.3 kHz. As an initial stage, the model presented in the form of simulator testbed passband, and is treated with the propagation parameters that were obtained from measurements in a Towing Tank in previous experiment. The next stage is testbed evaluation through experimental in a laboratory, such the effect of conversion process from electrical to audio signal at PC sound card and the capability of the receiver to recover the information.



3.6 2012 7th International Conference on Telecommunication Systems, Services, and Applications, TSSA 2012. . © 2012 IEEE.

Image transmission with OFDM technique in underwater acoustic environment

Santoso, T.B., Wirawan, Hendrantoro, G.

Research developments and applications in the underwater acoustic communication fields have been a challenge for researchers. In this paper we present a study about image transmission over underwater acoustic channels. We present the 256 OFDM transmission technique with BPSK modulation, forward error correction (FEC)-Hamming (7,4), least square (LS) and minimum mean square error (MMSE) equalizations. The simulation results show that FEC-Hamming gives a good performance, e.g. 5 dB SNR results in 0.0017 BER and 20.84 dB SNR. The performance of LS equalization and MMSE equalization at the receiver are compared. MMSE equalization need approximately 12 dB SNR for the BER of 0.001, or 2 dB lower than the LS case.

Keywords

underwater, OFDM, LS, MMSE



3.7 RINA, Royal Institution of Naval Architects - International Conference on Ship and Offshore Technology, ICSOT

Indonesia 2012: Developments in Ship Design and Construction

Seakeeping analysis of the trimaran ferry ship in short crested sea for a case of East Java water condition

Sulisetyono, A.

Seakeeping analysis is an important aspect in the assessing of ship performance in wave corresponding to the safety and comfort of ship's crews or passengers. This paper consider to the six degree of freedom (6 DOF) motions of the trimaran ferry ship that was operated in short crested wave of East Java sea, Indonesia. There were some snap shot data representing one year sea condition with of an hour period of snap shot. Based on the snap shot data, the wave spectrums were further generated using the standard ITTC formulation of JONSWAP spectrum. The 3D diffraction analysis was performed to obtain the first-order (high frequency) response motions of ship in regular wave for any ship's heading relative to the waves. The ship's motion responses in multidirectional seas were computed by multiplication of the Response Amplitude Operator (RAOs) and multidirectional wave spectrum. The standard deviations of each motion were obtained by square root of the summation of the total spectral energy of wave. The periods of ship motion were also determined by the division of the total spectral energy to the total spectral moment. The periods and standard deviations were plotted in the scatter charts representing the motion responses for all snap shot data. The cumulative exceeding probabilities of motion were determined, and it was used to examine the response of motions to exceed criteria value.



3.8 Journal of Coastal Research, 28(4), 829-842.

Nonlinear-Dispersion Effects in Modeling of Blocking of Stokes Waves

Suastika, Ketut

Effects of amplitude dispersion are investigated in modeling of blocking of Stokes waves in deep water. Modeling results of the wave-amplitude evolution using, respectively, the linear- and Stokes third-order dispersion relation, are compared with experimental data. Two data sets with relatively small-wave steepness are considered because of model restriction to weakly-nonlinear waves. The wave period in Test 1 is 1.1 s and in Test 2 is 1.2 s. The initial-target wave amplitude in still water in Test 1 is 1.0 cm, which is the same as Test 2. It is found that inclusion of amplitude dispersion in the model results in a larger wave-group velocity, as expected, and gives a better fit to the experimental data as compared to the use of the linear-dispersion relation. More specifically, using the Stokes third-order dispersion relation instead of the linear-dispersion relation in the model, the root-mean-squared error F_r , used as a measure for the goodness-of-fit between the experimental data and model-results, decreases from 3.5×10^{-3} to 1.8×10^{-3} in Test 1 and from 3.4×10^{-3} to 2.4×10^{-3} in Test 2.



3.9 Coastal Engineering Journal Volume: 54 Issues: 2 Article Number: 1250013 Published: Jun 2012

A Spectral Model For Blocking Of Random Waves

Suastika, I. K.

A spectral model is presented for blocking of long-crested random waves due to nonuniform collinear adverse current in the steady state situation. The spatial evolution of the spectral components in the region far from the blocking points (far field) is modeled with a spectral wave action balance, which is matched with a uniformly-valid solution in the region near the blocking points (near field). Wave-energy dissipation is taken into account both in the far and near fields, particularly dissipation due to wave breaking. Model results are compared with experimental data for the case of partial blocking and of nominally complete blocking. The value of the onset-breaking parameter γ , which is a calibration parameter that can best reproduce the observations in both cases, is γ approximate to 0.55. The fitted model is able to reproduce the observed patterns of the wave-height variation along the flume well and the observed variance spectra fairly well.



3.10 International Journal of Phytoremediation, 2013. © 2013 Copyright Taylor and Francis Group, LLC.

Phytoremediation of Wastewater Containing Lead (Pb) in Pilot Reed Bed Using *Scirpus Grossus*

Tangahu, B.V., Abdullah, S.R.S., Basri, H., Anuar, N., Mukhlisin, M.

Phytoremediation is a technology to clean the environment from heavy metals contamination. The objectives of this study are to treat Pb contaminated wastewater by using phytoremediation technology and to determine if the plant can be mentioned as hyperaccumulator. Fifty plants of *Scirpus grossus* were grown in sand medium and 600 L spiked water in various Pb concentration (10, 30 and 50 mg/L) was exposed. The experiment was conducted with single exposure method, sampling time on day-1, day-14, day-28, day-42, day-70, and day-98. The analysis of Pb concentration in water, sand medium and inside the plant tissue was conducted by ICP-OES. Water samples were filtered and Pb concentration were directly analyzed, Pb in sand samples were extracted by EDTA method before analyzed, and Pb in plant tissues were extracted by wet digestion method and analyzed. The results showed that on day-28, Pb concentration in water decreased 100%, 99.9%, 99.7%, and the highest Pb uptake by plant were 1343, 4909, 3236 mg/kg for the treatment of 10, 30, and 50 mg/L respectively. The highest BC and TF were 485,261 on day-42 and 2.5295 on day-70 of treatment 30 mg/L, it can be mentioned that *Scirpus grossus* is a hyperaccumulator.



3.11 INTERNATIONAL JOURNAL OF PHYTOREMEDIATION Volume: 15 Issue: 7 Pages: 663-676
Published: AUG 1 2013

Phytoremediation of Wastewater Containing Lead (Pb) in Pilot Reed Bed Using *Scirpus Grossus*

Tangahu, Bieby Voijant; Abdullah, Siti Rozaimah Sheikh; Basri, Hassan.

Phytoremediation is a technology to clean the environment from heavy metals contamination. The objectives of this study are to treat Pb contaminated wastewater by using phytoremediation technology and to determine if the plant can be mentioned as hyperaccumulator. Fifty plants of *Scirpus grossus* were grown in sand medium and 600 L spiked water in various Pb concentration (10, 30 and 50mg/L) was exposed. The experiment was conducted with single exposure method, sampling time on day-1, day-14, day-28, day-42, day-70, and day-98. The analysis of Pb concentration in water, sand medium and inside the plant tissue was conducted by ICP-OES. Water samples were filtered and Pb concentration were directly analyzed, Pb in sand samples were extracted by EDTA method before analyzed, and Pb in plant tissues were extracted by wet digestion method and analyzed. The results showed that on day-28, Pb concentration in water decreased 100%, 99.9%, 99.7%, and the highest Pb uptake by plant were 1343, 4909, 3236mg/kg for the treatment of 10, 30, and 50mg/L respectively. The highest BC and TF were 485,261 on day-42 and 2.5295 on day-70 of treatment 30mg/L, it can be mentioned that *Scirpus grossus* is a hyperaccumulator.



3.12 Applied Mathematical Sciences, Vol. 7, 2013, no. 123, 6115 - 6123

The influence of hydrodynamics on the spread of pollutants in the confluence of two rivers

Widodo, B.

In a river system, confluence is a very important issue. This is due to the confluence can affect the morphology and hydraulics in upstream and downstream. The aim of this study is to determine the effect of hydrodynamics on the spread of pollutants in the confluence of two rivers. The model is built based on partial differential equations in two-dimensional depth-averaged surface-water flow and the Continuum Principle. Furthermore it is solved using an implicit finite difference methods namely Alternating Direction Implicit (ADI) method because it has the accuracy and numerical stability relatively good. These results are then simulated using MATLAB 7.1 software. The Parameter used are COD, BOD, DO, discharge and velocity water flow obtained from The public company of Jasa Tirta I. Running the model performed on location Karangpilang through Sepanjang bridge, with discharge from the paper industry PT. S.Wijaya and oil industry PT Sarimas Permai and stream flow velocity 0.5 m / sec at a distance of 15 m from the confluence of two rivers. The results showed that the spread of pollutants followed in the longitudinal direction and the spread of pollutant was changed in the value of the velocity and concentration because of differences in location (before and after confluence).



3.13 Proceedings - 2011 IEEE International Conference on Control System, Computing and Engineering, ICCSCE 2011. © 2011 IEEE.

Sedimentation characteristics study on the confluence of two rivers using Meshless Local Petrov-Galerkin Method

Widodo, B.

The process of sedimentation that occurred in the river can cause siltation of the river resulting in overflow of water to the surface or flooding. This siltation is caused by sedimentation. In this paper we consider sedimentation problem occurred at the confluence of two rivers. We therefore develop a mathematical model of the problem and solving the model by using Meshless Local Petrov-Galerkin (MLPG) method. This MLPG method is an alternative way to solve this problem because it does not require mesh or grid. It therefore is very helpful in minimizing both running time of the numerical calculation and computer memory. From the results of numerical simulation we obtain that for the flow of the bend stream, there exists a decreasing in the height of the sediment is around 0.0002 and an increasing in speed of about 0.000848 during the initial velocity $v = 0.1$. When the initial velocity v increases, it will also increase in the speed and decrease in the height of the sediment. It can be occurred when we put $v = 0.9$, an increasing in water depth of about 0.015832, increasing in speed of around 0.068586, and the height of the sediment decrease by approximately 0.166470. The both speed and depth affect the height of the sediment on the riverbed. Likewise, the height of the straight stream sediment increases about 2.792678, the speed decreases about 5.172373, the depth of the river is also down about 2.792678, when the first river debit and the second river debit are $Q=0.5$. If we put the first river and the second river are different, when the first river debit is 0.3 and 0.9 for the second river debit, sediment remained ride height is about 0.297025, the speed of the river downs about 1.651025 and the depth of the river decreases approximately 0.278835.



3.14 Scientia Iranica, 2012. © 2012 Sharif University of Technology. Production and hosting by Elsevier B.V. All rights reserved.

Parametric study of a low wake-wash inland waterways catamaran

Yaakob, O.B., Nasirudin, A., Abdul Ghani, M.P., Abd Mukti, M.A., Ahmed, Y.M.

The wake wash from passing ships can cause environmental damage. The wake wash is an important issue for naval architects and shipbuilders in concentrating on more environmentally friendly designs. This paper presents results of a parametric study of catamaran hull form to obtain low wake wash hull form configurations or low speed inland waterway boats. The study uses a Computational Fluid Dynamics (CFD) simulation, and model experiments were carried out for validation of the CFD software set-up. The study concentrates on the asymmetric catamaran hull form. The investigation is conducted on two configurations of hull form; Flat Side Inward (FSI) and Flat Side Outward (FSO) configurations. The investigation is conducted on a hull form with a Length to Beam (LB) ratio of 12.2, 15.2 and 18.3 and a Separation to Length (SL) ratio of 0.2, 0.3 and 0.4. The results based on wave height criteria at various longitudinal cuts have shown that the FSO configuration has a lower wake wash compared with the FSI configuration. Considering LB and SL ratios, hull forms with a larger separation or higher LB ratios produce lower wave heights.



3.15 Coastal Engineering Journal. © 2012 World Scientific Publishing Company and Japan Society of Civil Engineers.

Analysis of directional wave spectra in shallow water areas using video image data

Zikra, M., Hashimoto, N., Yamashiro, M., Yokota, M., Suzuki, K.

In this study, a technique for analyzing directional wave spectra in shallow water areas using video image sequences is presented. The video image was obtained and collected by a single digital video camera. The technique was based on time series of the pixel brightness on video images. The pixel can be treated as a fixed instrument through use of the rectification process. The extended maximum likelihood method and the Bayesian directional method were used to estimate directional wave spectra using two different configurations of arrays from pixel brightness on video images. The study examined video image data at HORS pier on Hasaki Beach, Japan. The results indicate that video image data could be used to estimate surface wave spectra in very shallow water areas.



4.0

Prince Songkhla University, Thailand

4.1

International Journal of Hydrogen Energy, Volume 36, Issue 21, October 2011, Pages 14217-14226

Community analysis of thermophilic hydrogen-producing consortia enriched from Thailand hot spring with mixed xylose and glucose

Adilan Hniman, Poonsuk Prasertsan, Sompong O-Thong

Sediment samples from hot spring were enriched for hydrogen-producing bacteria with xylose, glucose and mixed of both sugars at high temperature (60 °C). Enriched cultures encoded as PGR and YLT showed high cumulative hydrogen production in xylose–glucose mixed and xylose with hydrogen evolution of 1506 and 1487 mL H₂/L-medium and hydrogen yields of 301.3 and 297.4 mL H₂/g sugarconsumed, respectively. The enriched cultures coded PGR and YLT were produced acetate and butyrate as main soluble metabolites with high hydrogen production. PCR-DGGE profiling showed that the enriched cultures gave best hydrogen production from xylose–glucose mixed comprised of three groups of hydrogen-producing species, (A) relating to genus *Bacillus* sp. and *Anoxybacillus* sp., (B) relating to genus *Caloramator* sp. and *Clostridium* sp. and (C) relating to efficient hydrogen-producing species (*Thermoanaerobacterium* sp. and *Caldicellulosiruptor* sp.). These microbial consortia developed show promising to apply for biohydrogen production from lignocellulosic hydrolysate containing xylose–glucose mixed.

Keywords

Thermophilic hydrogen-producing consortia; microbial community analysis; biohydrogen; lignocellulosic hydrolysate; xylose–glucose mixed



4.2 Desalination, Volume 280, Issues 1–3, 3 October 2011, Pages 370-377

Enhanced efficiency of dissolved air flotation for biodiesel wastewater treatment by acidification and coagulation processes

Cheerawit Rattanapan, Aneak Sawain, Thunwadee Suksaroj, Chaisri Suksaroj

A novel approach was developed to enhance the efficiency of the dissolved air flotation (DAF) for biodiesel wastewater by acidification and coagulation. Firstly, Grease & Oil and Chemical oxygen demand (COD) removal efficiencies of biodiesel wastewater using acidification with pure hydrochloric acid and pure sulfuric acid at pH = 3 and 1 day retention time were more than 80%, and 50%, respectively. Secondly, Grease & Oil and COD removal efficiencies of biodiesel wastewater using alum, polyaluminum chloride and ferric chloride coagulants without acidification at 1.0 g/L were more than 90% and 30%. Thirdly, DAF alone and DAF with acidification could not separate Grease & Oil from biodiesel wastewater. Thus, DAF with the acidification and coagulation is suggested for biodiesel wastewater treatment. Biodiesel wastewater treatment by acidification before alum coagulation allowed the alum concentration to be reduced by 60–90% compared to treating without acidification. In addition, the efficiency of Grease & Oil removal from biodiesel wastewater by DAF with alum and acidification was 85–95%. It can be concluded that the efficiency of Grease & Oil removal from biodiesel wastewater using DAF with acidification and coagulation was 10% greater compared to other processes.

Keywords

Biodiesel wastewater was treated by DAF with acidification and coagulation; Grease & Oil removal efficiency by DAF with coagulation and alum was 85%–95%; DAF with acidification and coagulation was greater effective than other processes; Thus, acidification and coagulation could be enhanced the efficiency of DAF.



4.3 Bioresource Technology, Volume 102, Issue 22, November 2011, Pages 10363-10370

Upflow bio-filter circuit (UBFC): Biocatalyst microbial fuel cell (MFC) configuration and application to biodiesel wastewater treatment

Chontisa Sukkasem, Sunee Laehlah, Adilan Hniman, Sompong O'thong, Piyarat Boonsawang, Athirat Rarngrarong, Mudtorlep Nisoa, Pansak Kirdtongmee

A biodiesel wastewater treatment technology was investigated for neutral alkalinity and COD removal by microbial fuel cell. An upflow bio-filter circuit (UBFC), a kind of biocatalyst MFC was renovated and reinvented. The developed system was combined with a pre-fermented (PF) and an influent adjusted (IA) procedure. The optimal conditions were operated with an organic loading rate (OLR) of 30.0 g COD/L-day, hydraulic retention time (HRT) of 1.04 day, maintained at pH level 6.5–7.5 and aerated at 2.0 L/min. An external resistance of circuit was set at 10 k Ω . The purposed process could improve the quality of the raw wastewater and obtained high efficiency of COD removal of 15.0 g COD/L-day. Moreover, the cost of UBFC system was only US\$1775.7/m³ and the total power consumption was 0.152 kW/kg treated COD. The overall advantages of this invention are suitable for biodiesel wastewater treatment.

Keywords

The UBFC system, biocatalyst MFC combined with PF and IA process has many benefits; Able to treat without chemical treatment or nutrient supplementation; Obtained COD removal rate 15.0 g/L-day, greater than conventional technologies.; The capital cost was \$118,380 per ton of treated COD, less than AD outlay; The power consumption was 0.152 kW/kg treated COD, closed to an aerated lagoon cost.



4.4 **Procedia - Social and Behavioral Sciences, Volume 91, 10 October 2013, Pages 341-348**

Sustainability Indicators for Assessing and Monitoring the Resource Management of Pak Phanang River Basin, Thailand

Meraman Mumtas, Chatupote Wichien

Pak Phanang river basin, one of the most important river basins in Thailand, is located in the middle of the southern peninsular. It has diverse resources and land use, and complex and dynamic ecosystem in terms of water use, flooding, and physical change. The construction of the water gate in 1999 has caused drastic changes in the ecosystem of the basin and has led to subsequent effects on the livelihood of the people in the basin. The objectives of this study, hence, was to identify the appropriate sustainability indicators for assessing and monitoring the basin land use through the reviews of historical perspectives, together with the natural and socio-economic impacts on natural resource degradation and challenges. The relationship between causes, problems, and symptoms of different ecological zones were analyzed and used as the basis of identifying sustainability indicators for further in-depth study.



4.5 **Materials Letters, Volume 90, 1 January 2013, Pages 83-86**

Water Ultrasonic-assisted synthesis of Nd-doped ZnO for photocatalysis

Oranuch Yayapao, Titipun Thongtem, Anukorn Phuruangrat, Somchai Thongtem

Undoped and Nd-doped wurtzite hexagonal ZnO nanoneedles were successfully synthesized by ultrasonic-assisted solution method, and characterized by X-ray diffraction (XRD), Fourier transform infrared (FTIR) spectroscopy, scanning electron microscopy (SEM) and transmission electron microscopy (TEM). The photocatalytic efficiencies of the 0, 0.5 and 1% Nd-doped ZnO nanoneedles were evaluated by the degradation of methylene blue under UV light. In this research, the 1% Nd-doped ZnO is the best photocatalytic performance with 2.5 times of the undoped ZnO.

Keywords

Undoped and Nd-doped ZnO used as photocatalytic materials; They were synthesized by the transmission of ultrasonic wave through solutions; The promising materials for waste water treatment.



4.6 Journal of Virological Methods, Volume 173, Issue 1, April 2011, Pages 75-84

Highly sensitive capacitive biosensor for detecting white spot syndrome virus in shrimp pond water

Saluma Samanman, Proespichaya Kanatharana, Wilaiwan Chotigeat,
Panchalika Deachamag, Panote Thavarungkul

Water is one major pathway by which the white spot syndrome virus (WSSV) pathogen enters aquaculture facilities. This paper describes the production and use of a capacitive biosensor for the quantitative detection of as little as 1 copy/ μl of WSSV in shrimp pond water. A glutathione-S-transferase tag for white spot binding protein (GST-WBP) was immobilized on a gold electrode through a self-assembled monolayer. Binding between WSSV and the immobilized GST-WBP was directly detected by a capacitance measurement. Under optimum conditions, the capacitive biosensor detected WSSV over a wide linear range of between 1 and 1×10^5 copies/ μl . The system was highly selective for WSSV. One analysis cycle required only 20–25 min of analysis time and 25 min of regeneration time. The capacitive biosensor was applied to analyze WSSV concentration in eight shrimp pond water samples and the results were in good agreement with those obtained by a real time quantitative polymerase chain reaction (real-time PCR) method ($P > 0.05$). The immobilized GST-WBP provided and could be reused for up to 39 analysis cycles for one electrode preparation with a relative standard deviation (RSD) of 2.4% and a good reproducibility of residual activity ($95.8 \pm 2.3\%$). The appealing performance of this biosensor indicated that it had great potential for an accurate very sensitive, quantitative, detection method for WSSV.



4.7 International Journal of Hydrogen Energy, Volume 36, Issue 5, March 2011, Pages 3409-3416

Biohydrogen production from cassava starch processing wastewater by thermophilic mixed cultures

Sompong O-Thong, Adilan Hniman, Poonsuk Prasertsan, Tsuyoshi Imai

Natural microbial consortia from hot spring samples were used to develop thermophilic mixed cultures for biohydrogen production from cassava starch processing wastewater (CSPW). Significant hydrogen production potentials were obtained from three thermophilic mixed cultures namely PK, SW and PR with maximum hydrogen production yields of 249.3, 180 and 124.9 mL H₂/g starch, respectively from raw cassava starch and 252.4, 224.4 and 165.4 mL H₂/g starch, respectively from gelatinized cassava starch. Acetic acid-ethanol and acetic-lactic acid type fermentation were observed in cassava starch fermentation, based on three thermophilic mixed cultures performance. The thermophilic mixed cultures PK, SW and PR exhibited the maximum hydrogen yield of 287, 264 and 232 mL H₂/g starch in CSPW, respectively corresponding to 53%, 48.7% and 42.8% of the theoretical values. Phylogenetic analysis of thermophilic mixed cultures revealed that members involved in cassava starch degrading bacteria and hydrogen producers in both raw cassava starch and CSPW were phylogenetically related to the *Thermoanaerobacterium saccharolyticum*, *Thermoanaerobacterium thermosaccharolyticum*, *Anoxybacillus* sp., *Geobacillus* sp. and *Clostridium* sp.



4.8 Process Biochemistry, Volume 46, Issue 1, January 2011, Pages 344-352

Removal of hydrogen sulfide by complete aerobic oxidation in acidic biofiltration

Sumate Chaiprapat, Rohana Mardthing, Duangporn Kantachote,
Seni Karnchanawong

Anaerobic treatment of sulfate-rich wastewater from concentrated rubber latex industry results in high hydrogen sulfide (H_2S) in the biogas, which is odorous, toxic, and corrosive to equipment. The effects of retention time (RT) and air mix ratio on the performance and kinetics of the aerobic biofilm reactor in H_2S removal were assessed. It was found that H_2S removal efficiency increased with increasing air mix ratio and RT. Under a 1:4 biogas-to-air ratio, the system could achieve average removals of 94.7%, 87.3%, 85.6% at RT of 160, 80 and 40 s, respectively. Our biofilter system showed a maximum elimination capacity (EC_{max}) of 256.4 $g/m^3/h$ in our kinetics study. When operated with the acidic wastewater discharged from concentrated rubber factory, the system gave an equivalent performance to that operated with synthetic liquid. Results also revealed that some undesirable methane oxidation had occurred in the biofilter bed. Furthermore, types of the liquid used apparently affected the dominant microbial species in the bed. Although the middle portion of biofilter bed contained fewer microorganisms, H_2S could still efficiently be converted to sulfuric acid that could potentially be reused in the concentrated rubber latex industry.



4.9 **Procedia - Social and Behavioral Sciences, Volume 91, 10 October 2013, Pages 573-580**

Arsenic Cadmium and Lead Concentrations in Sediment and Biota from Songkhla Lake: A Review

Siriporn Pradit, Manasawan S. Pattarathomrong, Suwanna Panutrakul

This article reviews the existing data on trace elements (Arsenic (As), Cadmium (Cd) and Lead (Pb)) in sediments and biota from Songkhla Lake, a shallow coastal lagoon in Southern of Thailand between 1998 and 2012. At present, the situation of those trace elements in sediments show moderate concentration levels for Cadmium and Lead. High levels for Arsenic have been found in the Outer Section of Songkhla Lake especially at the mouths of Samrong, U-Taphao and Phawong canals. The accumulation of trace elements in fish muscle tissue was well within limits for human consumption.



4.10 **Procedia - Social and Behavioral Sciences, Volume 91, 10 October 2013, Pages 429-436**

A Model of Health Impact Assessment for the Sub District Municipality: A Case Study of the Songkhla Lake Basin

Sukmag Phen, Suteeravut Pongthep

The objective of this study was to develop a health impact assessment model for the sub district municipality in the Songkhla Lake Basin. This qualitative research consists of 3 phases as follows. The first phase was documentary research, where the objective was to examine the HIA model. The second phase was to modify the model, and the objective was to develop and refine the model of the HIA by specialists. The final phase was participatory action research, and here the aim was to develop and improve the appropriate model for the sub district municipality. The study areas comprised of 21 sub district municipalities in the Songkhla Lake Basin. The study data collected by using participatory observation, in-depth interview, and focus group discussion, all of which finally analyzed using the content analysis method. The results of the first phase revealed that a possible model for the HIA for the subdistrict municipality in Songkhla Lake Basin was as follows. The first model was the model of the HIA for integrating the HIA process regarding policy or project development. The second model was the model of the HIA for the subdistrict municipality, where there were serious health impacts or community conflicts, or there were uncertain health impacts from project implementation. The third model was the community health impact assessment model [CHIA]. The results of this study will improve the subdistrict municipality in terms of applying or conducting the HIA for the importance of public health policy and the people's well being.



4.11 Ecological Modelling, Volume 258, 10 June 2013, Pages 82-90

Simulation modelling of dissolved organic matter removal in a free water surface constructed wetland

Thiwari Ophithakorn, Chaisri Suksaroj, Thunwadee Tachapattaworakul Suksaroj

A simulation model was developed to explain the reduction of dissolved organic matter (DOM) in a free water surface constructed wetland (FWS-CW). Laboratory-scale experiments were conducted in the FWS-CW system of the water reclamation plant of Hat Yai municipality in Southern Thailand. The FWS system was divided into different layers of FWS-CW components according to their mechanisms and the kinetic coefficient (k). The DOM, in terms of the soluble chemical oxygen demand (SCOD) concentrations simulated by the calibrated model, exhibited moderate agreement with the full-scale data. The model showed that the leaching of SCOD from the gravel bed is the most significant mechanism affecting the SCOD concentration in the wetland ponds. Although the organic loading rate (OLR) of the SCOD inflow of the FWS-CW was low, a high SCOD concentration in these ponds was still observed under the conditions of a long hydraulic retention time (HRT) and a slow hydraulic loading rate (HLR). Hence, FWS-CW management should focus on the relationship between HLR and HRT, as well as sludge management in the system, to prevent the release of SCOD. When this model was stimulated with the operational data of the FWS-CW under study, it revealed that the HRT should not exceed 2 days to prevent high SCOD discharge into the water reservoir.



5.0

Taylor University

5.1 Journal of Engineering Science and Technology Volume 6, Issue 5, October 2011, Pages 551-561

Experimental investigation on effect of additional reservoir onto conventional impedance pumping system

Lee, V.C.C., Abakr, Y.A., Woo, K.C., Al-Atabi, M.

Impedance pumping is defined as a valveless pumping mechanism, where an elastic tube is joined with a tube of different impedance, a periodic asymmetrical compression on part of the elastic tube will produce a unidirectional flow. Numerical and experimental studies had been conducted in the past in the field of impedance pumping, but no experimental work was found to exploit the principle of multi-stage impedance pumping for fluid transportation. This piece of work describes the investigation of the effect of additional reservoir onto the existing conventional impedance pumping system. Pressure head increment is proven to be viable in this experiment. A pressure head increment of 240 Pa is obtained in the two reservoirs single actuator system, 180 Pa in the three reservoir single actuator, and 480 Pa in the three reservoirs two actuator system. Flow rate of 5 mL/s, 6 mL/s and 8 mL/s is obtained for the two reservoirs single actuator, three reservoirs single actuator and three reservoirs two actuator system respectively. Results presented are of great significant and showed an increment of 100% in the pressure head and 60% in the flow rate in the three reservoirs system as compared to the conventional system. © School of Engineering, Taylor's University.

Keywords

Elastic; Impedance pumping system; Multi-stage; Unidirectional flow; Valveless



6.0

Universiti Kebangsaan Malaysia

6.1

Sains Malaysiana, 42 (5). pp. 561-570. ISSN 0126-6039

Aptian to turonian radiolarians from chert blocks in the Kuamut Melange, Sabah, Malaysia

Basir Jasin and Junaidi Asis

The Kuamut Melange is located in the Kunak district, southeast Sabah. The mélange consists of clasts and blocks of broken Paleogene formations, and dismembered ophiolite blocks embedded in shale matrix. Fourteen samples were collected from sections S1 and S2 of the Kuamut Melange. A total of 45 species of radiolarians have been identified and only 36 selected species are used for age determination. Three assemblages (I-III) were identified. Assemblage I consists of *Dictyomitra excellence*, *Crucella bossoensis*, *Hiscocapsa asseni*, *Hexapyramis precedis*, *Thanarla brouweri*, *Acanthocircus levis*, *Obeliscoites vinassai*, *Stichomitra communis*, *Staurosphaeretta longispina*, *Xitus spicularius*, *Triactoma cellulosa*, and *Dactyliosphaera maxima*. This assemblage is marked by the occurrence of *Crucella gavalai* indicative of Aptian to Albian in age. Assemblage II was characterized by zonal marker *Xitus mclaughlini*. Other species in this assemblage are *Xitus spinosus*, *Stichomitra tosaensis*, *Dictyomitra gracilis*, *Dictyomitra montisserei*, *Pseudodictyomitra pseudomacrocephala*, *Pessagnobrachia fabianii*, *Crucella messinae*, *Tuguriella pagoda*, *Dictyomitra obesa*, *Triactoma paronai*, *Rhopalosyringium euganeum*, *Acanthocircus venetus*, *Acaeniotyle rebelis*, *Dictyomitra formosa*, *Pseudodictyomitra tiara* and *Patellula helios*. This assemblage ranges from Albian to Cenomanian. Assemblage III is represented by zonal marker *Crucella cachensis* and others species in this assemblage are *Hemicryptocapsa polyhedra*, *Eostichomitra bonum*, *Pseudotheocampe fina*, *Ultranapora cretacea* and *Alievium superbum*. Assemblage III is Turonian in age. The radiolarian assemblages suggest that the age of chert blocks ranges from Aptian to Turonian, Cretaceous. The cherts were originally deposited on an oceanic crust of a marginal basin during Cretaceous and were tectonically deformed to form melange in Miocene time.

Keywords

Aptian; Kuamut; Melange; radiolarians; Turonian



6.2 Sains Malaysiana, 42 (9). pp. 1301-1310. ISSN 0126-6039 (2013)

Hydraulic performance of free surface breakwaters: a Review

H.M., Teh

This paper introduces the concept of free surface breakwaters for coastal protection. The advantages, limitations and applications of these breakwaters are discussed. Based on their configurations, free surface breakwaters have been classified into four types, namely solid-type, plate-type, caisson-type and multipart-type. Typical designs of the respective breakwater types are presented and the hydraulic characteristics are reviewed. In addition, comparisons of hydraulic efficiency of some of the free surface breakwaters are also addressed in this paper.

Keywords

Energy dissipation; free surface breakwater; wave attenuation; wave reflection



6.3 Sains Malaysiana, 42 (11). pp. 1571-1580. ISSN 0126-6039 (2013).

Biometric relationships of the pool barb *Puntius sophore* (Hamilton 1822) (Cyprinidae) from three major rivers of Bangladesh

Hossain, Md. Yeamin and Rahman, Md. Mosaddequr and M. Abdallah, Elgorban and Ohtomi, Jun

The present study describes population structure (length-frequency distribution-LFD) and biometric relationships including length-weight relationship (LWR), length-length relationship (LLR), Fulton's condition factor (K), relative weight (W_r) and form factor ($a_{3.0}$) of *Puntius sophore* wild populations from three major rivers of different geographical locations of Bangladesh. A total of 784 specimens were caught by traditional fishing gear from March 2010 to February 2011. For each individual, the total length (TL), fork length (FL) and standard length (SL) were measured by digital slide calipers. Individual body weight (BW) was also taken by a digital balance. The results showed significant differences in TL-frequency distributions among populations ($p < 0.05$), with larger mean TL size (6.92 ± 1.21 cm) was recorded from the Rupsha River. The coefficient b of the LWR was close to the isometric value ($b \approx 3.000$) in these rivers of Bangladesh, although it suggested negative allometric growth in the Padma River ($b \approx 2.900$). The results also indicated that the LWRs were highly correlated ($r^2 > 0.921$). Fulton's condition factor (K) showed significant variations ($p < 0.001$) among the populations, with best performance by the Padma River, followed by the Jamuna and Rupsha River; whereas, relative weight (W_r) was close to 100 for all the populations, indicating the balance habitat with food availability relative to the presence of predators. The estimated values of $a_{3.0}$ were as 0.0158, 0.0142 and 0.0152 for *P. sophore* in the Jamuna, Padma and Rupsha River. These results will be useful for fishery biologists and conservationists to suggest adequate regulations for sustainable fishery management and conservation its numerous stocks in the region.

Keywords

Biometric; condition factor; length-weight relationships; *Puntius sophore*



6.4 Sains Malaysiana, 42 (11). pp. 1539-1548. ISSN 0126-6039 (2013).

The 'black waters' of Malaysia: tracking water quality from the peat swamp forest to the sea

Irvine, Kim and Vermette, Stephen and Firuza Begham Mustafa

Longitudinal water quality trends were assessed in the Tenggi River system, Selangor, Malaysia, as the water moved from a peat swamp forest, through different agricultural land uses and finally through a town and then to the Straits of Malacca. Water draining from the peat swamp forest was dark in color due to its organic content and low in dissolved oxygen, pH, *E. coli*, calcium, nitrate and ammonia. The normal diurnal pattern for water temperature was observed for the peat swamp forest drainage, but there was no clear diurnal pattern evident in the dissolved oxygen data. The *E. coli* levels increased monotonically from the peat swamp forest waters (0 colonies/100 mL) through the agricultural areas (100-2000 colonies/100 mL) and town (7100 colonies/100 mL) and similarly pH increased along the same continuum. Dissolved oxygen increased from the peat swamp forest through the agricultural areas, but was lower in the town-impacted reach of the Tenggi River.

Keywords

Dissolved oxygen; *E. coli*; land use; peat swamp forest; Selangor



6.5 Geografia : Malaysian Journal of Society and Space, 8 (5). pp. 124-139. ISSN 2180-2491 (2012).

3D GIS urban runoff mechanism: A new perspective using volumetric soft geo-object

Izham Mohamad Yusoff , and Main Rindam

With the enhancement of the current GIS data model into a 3D dynamic simulation form, the importance of urban runoff mechanism could be visualized significantly. Such enhancement provides a valuable step for urban runoff modelers by visualizing complex streamflow routing, overland flow, channel flow routing and runoff volume coverage information. Inclusion of Volumetric Soft Geo-objects (VSG) offers substantial effort towards representing 3D dynamic simulation of overland flow volume that hits the urban flood-plain areas, estimating channel flow capacity, routing and diversions to reduce urban flood disaster. The VSG are driven by a Kinematic Wave Routing and Green-Ampt method for simulating open channel flow and overland flow volume respectively using HEC-HMS hydrologic model. Basin model, sub-basin, reach and junction elements are extracted from Digital Elevation Model (DEM) with 5 meter resolution using HEC-GeoHMS programme within ArcView GIS software and HEC-HMS model. The comparison of simulated discharge volume using VSGs with observed 10 minutes interval discharge volume gave a reading of $R^2 = 0.88$ and a Nash-Sutcliffe coefficient of 0.82. Such 3D VSG visualization is useful in predicting potential location of flood disaster, landslide high risk spots, and informative. It is also valued as a realistic and sustainable hydrologic impact management instrument by contemporary GIS practitioners including hydrologists, environmentalists, town planners and other relevant scientists.

Keywords

3D GIS; Green-Ampt method; kinematic wave routing; simulation; visualization, VSG



6.6 Sains Malaysiana, 40 (6). pp. 549-554. ISSN 0126-6039 (2011)

Accumulation of settling particles in some coral reef areas of Peninsular Malaysia.

Lee Jen Nie and Che Abd Rahim Mohamed

The aim of this study was to determine the accumulation of settling particles in coral reefs of Peninsular Malaysia. Settling particles were collected from the coral reefs of Port Dickson, Pulau Langkawi, Pulau Tioman, Pulau Redang and Pulau Tinggi from 2005 to 2008. The average total settling particles in Pulau Langkawi and Port Dickson was 49.8 mg/cm²/day, while for Pulau Tioman, Pulau Redang, and Pulau Tinggi was 3.5 mg/cm²/day. The results showed that accumulations rate in west coast were higher than east coast of Peninsular Malaysia. However, Pulau Tioman in the east coast received high accumulations rate of settling particles in certain times of the year due to sediment resuspension at shallow reefs caused by high energy seasonal yearly wave and monsoon.

Keywords

Accumulations rate; coral reef; organic matter; Peninsular Malaysia; settling particles



6.7 **Sains Malaysiana, 42 (8). pp. 1091-1100. ISSN 0126-6039**

Facies analysis of the Uppermost Kubang Pasu Formation, Perlis: a wave- and storm-influenced coastal depositional system

Meor Hakif Amir Hassan, and Yeow, Boon Sim and Lee, Chai Peng
and Abdul Hadi Abdul Rahman

A detailed sedimentological study and facies analysis of the Permian age, uppermost succession of the Kubang Pasu Formation in Perlis was conducted in order to reconstruct the palaeo-depositional environment. Four stratigraphic sections of the uppermost Kubang Pasu Formation were logged at Bukit Chondong and Bukit Tungku Lembu, Perlis. The sections were divided into facies based on lithology and sedimentary structures. Large scale patterns in the form of facies associations and facies successions were also identified. The uppermost Kubang Pasu Formation can be divided into several coarsening upward facies successions. Each facies succession grades upward from an offshore facies association (FA1) composed of bioturbated mudstone and minor thin sandstone, into a distal lower shoreface facies association (FA2) composed primarily of mudstone interbedded with hummocky cross-stratified sandstone (HCS) and finally a proximal lower shoreface facies association (FA3) composed of amalgamated hummocky cross-stratified sandstone beds. The facies succession is interpreted as representing a wave- and storm-influenced coastal depositional environment. The gradual transition from siliciclastics to carbonates is probably related to post rift thermal subsidence and tectonic quiescence due to separation of Sibumasu from Gondwana during the Permian.

Keywords

Kubang Pasu Formation; Perlis; Permian; shoreface



6.8 Sains Malaysiana, 43 (1). pp. 21-29. ISSN 0126-6039 (2014)

Effects of meteorological conditions on the occurrence of *cochlostinium polykrikoides* and *pyrodinium bahamense* var. *compressum* in coastal waters of Kota Kinabalu, Sabah, Malaysia.

Normawaty Mohammad-Noor, Encik Weliyadi, Than Aung,
Aimimuliani Adam and Dayang Siti Maryam Hanan

In the Kota Kinabalu coastal area, the episodic occurrences of harmful algal bloom (HAB) species had been reported more than a decade ago. But, the time of the occurrence and factors contributing to the occurrence are still inadequately understood. To fill the gap, a study using 4 years field data from 2007 to 2010 was conducted. Cell densities of two HAB species, physicochemical parameters such as temperature, salinity, pH and dissolved oxygen together with rainfall data, wind data and general influence of ENSO episodes were taken into account to identify the most probable factors that trigger the occurrence of HAB species in the Kota Kinabalu coastal waters. From the analysis, *C. polykrikoides* blooms after 1 to 2 days of rain and significantly high nutrient concentrations were recorded during the blooms. Other physicochemical parameters were almost the same during the bloom and non-bloom events. Climate phenomena like ENSO (El Niño Southern Oscillation) affected the occurrence of *P. bahamense* var. *compressum* and *C. polykrikoides*. *P. bahamense* var. *compressum* occurred during El Niño due to high salinity and no blooms were recorded during La Niña. This indicates that unusual climate condition suppressed the bloom formation. The results gained from this study provide important information in managing HAB species particularly in the Kota Kinabalu coastal area.

Keywords

Algal blooms; El Niño phenomena; meteorological data; paralytic shellfish poisoning; Sabah



6.9 Sains Malaysiana, 41 (8). pp. 939-947. ISSN 0126-6039 (2012)

Supervised and unsupervised artificial neural networks for analysis of diatom abundance in tropical Putrajaya Lake, Malaysia

Sorayya , M and Aishah, and Mohd. Sapiyan , B

Five years of data from 2001 until 2006 of warm unstratified shallow, oligotrophic to mesotrophic tropical Putrajaya Lake, Malaysia were used to study pattern discovery and forecasting of the diatom abundance using supervised and unsupervised artificial neural networks. Recurrent artificial neural network (RANN) was used for the supervised artificial neural network and Kohonen Self Organizing Feature Maps (SOM) was used for unsupervised artificial neural network. RANN was applied for forecasting of diatom abundance. The RANN performance was measured in terms of root mean square error (RMSE) and the value reported was 29.12 cell/mL. Classification and clustering by SOM and sensitivity analysis from the RANN were used to reveal the relationship among water temperature, pH, nitrate nitrogen (NO₃-N) concentration, chemical oxygen demand (COD) concentration and diatom abundance. The results indicated that the combination of supervised and unsupervised artificial neural network is important not only for forecasting algae abundance but also in reasoning and understanding ecological relationships. This in return will assist in better management of lake water quality.

Keywords

Diatom; forecasting; recurrent artificial neural network; self organizing maps.



6.10 *Malaysiana*, 41 (4). pp. 389-394. ISSN 0126-6039 (2012)

Application of factor analysis in geochemical fractions of heavy metals in the surface sediments of the offshore and intertidal areas of Peninsular Malaysia

Yap , C.K

In this study, heavy metal data (including four geochemical fractions) from offshore and intertidal sediments collected off the west coast of Peninsular Malaysia were analyzed using factor analysis. A similarity was found when comparing between offshore and intertidal sediments, where out of the 20 variables, five factors (resistant Cu, total Cu, resistant Pb, total Pb and total Zn) could be clearly selected on the basis of their high loadings as derived by factor analysis in both sediment sampling areas. However, the statistical outputs based on the present study using factor analysis cannot be practically acceptable mainly because the resistant fractions are not of anthropogenic origins and ecotoxicologists are more concern on the anthropogenic ones. Only a modification using a specific normalizing agent such as the nonresistant fraction, should be tested to show feasibility of the contribution of anthropogenic sources in the two sampling areas. However, a more comprehensive metal monitoring data should be compiled to complement the results obtainable from factor analysis, before a valid Malaysian Marine Sediment Pollution Index or Sediment Quality Guidelines, can be proposed to be established.

Keywords

Factor analysis; metals in sediment; Peninsular Malaysia



7.0

Universiti Malaya

7.1

Malaysian Journal of Science Volume 31, Issue 1 (2012)

Bioassay-guided identification of chemical components in *Typhonium roxburghii* Schott

Annie Sulochana Selvakumari, P., John De Britto, A.,

Typhonium roxburghii Schott (corm) extracts were screened for insecticidal activity against the storage pest *Tribolium castaneum* (Herbst). Among the different extracts tested, the benzene extract was found to be more effective (LC₅₀ 3.042% in 24 h). However, the yellow viscous mass obtained from the petroleum ether fraction of the benzene extract induced absolute mortality at 0.12% concentration (LC₅₀ 0.056% in 24 h). It was subjected to GC-MS studies and the chemical constituents were identified as methyl ester of 2-hydroxy benzoic acid, diethyl phthalate and dioctyl phthalate. Cultivation of *T. roxburghii* is possible because it does not prefer natural habitat. It is quick growing and needs no fencing. It can be cultivated in wastelands with fewer expenses. The positive externalities due to cultivation of *T. roxburghii* would be in the form of scenic beauty of the region with its evergreen leaves, virtual absence of mosquitoes even though sewage water is used. Identification of chemical constituents in *T. roxburghii* is a pioneer work and a more extensive exploratory study might reveal more. This can be exploited as an eco-friendly bio-pesticide.

Keywords

Typhonium roxburghii, *Tribolium castaneum*, benzene extract, LC₅₀ values, chemical constituents



7.2 Malaysian Journal of Science Volume 31, Issue 2 (2012)

Land Use and Catchment Size/Scale on the Water Quality Deterioration of Kinta River, Perak, Malaysia

Azyana, Y., Nik Norulaini N.a, Nurul Jannah H.,

GIS and statistical analysis tools were used to examine the impact of catchment size and land use predictors that have an influence on the Kinta River water quality. The percentage of five land use predictor variables specifically forest land, agricultural land, developed areas, water bodies and mine areas were extracted from the entire catchment and buffer zones with radii ranging from 200 to 1000 m. Correlation and regression analysis were conducted on twelve water quality parameters at ten selected stations. Results suggest that, in most cases, the entire catchment landscape characteristics appear to have slightly greater influence on water quality rather than the specific sampling site of predetermined buffer radii. Developed land use becomes the best indicator to predict the degradation of water quality. While forested land, agricultural land, mining areas and water bodies do not contribute much to the river pollution.

Keywords

water quality, entire catchment, developed area, GIS



7.3 **Advanced Science Letters, 14 (1). pp. 360-364. ISSN 1936-6612 (2012)**

Wave data for shallow and deep water sedimentary basins of Malaysia

Jameel, M.; Islam, A.B.M.; Salman, F.A.; Khaleel, M.; Jumaat, M.Z.

The recent years have seen significant development of offshore structures in Malaysian region for oil and gas exploration. Analyzing and studying the behavior of offshore marine structures subjected to environment conditions native to Malaysian seas offshore of Terengganu and Sarawak requires that the sea wave characteristics be properly probed. In addition, the knowledge of wave characteristics is essential for planning, design and construction of new ports coastal protection constructions, harbors and navigational channels. It correspondingly contributes to fisheries activities, navigation, marine habitat management and coastal development and planning. As this kind of research is still young for the case of Malaysian oil and gas exploration cum production activity, research methods are introduced and implemented in the study to catch on the wave characteristics in deep water be existent at offshore Terengganu and Sarawak. These essentially include obtaining reliable sea wave data for the purpose of offshore engineering design, studying the wave height distributions to predict the probability of occurrences of different sea states. Subsequently, the wave data's for the water depths of the Terengganu and Sarawak basin, which is 200 m (shallow) and 2000 m (ultra-deep) respectively are developed. The sea wave data have been predicted for 100 years occurrence probabilities and 1000 years return periods.



7.4 Environmental Geochemistry and Health, 33 (SUPPL.). pp. 91-101. ISSN 0269-4042 (2011)

Pilot-scale tests to optimize the treatment of net-alkaline mine drainage

Jang, M.; Kwon, H.

A pilot-scale plant consisting of an oxidation basin (OB), a neutralization basin (NB), a reaction basin (RB), and a settling basin (SB) was designed and built to conduct pilot-scale experiments. With this system, the effects of aeration and pH on ferrous oxidation and on precipitation of the oxidized products were studied systemically. The results of pilot-scale tests showed that aeration at 300 L/min was optimum for oxidation of Fe(II) in the OB, and the efficiency of oxidation of Fe(II) increased linearly with increasing retention time. However, Fe(II) was still present in the subsequent basins-NB, RB, and SB. Results from pilot-scale tests in which neutralization was excluded were used to obtain rate constants for heterogeneous and homogeneous oxidation. Oxidation of Fe(II) reached almost 100 when the pH of the mine drainage was increased to more than 7.5, and there was a linear relationship between total rate constant, $\log(K_{\text{total}})$, and pH. Absorbance changes for samples from the NB under different pH conditions were measured to determine the precipitation properties of suspended solids in the SB. Because ferrous remained in the inflow to the SB, oxidation of Fe(II) was dominant initially, resulting in increased absorbance, and the rate of precipitation was slow. However, the absorbance of the suspension in the SB rapidly dropped when pH was higher than 7.5

Keywords

Mine drainage; Net alkalinity; Oxidation; Pilot-scale; Precipitation



7.5 Malaysian Journal of Science Volume 31, Issue 2 (2012)

Antimicrobial Resistance in Bacteria Isolated from Tropical Coastal Waters of Peninsular, Malaysia

Kian Giap You, Bong, C.w., Lee, C.w.,

Thirty three heterotrophic bacteria isolated from tropical coastal waters in Peninsular Malaysia were tested for susceptibility to 15 different antibiotics representing nine different classes of antimicrobial agents. We found that tetracycline, sulfonamide, mecillinam, sulfamethoxazole, erythromycin, and streptomycin resistance were predominant among the bacterial isolates. Resistance to chloramphenicol, ampicillin, vancomycin, norfloxacin, ofloxacin and trimethoprim/sulfamethoxazole were less common. All of the bacterial strains were susceptible to meropenem, imipenem, and ciprofloxacin. Approximately 70% of the isolates were resistant to two or more structural classes of antibiotic. Findings from this preliminary study indicated the prevalence of antibiotic resistance bacteria in the coastal waters of Peninsular Malaysia.

Keywords

marine bacteria, antibiotic, multidrug resistance, coastal waters



7.6 Aquatic Ecosystem Health and Management, 15 (3). pp. 279-286. ISSN 14634988 (2012)

Marine debris composition and abundance: a case study of selected beaches in Port Dickson, Malaysia

Khairunnisa, A.K.; Fauziah, S.H.; Agamuthu, P.

Malaysia has a long coastline and is well known for its beautiful beaches which play different roles, depending on the characteristics and location. With increasing population and rapid development, the beaches are experiencing threats from pollution. One of the most visible threats is due to solid waste disposal. A scientific quantitative dataset of marine debris in Malaysia is, however, very rare. Therefore, a study on marine debris was conducted on two beaches in Port Dickson, Malaysia, from January to March 2010. The objective of the study was to compare the density of waste on two selected beaches with different economic activities. Teluk Kemang and Pasir Panjang are recreational and fishing beaches, respectively. Pasir Panjang received at least 2 units of debris for every 2 m^2 ($0.495 \pm 0.108 \text{ items m}^{-2}$), weighing $46.079 \pm 12.507 \text{ g m}^{-2}$. Debris found in Teluk Kemang was lower than that of Pasir Panjang with 1 unit of waste for every 2 m^2 ($0.262 \pm 0.045 \text{ items m}^{-2}$), weighing $2.067 \pm 1.238 \text{ g m}^{-2}$. Based on the number of items, plastics were the most abundant type of debris at 64% in Teluk Kemang and 46% in Pasir Panjang. In terms of weight, paper was higher (48%) than plastic (43%) in Teluk Kemang, while the highest percentage of debris found on Pasir Panjang beach was bulky waste (54%). The number of items and weight of debris were higher in Pasir Panjang due to the abundance of huge and heavy abandoned nets from fishing activities left on the beach. Daily clean-ups of Teluk Kemang, a popular recreational beach, contributed to significantly lower amounts of debris found there. On the whole, types of waste found on both beaches were similar. However, the percentage and amount of each waste's type varied between the two beaches. The results indicated that the density of waste is highly dependable on the economic activities of the relevant beaches.

Keywords

Fishing beach, litter, marine pollution, recreational beach, solid waste



7.7 Southeast Asian Journal of Tropical Medicine and Public Health, 43 (1). pp. 129-135. ISSN 0125-1562 (2012)

***Clostridium Perfringens* and Sulphite Reducing Clostridia Densities in Selected Tropical Malaysian Rivers**

Lee, F. C. H.; Hakim, S. L.; Kamaluddin, M. A.; Thong, K. L.

Clostridium perfringens (CP) and sulphite reducing clostridia (SRC) densities in the Selangor River, Bernam River and Tenggi River Canal were examined between April 2007 and January 2008. Water samples were taken from two or three locations along each river, using either depth-integration or grab sampling methods. The downstream sampling site of the Selangor River, Rantau Panjang, reported the highest arithmetic mean of CP and SRC densities (583.45 and 8,120.08 cfu/100 ml, respectively). Both CP and SRC densities in the Selangor River increased further downstream, but the reverse was true in the Bernam River. The SRC densities in these rivers were significantly different from each other ($p < 0.05$) when comparing upstream and downstream results, but CP densities were not significantly different ($p > 0.05$). SRC densities were significantly correlated ($p < 0.05$) in different locations along the Selangor River and the Bernam River. The CP densities did not show such pattern ($p > 0.05$). River discharge had no significant correlation with SRC or CP densities by study site ($p > 0.05$). Since the Selangor River has a denser human population along its banks, this study confirms CP as a suitable indicator of human fecal contamination. However, tracing CF distribution along the river is more difficult than SRC. To our knowledge, this is the first study of CP and SRC densities from Malaysian rivers. CP densities found in this study were within the range of general water bodies reported from other countries.

Keywords

Clostridium perfringens, sulphite reducing clostridia, river, water, tropical, depth-integration method



7.8 Malaysian Journal of Science Volume 31, Issue 1 (2012)

Study of marine structural corrosion using corrosion coupons in Lumut area

Narayanan Sambu Potty, Ong, Shiou Ting, M.s. Liew,

The corrosion rate in marine environments affects economic interest since the loss of steel in marine structures has impact on structural safety and performance. With emphasis to maintain existing structures in service, there is increasing interest in predicting corrosion rate at a given location for a given period of exposure. Corrosion allowances are prescribed for structural members by standards based on the corrosion protection provided, expected rate of corrosion and service life of structure. There are no studies to determine the appropriate corrosion allowance for marine steel structures in Malaysia. The research objectives are to determine the nature and rate of corrosion and the effect of differences in the immersion depth and microalgae on the corrosion rate. Two sets of corrosion coupons of Type 3 Steel consisting of mild steel were immersed in seawater at Lumut in Malaysia. The corrosion rate of the coupon is estimated based on the material weight loss with time. The corrosion rate is controlled by oxidation in short term and bacterial activity in long term. Corrosion rate in the immersion zone is observed to be more than in the splash zone. The results are also compared with code prescriptions and discussed.

Keywords

rate of corrosion, uniform corrosion, pitting, corrosion coupons, marine structures



7.9 Environmental Monitoring and Assessment, 185 (2). pp. 1541-1554. ISSN 0167-6369 (2013)

Assessment of organochlorine pesticides and plasticisers in the Selangor river basin and possible pollution sources

Santhi, V.A.; Mustafa, A.M.

A study on the quality of water used for potable use was conducted in the Selangor River basin from November 2008 to July 2009. Seven sampling sites representing the intake points of water treatment plants in the basin were selected to determine the occurrence and level of 15 organochlorine pesticides (OCPs), six phthalate esters (PAEs) and bisphenol A (BPA). Results indicated OCPs were still detected regularly in 66.1 of the samples with the $\Sigma(15)$ OCPs pound ranging from 0.6-25.2 ng/L. The first data on PAEs contamination in the basin revealed $\Sigma(6)$ PAEs pound concentrations were between 39.0 and 1,096.6 ng/L with a median concentration of 186.0 ng/L while BPA concentration ranged from < 1.2 to 120.0 ng/L. Although di-n-butyl phthalate was detected in all the samples, concentrations of di-ethyl(hexyl)phthalate were higher. Sampling sites located downstream recorded the highest concentrations, together with samples collected during the dry season. Comparison of the detected contaminants with the Department of Environment Water Quality Index (DOE-WQI) showed some agreement between the concentration and the current classification of stream water. While the results suggest that the sites were only slightly polluted and suitable to be used as drinking water source, its presence is because for concern especially to the fragile firefly "Pteroptyx tener" ecosystem located further downstream.

Keywords

Organochlorine pesticide; Phthalate; esters; Bisphenol A; Surface water



7.10 Journal of Water and Health. ISSN 1477-8920 (2013)

Assessment of endocrine disruptors - DDTs and DEHP (plasticizer) in source water: a case study from Selangor, Malaysia.

Santhi Armugam Veerasingam, Mustafa Ali Mohd

The presence of endocrine disruptors in source water is of great concern because of their suspected adverse effects on humans, even when present at very low levels. As the main source of potable water supply, rivers in Malaysia are highly susceptible to contamination by various endocrine disruptors originating from anthropogenic activities. In this study, the contamination levels of 1,1,1-trichloro-2,2-bis (4-chlorophenyl) ethane (DDT) and its metabolites and di-(2-ethylhexyl) phthalate (DEHP) in rivers of Selangor were examined using gas chromatography/mass spectrometry. Samples were collected from sites representing source water for 18 drinking water treatment plants in Selangor between July 2008 and July 2009. DDT and its metabolites were detected in only 14 of the 192 samples analysed at levels ranging from 0.6 to 14.6 ng/L. Meanwhile DEHP was detected in 96.8 of the samples at levels ranging from below quantitation level (18 ng/L) to 970 ng/L. The detected levels of DDTs and DEHP were lower than the WHO and Malaysian Guideline for Drinking Water Quality. Data obtained from this study should also serve as a reference point for future surveillance on these endocrine disruptors.

Keywords

DDT; DEHP; endocrine disruptor; gas chromatography/mass spectrometry; river water; water and health



7.11 Sci Total Envi. 2012 Jun 15; 427-428: 332-8. Doi:10.1016/j.scitotenv.2012.04.041. Epub 2012 may 9. © 2012 Elsevier B.V.

Occurrence of bisphenol A in surface water, drinking water and plasma from Malaysia with exposure assessment from consumption of drinking water

Santhi, V. A.; Sakai, N.; Ahmad, E.D.; Mustafa, A.M.

This study investigated the level of bisphenol A (BPA) in surface water used as potable water, drinking water (tap and bottled mineral water) and human plasma in the Langat River basin, Malaysia. BPA was present in 93 of the surface water samples at levels ranging from below limit of quantification (LOQ; 13 ng/L) to 215 ng/L while six fold higher levels were detected in samples collected near industrial and municipal sewage treatment plant outlets. Low levels of BPA were detected in most of the drinking water samples. BPA in tap water ranged from 3.5 to 59.8 ng/L with the highest levels detected in samples collected from taps connected to PVC pipes and water filter devices. Bottled mineral water had lower levels of BPA (3.3 +/- 2.6 ng/L) although samples stored in poor storage condition had significantly higher levels (113 +/- 5.3 ng/L). Meanwhile, only 17 of the plasma samples had detectable levels of BPA ranging from 0.81 to 3.65 ng/mL. The study shows that BPA is a ubiquitous contaminant in surface, tap and bottled mineral water. However, exposure to BPA from drinking water is very low and is less than 0.01 of the tolerable daily intake (TDI).

Keywords

Bisphenol A; River water; Drinking water; Plasma; Exposure assessment



8.0

Universiti Malaysia Perlis

8.1 Chemical Engineering Science, Vol. 79, 228–238, 10 September 2012, Published by Elsevier Ltd

RO concentrate treatment by a hybrid system consisting of a pellet reactor and electro dialysis

Anh T.K. Tran, Yang Zhang, Nora Jullok, Boudewijn Meesschaert,
Luc Pinoy, Bart Van der Bruggen

This paper investigates the feasibility of a hybrid system consisting of a pellet reactor and electro dialysis (ED) to treat reverse osmosis (RO) concentrates in which the pellet reactor was used to remove the scaling potential before ED treatment. The objective of the hybrid system was a high recovery for the RO system, and zero liquid discharge for the RO. The performance of the pellet reactor on lab-scale was evaluated at superficial velocities of 48, 61 and 73 m/h with an initial pH 11. The efficiency of calcium removal was between 70 and 80%. Precipitation in the pellet reactor showed higher calcium removal up to 95% when the pH was adjusted to 11.5. The wastewater with reduced scaling potential (after pellet crystallization) was treated by ED to achieve the required characteristics for reinserting the liquid to an integrated system ultrafiltration–reverse osmosis (UF–RO). Without the pellet reactor and using RO concentrate as feed of ED in feed and bleed operation, the ED was rapidly scaled and reached the maximum voltage. By removing 80% calcium in RO concentrate in the pellet reactor, the ED system can be operated in a stable way with high current efficiency and without scaling.

Keywords

RO concentrate treatment, hybrid system, pellet reactor, electro dialysis, precipitation, zero liquid discharge



9.0

Universiti Malaysia Sabah

9.1

Harmful Algae, Volume 10, Issue 5, July 2011, Pages 495-502

Temporal and spatial distribution of harmful algal bloom (HAB) species in coastal waters of Kota Kinabalu, Sabah, Malaysia

Aimimuliani Adam, Normawaty Mohammad-Noor, Ann Anton,
Ejria Saleh, Shahbudin Saad, Sitti Raehanah Muhd Shaleh

Development of harmful algal blooms (HABs) in coastal waters of Kota Kinabalu, Malaysia, is a recurring problem. The blooms are caused by *Pyrodinium bahamense* var. *compressum* and *Cochlodinium polykrikoides*. Recently, another potential HAB species, *Gymnodinium catenatum*, was identified. The occurrence of these species is known to be related to a range of factors, including seasonal monsoons, nutrients, physical parameters and geomorphology. To understand the occurrence and distribution of the three species, extensive samplings were carried out over a period of one year, including the South West Monsoon (SWM), North East Monsoon (NEM) and Inter-Monsoon (IM) periods, at 5 stations located in 3 different bays off Kota Kinabalu. Cell density of the three HAB species and in situ physical parameters (salinity, pH and temperature) were recorded. Secondary data such as rain fall and wind speed were obtained from the Meteorology Department, Kota Kinabalu. *C. polykrikoides* and *G. catenatum* occurred year-round with the highest cell densities of 1.54×10^7 cells L^{-1} and 1.24×10^6 cells L^{-1} in December (NEM). *P. bahamense* var. *compressum* was found in low numbers with maximum cell density of 2×10^4 cells L^{-1} in August (SWM). The absence of *P. bahamense* var. *compressum* during the highest peak of *C. polykrikoides* and *G. catenatum* was related to nutrient concentrations and composition. The three species tended to occur at stations near the river and in a sheltered area. The results of the study indicate that the coastal area of Kota Kinabalu may continue to experience HAB problems, unless environmental conditions change significantly.



9.2 Journal of Hydrology, Volumes 432–433, 11 April 2012, Pages 26-42

Delineation of temporal variability and governing factors influencing the spatial variability of shallow groundwater chemistry in a tropical sedimentary island

Chin Yik Lin, Mohd Harun Abdullah, Sarva Mangala Praveena,
Aminatul Hawa Bt Yahaya, Baba Musta

An attempt has been made to delineate the temporal variability and factors governing the shallow groundwater chemistry using analysis of variance (ANOVA) and multivariate analysis notably R-mode factor (FA) and hierarchical cluster analysis (HCA). Subsequently, geostatistical isoplethic maps were applied to convey better understanding on the distribution of selected groundwater parameters. The Manukan Island's shallow aquifer with sedimentary setting that constantly ed for freshwater supply has been selected for this study. One-way ANOVA suggested that neither changes of tide level nor rainfall volume appeared to exert significant influence on the groundwater chemistry of the small island. Rather, the groundwater chemistry was greatly governed by influence from seawater intrusion, which characterized by considerable amount of Ca, Na, and Cl. Such condition was well explained by a Piper diagram, where most plots were situated at the middle diamond shaped diagram, indicating mixing condition. FA likewise revealed that the shallow groundwater receives marked influence from carbonate dissolution and silicate weathering processes, especially boreholes located in the inland area. This can be clearly noted from the distinct groupings of relationships among different factors. HCA classified boreholes into three groups according to their locations in the coastal area, suggesting significant chemical variations between boreholes with distance from coast. Such distribution pattern was particularly evident in the isoplethic map. Overall, it appears that the shallow groundwater in the tropical island is not an appropriate source for drinking water in concern to its exceptionally high salinity and several elevated minor elements (Mn, Pb, and Se). For this, it is suggested that efforts in exploring other alternative sources should be performed outright.



9.3 Applied Geochemistry, Volume 29, February 2013, Pages 13-31

Geochemical processes, evidence and thermodynamic behavior of dissolved and precipitated carbonate minerals in a modern seawater/freshwater mixing zone of a small tropical island

Chin Yik Lin, Baba Musta, Mohd Harun Abdullah

The geochemical processes and thermodynamic behavior of dissolved and precipitated carbonate minerals controlling the hydrochemistry of an aquifer in the seawater/freshwater mixing zone of a small island are identified. Field and laboratory analyses, geochemical modeling (PHREEQC) and multivariate statistical analysis (MSA) provide a quantitative interpretation for the geochemistry of the carbonate-dominated aquifer. Geochemical analyses and modeling results show that dissolution and re-precipitation of CaCO_3 are the prevalent processes governing geochemical reactions in the mixing zone. Furthermore, this was confirmed by coherent statistical output that incorporates Principle Component Analysis (PCA) and k-means Cluster Analysis (k-CA). Generally, the composition of the lowland sandy soil was rather homogeneous and was primarily composed of quartz, aragonite, calcite and Mg-calcite. Thermodynamic model calculations indicate that the carbonate minerals calcite, aragonite and dolomite are supersaturated in the mixing zone. Nevertheless, Powder X-ray Diffraction (PXRD) and Scanning Electron Microscope (SEM) examination verified the occurrence of low-Mg-calcite (LMC) and the absence of dolomite, attributed to thermodynamic/kinetic hindrance, cation disorder and the presence of dolomite crystal growth rate inhibitors (such as SO_4). The results suggest that dissolution of aragonite and precipitation of LMC drives the solid phase geochemistry in the small tropical island aquifer.



9.4 Applied Energy, Volume 112, December 2013, Pages 737-746

Evaluation of geothermal energy in desalination by vacuum membrane distillation
Original Research Article

Rosalam Sarbatly, Chel-Ken Chiam

This paper presents the energy evaluation of the cross-flow vacuum membrane distillation (VMD) for three types of lab-fabricated polyvinylidene fluoride (PVDF) membranes and the commercial Westran S PVDF membrane. Membranes with the effective area 23.5 cm^2 are tested with distilled water and geothermal water as the feed solutions. Results show that the membrane porosity controlled the flux through the fabricated membranes and the commercial membrane. The commercial membrane with porosity of approximately 76.5%, which was the most porous among the tested membranes, gave the highest flux at $9.28 \text{ kg/m}^2 \text{ h}$ under the optimum conditions of 33.2 L/h feed flow rate and 30 kPa downstream pressure. The corresponding specific energy consumption was $66.03 \text{ kW/kg h}^{-1}$ when distilled water was examined. Heating energy of $87\text{--}89 \text{ kW/kg h}^{-1}$, which is approximately 95% of the total energy consumption, could be saved when the warm geothermal water is fed directly into the VMD system. The water produced meets the drinking water quality with the TDS varying between 102 and 119 ppm, thus the geothermal water desalination using the VMD system to produce the drinking water is satisfactory. An economic analysis for a $20,000 \text{ m}^3/\text{d}$ VMD desalination plant finds that the water production costs are $\$0.50/\text{m}^3$ and $\$1.22/\text{m}^3$ respectively for the plant operated with and without geothermal energy (GE). Compare to the plant without GE utilisation, the water production costs of the plant operated with GE are less than $\$0.50/\text{m}^3$ that is at least $\$0.72/\text{m}^3$ or approximately 59% in cost saving when the water fluxes are larger than $6.6 \text{ kg/m}^2 \text{ h}$. The specific membrane cost reduced from $\$0.058/\text{m}^3$ to $\$0.035/\text{m}^3$ when the membrane life extended from 3 to 5 years.



9.5 Fire Safety Journal, Volume 51, July 2012, Pages 61-67

Estimating the flammability of vapours above refinery wastewater laden with hydrocarbon mixtures

Mohanad El-Harbawi, Siti Nurul Asikhin Bt. Shaaran, Fatimah Ahmad, Muhammad Aizat Abd Wahid, Adamu Abdul, Damian W. Laird, Chun-Yang Yin

In this study, the likelihood of fire hazards attributed to the vapourisation of hydrocarbon components derived from refinery wastewater drainage systems was assessed. Liquid samples containing mixtures of hydrocarbon products and water were collected from a refinery drainage system and subjected to a distillation process to separate oil and water. The oil-liquid phase was analysed using gas chromatography-mass spectrometry (GC-MS) to examine the composition of the sample. Hydrocarbon compounds ranging from C₉ to C₁₆ were detected. Mole fractions of 28 selected components in the liquid phase were obtained from the GC-FID data and used to calculate mole fractions of components in the gas phase via modified Raoult's law. Lower Flammability Limits (LFLs) and Upper Flammability Limits (UFLs) for individual components were calculated using a stoichiometric concentration method, while the LFL and UFL values for the mixture (LFL_{mix} and UFL_{mix}) were calculated using the Le Chatelier equation. The LFL_{mix} and UFL_{mix} values were used to construct a flammability diagram and subsequently used to determine the flammability of the mixture. The findings of this study may assist in minimising fire hazards associated with the presence of hydrocarbon vapours derived from refinery wastewater streams.



10.0

Universiti Malaysia Sarawak

10.1 Separation and Purification Technology, Volume 113, 24 July 2013, Pages 51-63

Oil removal from aqueous state by natural fibrous sorbent: An overview

Rafeah Wah, Luqman Abdullah Chuah, Thomas Shean Yaw Choong,
Zainab Ngaini, Mohsen Mobarekeh Nourouzi

The threat of oil pollution increases with the expansion of oil exploration and production activities, as well as the industrial growth around the world. The study on the treatment of oily wastewater is a critical issue to the environmental protection as oil caused problems to the wastewater treatment facilities. Although oil particles can efficiently be removed by advanced technologies, the treatments are usually expensive and difficult to maintain. Adsorption and coalescence filtration are promising choice of treatment for its simplicity, effectiveness, and feasibility when appropriate sorbent is used. This review discusses the recent papers on the use of natural fibrous sorbent for removal of oil from wastewater, and its current development. With their excellent oil removal properties, environmental friendliness, easy availability, and feasibility, natural fibrous sorbents are an attractive alternative for oily wastewater treatment.

Keywords

Oily wastewater, Natural fibre;, Adsorption, Coalescence



10.2 *Procedia Engineering*, Volume 50, 2012, Pages 69-77

Salak River Water Quality Identification and Classification According to Physico-Chemical Characteristics

Nor Azalina Rosli, Mohd Hafiz Zawawi, Rosmina Ahmad Bustami

Anthropogenic activities over the years had adversely affected the environment especially the river and its ecosystem. This paper aims to study the river quality status of Salak River (locally known as Batang Salak) and map the river based on their water classes. 18 samples were collected and tested for physical-chemical parameters (pH, temperature, DO, BOD, COD, TSS, TDS, EC and NH₃-N) and heavy metals (As, Cr, Cu, Mn, Ni, Pb and Zn). Subsequently, the quality of the river is determined using Water Quality Index (WQI) and classified according to the National Water Quality Standards (NWQS) for Malaysia. The results show that the river has low level of DO (range 2.08-2.34mg/L) and high level of COD (range 645-1044mg/L), and Pb (range 0.01-0.09mg/L). Based on the WQIs and NWQS, the river quality status for Salak River falls under Class IV which indicates that the river is slightly polluted. Further actions should be taken into consideration to further improve the quality of Salak River, hence, promoting a healthier environment to the surrounding communities.

Keywords

river water quality, WQI, physico-chemical, heavy metals



10.3 World Applied Sciences Journal, 2013. © IDOSI Publications, 2013

Comparison of water quality at different locations at Batang Ai Reservoir, Sarawak, Malaysia

Ling, T.-Y., Nyanti, L., Leong, C.-K., Wong, Y.-M.

Batang Ai Hydroelectric Reservoir not only supplied the energy needed for development, it is also one of the important sites for cage culture. Information regarding water quality at different locations at the reservoir is scarce in literature. Therefore, the objective of this study was to determine the water quality at different locations of the reservoir. Results of the water quality study show that thermocline occurred between 7-11 m depth. Chlorophyll-a ranged from 0.38 mg/m³ to 6.02 mg/m³. The most frequent occurrence of highest chlorophyll-a was at 10 m depth. There was a significant negative correlation between chlorophyll-a and turbidity. BOD₅ was the highest at the outflow with values of 5.9 mg/L in November 2011 and 6.7 mg/L in April 2012. Higher BOD₅ was observed at stations near to the reservoir inflow due to settlements upstream. Turbidity and total suspended solids complied with Class II standards. As DO values could be less than 5 mg/L at depths of 10 m and below as evidenced in November 2011 near the cage culture site, mixing of epilimnion and hypolimnion water is potentially unhealthy for the caged fish. There is also a need for reduction of organic waste from households upstream.

Keywords

Aquaculture, Biochemical oxygen demand, Chlorophyll-a, Dam, Turbidity



10.4 World Applied Sciences Journal, Vol. 18(6), 855-860, 2012,IDOSI Publications

Water and sediment quality near shrimp aquaculture farm in Selang Sibu River, Telaga Air, Sarawak, Malaysia

Ling, T.-Y., Jaafar, N., Nyanti, L.

Shrimp farms are commonly located in the estuaries where it supplies the brackish water needed. World-wide, there have been reports of environmental degradation due to loadings of pollutants from shrimp farms. Therefore, the objective of this study was to determine the water and sediment quality near a shrimp farm discharge area. Water and sediment samples were collected at six stations near the discharge. Results of the study show that temperature ranged from 29.2-31.2°C and mean salinity ranged from 19-22 PSU. Water transparency was significantly lower and ammonia-nitrogen was significantly higher near the shrimp farm discharge station when compared to all the other stations. When there was discharge, water transparency was lower and ammonia-nitrogen was higher at all stations along the 3 km distance. In the sediment, total organic carbon ranged from 3.17-4.79% and total nitrogen of the stations ranged from 458.7 to 543.9 mg/kg. Total organic carbon, total nitrogen and total phosphorus of sediment at stations within 1.5 km of the shrimp farm discharge point were significantly higher than stations beyond that indicating that the impact of shrimp discharge on the sediment appears to be within 1.5 km from the discharge point.



10.5 Journal of Sustainability Science and Management, Volume 7 Number 1, June 2012 : 16-22

Temporal and spatial variations and decay rates of *E. Coli* in river sediment

Ling, T.Y., Azyyati, Z.I.M., Lesley, M.B.

Though the Serin River is used by the community as a source of drinking water, laundry and recreation, little is known about the bacterial contamination in the sediment. Therefore, in this study, the concentration of *E. coli* in the sediment was determined at nine stations in seven sampling trips and the decay rate of *E. coli* in the river sediment was determined in the laboratory. Results of *E. coli* count in the sediment shows high variation among the trips especially at stations near human activities. The highest and second highest mean populations were recorded in the sediment near human settlements. *E. coli* counts ranged from 4.0 to 7.2 log CFU/g and between consecutive trips mean rate of change of *E. coli* in the sediment ranged from -0.2 to 0.2 log CFU/g per day. Contaminations of the tributary with animal farms varied likely due to oxidation pond discharge. Laboratory studies showed that decay rate of *E. coli* in the river sediments ranged from 0.223 to 0.435 d⁻¹ and the first order decay model fitted the survival very well ($R^2= 0.972-0.995$) except in the sediment with lower pH and high temperature. The high count of *E. coli* in the sediment could render the water unsuitable for drinking and water contact recreation as it could be resuspended during disturbances.

Keywords

Coliforms, *E. Coli*, River sediment, Survival study



10.6 World Applied Sciences Journal, Vol. 16(4): 550-559, 2012,IDOSI Publications

Spatial and temporal variations of heavy metals in a tropical river

Ling, T.-Y., Kho, C.-P., Nyanti, L.

Previous water quality assessment conducted at the Serin River identified human and agricultural activities, especially livestock farming as the main sources of pollution. However, the number of stations studied was limited. In view of the use of the river water for various domestic purposes such as drinking water supply, heavy metals status in the river water was assessed at twelve stations in ten samplings trips. The results show that the mean concentrations of heavy metals in the river water followed the sequence of Fe>Zn>Pb>Cu>Cd. Rainy month led to an increase in heavy metals and it was associated with agriculture and animal farms. Thus, it indicates contributions from fertilizers in runoff and overflow of oxidation ponds. In addition, an increase in lead indicates vehicular contributions. Tributaries have higher heavy metals concentrations but had minimal impact on the main river due to dilutions. Near the water intake station, chromium, cadmium and lead occasionally exceeded the WHO drinking water guideline.

Keywords

Agricultural activities, Animal farming, Heavy metals, Road runoff, Serin river



10.7 **Advanced Materials Research, Volume 356-360, 2012, Pages 2406-2415, 2011 International Conference on Energy, Environment and Sustainable Development, ICEESD 2011 © (2012) Trans Tech Publications, Switzerland.**

Dominant factors influencing overall temporal sedimentation rates at Loagan Bunut Lake, Miri, Sarawak, Malaysia

Dagang, R.B., Lau, S., Sayok, A.K.

This paper is to predict dominant factors influencing temporal sedimentation rates at Loagan Bunut Lake using best-fit model of sedimentation rate and distance from Bunut River. The lake is a flood plain lake located in Sarawak, Malaysia. Twenty two cylindrical traps were installed at the lake from November 2005 until April 2008. Each sample was collected after about four to five months of deployment. Dry sedimentation rates from the traps and the linear distances from Trap 1 located at the confluence of Bunut River were measured. The factors that influence the temporal sedimentation at the lake were both internal and external physical changes of the lake. The factors were net ws (net Stoke's settling velocity) and water volume in the lake for suspended sediment distribution.



11.0

Universiti Pendidikan Sultan Idris, Malaysia

11.1

**Marine Pollution Bulletin, Volume 80, Issues 1–2, 15 March 2014, Pages 344–350
2013, Published by Elsevier Ltd**

Distribution of surfactants along the estuarine area of Selangor River, Malaysia

Alsalahi, M.A., Latif, M.T., Ali, M.M., Magam, S.M. Wahid,
N.B.A., Khan, M.F., Suratman, S.

This study aims to determine the levels of methylene blue active substances (MBAS) and ethyl violet active substances (EVAS) as anionic surfactants and of disulphine blue active substances (DBAS) as cationic surfactants in the surface microlayer (SML) around an estuarine area using colorimetric methods. The results show that the concentrations of surfactants around the estuarine area were dominated by anionic surfactants (MBAS and EVAS) with average concentrations of 0.39 and 0.51 $\mu\text{mol L}^{-1}$, respectively. There were significant between-station differences in surfactant concentrations ($p < 0.05$) with higher concentrations found at the stations near the sea. The concentration of surfactants was higher during the rainy season than the dry season due to the influence of runoff water. Further investigation using total organic carbon (TOC) and total organic nitrogen (TON) shows that there is a significant correlation ($p < 0.05$) between both anionic and cationic surfactants and the TON concentration.

Keywords

DBAS, Estuarine area, EVAS, MBAS, Surfactants



11.2 Research Journal of Applied Sciences, Vol. 6 (7): 494-500, 2011

Assessment on hydrological aspects of industrial town: Case of Bandar Baru Nilai, Negeri Sembilan, Malaysia

Aiyub K., Ngah M.S.Y.C., Arifin K., Jahi J.M., Awang A., Razman M.R.

One of the basic factors for continuous economic development in tropical areas is the availability of the water supply from the forest water catchment. Hydrological characteristics analysis is important to determine the availability of water which later influences the event of flash flood, surface flow velocity, base flow and underground water retention. Hydrological characteristics analysis of industrial town of Bandar Baru Nilai (BBN) was carried out based on the topography map analysis covering an area of 416 km² and located in sensitive highland region with various channels and basic level rivulets that are formed as rain catchment areas. In total, there are 26 ponds in the study area where 14 of it functions as rain catchment pond and flood control. Systematic long term planning by the developer at the early stage of land development in this new industrial town prevents the possibility of flood Occurrences especially at the downstream of the river.

Keywords

Flood control, Hydrological characteristics, Malaysia, Morphometry, Rainfall, Water catchment



11.3 Water and Environment Journal, Vol. 26 (4): 490-503, December 2012

Application of MIKE SHE modelling system to set up a detailed water balance computation

Rahim B.E.E.A., Yusoff I., Jafri A.M., Othman Z., Abdul Ghani A.

Estimation of total water balance is a substantial issue for watershed modelling in order to simulate the major components of the hydrological cycle to determine the stress of different anthropogenic activities on the available water resources within a catchment. In this context, the fully distributed physically based MIKE SHE modelling system was used to simulate the individual hydrological components of the total water balance for the Paya Indah Wetlands (PIW) watershed in the west of Peninsular Malaysia. Results reveal that the overall water balance is predominantly controlled by climate variables. Application of the model to the PIW watershed provides detailed estimation of the total water balance for a first-order catchment in which actual evapotranspiration (ET) represents approximately 65 and 58%, while overland flow (OL) to the PIW lake system represents 12.38 and 12.3% of the total rainfall during the calibration and validation periods, respectively. The difference of the inflow and outflow was taken as storage in depth. Overall, the model gives a reasonable output of total error of less than 1% of the total rainfall, which in turn indicates that the interaction among components is satisfactorily sustained.

Keywords

Evapotranspiration (ET), Exfiltration, Surface/subsurface flow interaction, Water balance, Wetland



11.4 Journal of Radioanalytical and Nuclear Chemistry, Vol. 295 (3): 1715-1730, 2013

Historical variations of Bera Lake (Malaysia) sediments geochemistry using radioisotopes and sediment quality indices

Gharibreza M., Raj J.K., Yusoff I., Othman Z., Tahir W.Z.W.M., Ashraf M.A.

The Bera Lake basin is a lacustrine mire system and the largest natural lake in Peninsular Malaysia. Three cores were collected from the lake sediments in order to assess sediment quality and ecological risks for aquatic life and human health. An index analysis approach (C_f , C_d , E_r , and IR) and fallout ^{210}Pb and ^{137}Cs radioisotopes were applied to assess the impacts of environmental evolutionary changes. Sediment chronology was determined using the Constant Rate of Supply model with the resultant ages verified by ^{137}Cs horizons. Although the general contamination factors indicate low risk conditions in Bera Lake the risks associated with individual layers ranged from moderate to considerable. Five deforestation phases can be identified in the dated sediment cores with distinct variations in heavy metal influxes since 1972. These phases are in excellent agreement with the dates of land clearance and development projects undertaken over the past four decades. This study has highlighted the capability of contamination factors and chronological methods in environmental evolutionary studies where catchments have experienced extensive land use changes. The destiny of heavy metal influxes into a lake can also be revealed using this methodology.

Keywords

Bera Lake, Contamination factors, CRS model, Ecological risk assessment, Radioisotopes ^{210}Pb and ^{137}Cs



11.5 Journal of Food Agriculture & Environment, Vol. 10 (2): 1072-1075, 2012

The application of the law in Malaysia towards safety on drinking water: Study on law of tort focusing on private nuisance

Razman Muhammad Rizal, Jahi Jamaluddin Md, Bin Mokhtar Mazlin, et al.

The law of tort on private nuisance plays an important role in protecting individuals from contaminated and polluted drinking water in order to safeguard safety. The use of the law of tort on private nuisance in the area of an individual's protection is largely in reply to the necessity of each individual to protect his rights and interests in consuming drinking water. Therefore, this paper examines the use of the law of tort on private nuisance in relation to the individual protection on the drinking water safety from Malaysian laws point of view. Moreover it identifies actions and cases which are dealing with individual protection on contaminated and polluted drinking water from the Malaysian legal perspectives and lastly, discuss the law of tort on private nuisance as a means to protect individuals from contaminated and polluted drinking water in Malaysia.



11.6 Proceeding of the 20th National Symposium on Mathematical Sciences (SKSM20): Research in Mathematical Science: A Catalyst for Creativity and Innovation, AIP Conference Proceedings, Vol. 1522: 221-228, 2013

Behaviour of Daily River Flow: Chaotic?

Adenan N.H., Noorani, M.S.M.

This study was conducted to provide evidence of the chaotic behavior of the daily river flow data at Lubuk Paku station on the Pahang River in the Pahang River Basin in Malaysia. Four nonlinear dynamic methods are employed: (1) phase space reconstruction; (2) average mutual information algorithm; (3) false nearest neighbors algorithm; and (4) correlation dimension method. First, average mutual information method is used to determine a first minimum of delay time. Second, the sufficient embedding dimension is estimated using the false nearest neighbour algorithm. The time delay and sufficient dimension are used in phase space reconstruction. The presence of chaos in river flow has been analyzed through the correlation dimension method. The correlation dimension is less than 3. Hence, we can conclude that low correlation dimension presence by examined river flow time series data Lubuk Paku station on the Pahang River, Malaysia.

Keywords

Average Mutual Information, chaotic behaviour, correlation dimension, false nearest neighbors



11.7 Environmental Forensics, Vol. 14(1): 59-68, January 2013

Correlation Between Surfactants and Heavy Metals in a Natural Lake

Razak I.S., Tan Z.Z., Nor Z.M., Wahid N.B.A., Mushrifah I., Latif M.T.

There is some concern that when heavy metals and surfactants exist together in the environment, the surfactants will affect the transport and fate of the heavy metals. This study was conducted to determine the presence of surfactants and heavy metals in a natural lake's surface microlayer and in rainwater from seven locations in the Lake Chini area in Malaysia. Colorimetric analysis was used to determine the concentration of anionic surfactants as methylene blue active substances (MBAS) and cationic surfactants as disulphine blue active substances (DBAS). Inductively coupled plasma mass spectrometry was used to determine the concentration of heavy metals such as Cu, Pb, Zn, Fe, Cd, and Ni. The results indicated that the average concentrations of MBAS and DBAS in the lake's surface microlayer were higher in the dry season (0.27 ± 0.06 and $0.22 \pm 0.02 \mu\text{mol L}^{-1}$) than in the wet season (0.22 ± 0.03 and $0.19 \pm 0.02 \mu\text{mol L}^{-1}$). The average concentrations of MBAS and DBAS in rainwater were $0.21 \pm 0.02 \mu\text{mol L}^{-1}$ and $0.18 \pm 0.02 \mu\text{mol L}^{-1}$, respectively. Surfactants in the lake's surface microlayer were found to be positively correlated with Pb, Cd, Zn ($p < 0.01$) and with Ni ($p < 0.05$). These findings have implications when evaluating fate & transport of metals in the presence of surfactants that could be useful in environmental forensic investigations.

Keywords

Heavy metals, Lake Chini, lake surface microlayer, rainwater, surfactants



11.8 Soil and Tillage Research, Vol. 131: 1-10, July 2013, Published by Elsevier B.V.

Land use changes and soil redistribution estimation using ^{137}Cs in the tropical Bera Lake catchment, Malaysia

Gharibreza M., Raj J.K., Yusoff I., Othman Z., Tahir W.Z.W.M., Ashraf M.A.

The catchment of Bera Lake in Pahang State, Peninsular Malaysia has experienced severe land use changes since 1972 with some 340 km² (out of a total area of ~600 km²) having been converted to oil palm and rubber plantations and in some places, newly cleared for monoculture. The proportional model using the ^{137}Cs radionuclide was recognized as being the most suitable conversion model for estimating soil redistribution in the catchment as the deforested land has been cultivated once in a medium-term range of 30-40 years. Thirty-five bulk core soil samples were taken to a depth of 25 cm in areas of different land use and known dates of tillage commencement in the catchment. Ten bulk core samples were also collected in the bottom sediments of wetlands and open waters to estimate accumulation rates in these sink areas. Individual land development districts with known elapsed times from start of tillage allowed determination of soil redistribution rates and preparation of a soil redistribution map. A mean soil erosion rate of $915 \pm 345 \text{ th}^{-1}\text{y}^{-1}$ was determined in areas of cleared land, whereas rates of 117 ± 36 , and $70 \pm 35 \text{ th}^{-1}\text{y}^{-1}$, were determined in areas of developing, and developed, oil palm and rubber plantations, respectively. The overall accumulation rate of eroded soils within the wetlands and open waters was determined to be 1.025 cm y^{-1} since 1995. The Bera Lake catchment soil redistribution map is the first attempt in Malaysia to map soil redistribution using the ^{137}Cs technique on a catchment scale. The soil redistribution map will provide good guidelines for future soil conservation practices and sustainable land use programs

Keywords

^{137}Cs radionuclide, Bera Lake catchment, Land use changes, Proportional model, Soil redistribution



11.9 Agriculture, Ecosystems and Environment, Vol. 165: 19-27, 5 January 2013, © 2012 Elsevier B.V.

Effects of agricultural projects on nutrient levels in Lake Bera (Tasek Bera), Peninsular Malaysia

Gharibreza M., Raj J.K., Yusoff I., Ashraf M.A., Othman, Z., Tahir, W.Z.W.M.

Lake Bera is the largest natural lake in Peninsular Malaysia and was designated as its first RAMSAR site in 1994. The lake has a total catchment area of 593.1km², although approximately 340km² of the original tropical rain forest cover has been converted to oil palm and rubber plantations since 1972. Research was conducted to determine the soil nutrient contents in the areas of developed land and to correlate historical variations in nutrient concentrations and eutrophication at the lake with anthropogenic activities. Thus, soil samples in areas of different land use in the catchment area were collected in addition to two cores in the bottom sediments of Lake Bera. In total, 132 samples were analyzed for total carbon (TC) and total nitrogen (TN) contents as well as fallout ²¹⁰Pb and ¹³⁷Cs radioisotope activities. Sediment profile dating was performed using the constant rate of supply (CRS) model; the resultant sediment ages were verified by ¹³⁷Cs horizons. Soils in cleared forest areas exhibited the lowest average nutrient content and ¹³⁷Cs inventory with an average loss of carbon, nitrogen and ¹³⁷Cs, of 54.6%, 31.2%, and 74%, respectively, in comparison with soils in areas of undisturbed forest. Clear-felling and burning during forest conversion were identified as the two main mechanisms that disrupted the nutrient cycles in the lake catchment. The total concentrations of nutrients in the bottom sediment profiles in the main open water and in the north of Lake Bera decreased in the order of TOC>K>TN>S>Mg>C. The results highlight a clear correlation between variations of nutrient contents in the lake sediments with anthropogenic and natural events dates using the CRS model; the C/N ratio has remarkably increased four times since oil palm plantations were developed in 1981. This result indicates an upward increase in eutrophication during and following land-use changes. The results also suggest long-term increasing acidic conditions in Lake Bera, leading to a reduction in exchangeable cation contents (Ca, Mg, and K), organic matter preservation, and an incremental addition of SO₄ (sulfate) and NO₃ (nitrate) ions, particularly in the top layer of the sediment column. This situation will result in Lake Bera being on the verge of considerable ecological risk, as illustrated by very low dissolved oxygen contents, high levels of nitrate, and a reduction in the fish population.

Keywords

²¹⁰Pb and ¹³⁷Cs radionuclides, C/N ratio, Eutrophication, Lake Bera, Land use changes, Nutrient contents



11.10 World Applied Sciences Journal, Vol. 17(10): 1238-1245, 2012, IDOSI Publications

Marine pollution trend analysis of tourism beach in peninsular Malaysia

Ngah, M.S.Y.C., Hashim, M., Nayan, N., Said, Z.M., Ibrahim, M.H.

The focus of this research was to study the problem of marine pollution that is occurring on the east coast of Peninsular Malaysia. The research area covered three major tourism beaches namely Pantai Cahaya Bulan (Kelantan), Pantai Batu Buruk (Terengganu) and Pantai Teluk Chempedak (Pahang). This study attempted to identify the parameters of the existing major pollutants and their trends from 2000 to 2006. This study also identified the causes of marine pollution occurring at the research area, evaluating and comparing the level of marine pollution among the three research sites. Results showed that the TSS, E. coli and OandG parameters are always above the Standard Interim of Marine Water Quality suggested by DOE for three selected areas. Heavy metals parameter such as Pb, Cd and Cu are also above the standard set by DOE. Anthropogenic activities such as land banked up or land use development in the coastal zone, untreated domestic waste effluent and oil spill incidents were partly due to ship collision or unlawful discharge oil effluent that contributed to the degrading water quality. In conclusion, although, several pollution parameters in the study area are decreasing the amount is still above the set standard.

Keywords

Marine pollution, Tourism beach, Trend



12.0

Universiti Putra Malaysia

12.1 JTAS Vol. 36 (2) May. 2013 Article ID: JTAS-0408-2011

Ribosomal DNA Analysis of Marine Microbes Associated with Toxin-producing *Pyrodinium bahamense var. compressum* (Böhm), a Harmful Algal Bloom Species

Chin G. J. W. L., Teoh P. L., Kumar S. V. and Anton A.

Blooms of the toxic alga, *Pyrodinium bahamense var. compressum* (Böhm), have become a problem in Malaysia over the past three decades. The alga is a causative agent of paralytic shellfish poisoning, a potentially fatal neurological disorder. Past research suggest that bacteria-algae association may play a direct or indirect role in toxin production. As such, ribosomal DNA-based restriction enzyme analysis for the identification of bacteria associated with *Pyrodinium* spp. was undertaken. A total of 16 bacterial isolates were successfully obtained from the clonal cultures of *Pyrodinium* spp. The diversity of the extracellular bacteria associated with *Pyrodinium bahamense var. compressum* was limited to the Phyla *Proteobacteria* and *Actinobacteria*. The major bacterial species identified included *Alcanivorax* spp. and *Hyphomonas* spp., whereas *Kocuria* spp., *Nesterenkonia* spp., *Alteromonas* spp., *Roseobacter* spp., *Xanthomonas* spp., and *Acinetobacter* spp. were identified as minor isolates. The identified bacterium *Hyphomonas* spp. exhibited high sequence identity with an unknown bacterium strain, SCRIPPS_739, in the GenBank database that is known to be associated with toxic and non-toxic dinoflagellates, *Alexandrium* spp. and *Scrippsiella trochoidea*, respectively.

Keywords

Bacteria, harmful algal bloom, paralytic shellfish poisoning, *Pyrodinium bahamense var. compressum*, ribosomal DNA



12.2 JST Vol. 21 (1) Jan. 2013 Article ID: JST-0292-2011

Assessment of Heavy Metal Pollution in the Straits of Johore by Using Transplanted Caged Mussel, *Perna viridis*

Eugene Ng, Y. J., Yap, C. K., Zakaria, M. P. and Tan, S. G.

In this study, a polluted site at Kg. Pasir Puteh was assessed for heavy metal pollution by using transplanted caged mussel (*Perna viridis*) from a relatively clean population, Sg. Melayu; both are located in the Strait of Johore. For control purposes, the *P. viridis* from Kg. Pasir Puteh were also simultaneously transplanted in Sg. Melayu at the same time. It was found that Zn was the metal which got accumulated fastest in the transplanted mussel while Cd was the slowest. This study indicated that the byssus of *Perna viridis* was most effective for biomonitoring of Cd, Ni, Pb and Zn, while the shell could be used for the biomonitoring of Cu, Ni and Pb and the total soft tissue for the biomonitoring of Ni since they were able to accumulate and eliminate the respective metals well. By using mussel as a biomonitor, the present study found that Kg. Pasir Puteh, which is located in the eastern part of the Strait of Johore, had significantly higher contamination and bioavailabilities of Cd, Cu, Fe, Ni, Pb and Zn. Therefore, the use of the transplanted caged mussels is very useful for heavy metal assessment purposes since it can increase the validity of data interpretation by minimizing ecological factors.

Keywords

Heavy metal, *Perna viridis*, Strait of Johore, transplant



12.3 JTAS Vol. 35 (3) Aug. 2012 Article ID: JTAS-0267-2010

Isolation of Metal Tolerant Bacteria from Polluted Wastewater

Haryati Jamaluddin, Dalila Mad Zaki and Zaharah Ibrahim

Screening of standing and flowing water sample from Malaysian gold mine environment yielded 24 single colonies and all isolates were assessed for their metal tolerance capability. A preliminary screening on Chloride Free Medium (CFM) agar plate supplemented with 5mM of Cu^{2+} , Ag^+ and Zn^{2+} showed that two isolates were tolerant towards Cu^{2+} ion, while two other isolates were tolerant towards Zn^{2+} ion and one single isolate was tolerant towards Ag^+ ion. Partial identification by 16S rRNA determined that they are only two distinct species of bacteria, namely, *Bacillus* sp. and *Achromobacter* sp. The identification was supported by physical and biochemical characterizations which showed that *Bacillus* sp. was a positive rod while *Achromobacter* sp. was a gram negative coccus. Maximum tolerance concentrations (MTC) of *Bacillus* sp. and *Achromobacter* sp. were determined in liquid CFM medium and the results showed that *Bacillus* sp. could tolerate up to 20 μM Cu^{2+} ion and 2.5 mM Zn^{2+} ion, while *Achromobacter* sp. could tolerate up to 5 μM Ag^+ and 20 μM Cu^{2+} ion.

Keywords

Bacteria; Metal ion; Metal tolerant bacteria; Mining environment



12.4 JSSH Vol. 21 (S) Sep. 2013 Article ID: JSSH-0936-2013

Determinants of Flood Fatalities: Evidence from a Panel Data of 79 Countries

Jaharudin Padli, Muzafar Shah Habibullah and A. H. Baharom

There is available evidence from different parts of the world that floods and storm account for about 67 percent of the natural disasters. While, earthquake, landslides, drought, extreme temperature, wildfire and volcano eruptions contribute to the remaining 23 percent. In many developing countries, the frequent occurrences of natural disasters, particularly floods are not uncommon. Yearly recurrence of floods bring devastate economies. The objective of the present study is to investigate factors that can mitigate the impact of floods on human fatalities and damages. We use a panel of 79 countries for the period of 1981-2005 and employ the two-step system GMM estimator to show that the level of economic development, population, investment, openness and education impact flood fatalities, total people affected and total cost of damages.

Keywords

Natural disasters, floods, GMM, developing economies



12.5 JST Vol. 20 (2) Jul. 2012 Article ID: JST-0284-2011

Groundwater from Fractured Granite and Metasedimentary Rocks in the West Coast of Peninsular Malaysia

Nasiman Sapari, Raja Zainariah Raja Azie and Hisyam Jusoh

Hard rock formations consisting of granite and metasedimentary rocks in Peninsular Malaysia have been considered to be of poor aquifers. The map of shows the area underlain by hard rock as having poor to moderate potential for groundwater production ($<230\text{m}^3/\text{well}/\text{day}$). This paper presents finding of productive hard rock aquifers in the west coast of Peninsular Malaysia. Data from tubewell drilling scarried out for industrial water supply were analyzed. It was found that the hard rocks could yield fresh water up to a maximum of $890\text{m}^3/\text{well}/\text{day}$. The wells were between 50 m and 200 m deep. High discharge rates of groundwater above $300\text{m}^3/\text{well}/\text{day}$ were encountered from wells that penetrate major fracture zones. The hard rocks are generally fractured at various depths. Groundwater in interconnected fractures has a steady flow that sustains production during pumping tests and actual usage of the wells. This phenomenon indicates that the groundwater is being recharged by infiltration of rainwater through the overlying weathered rocks and soils. Tubewells in hard rock of West Coast of Peninsular Malaysia were found to have average discharge rates of $343\text{m}^3/\text{well}/\text{day}$. However, deep tubewells penetrated only weathered granite, are generally non productive ($<70\text{m}^3/\text{well}/\text{day}$). Limited fracture openings and restricted recharge areas are likely to be the reason for the low discharge. Clay particles in fractures were observed to be the factor for the low success rate and poor quality of the water particularly in meta sedimentary areas.

Keywords

Discharge rates, groundwater, granite, sedimentary rocks, tubewells, usage



12.6 Pertanika J. Trop. Agric. Sci. 35 (4): 805 - 814 (2012)

Relationship between Size of Fish and Parasitic Intensity in Four Freshwater Fish Species from Tasik Merah, Perak, Peninsular Malaysia

Rahman, W. A. and Hamidah Saidin

A total of 79 fish from Tasik Merah, Perak, Peninsular Malaysia were examined for the presence of fauna. The fish species examined included *Puntius schwanefeldii*, *Puntius gonionotus*, *Hampala macrolepidota* and *Notopterus notopterus*. Meanwhile, a total of ten species of the parasites were found to be belonging to two major groups of nematode and trematode. The nematodes were *Capillaria* sp., *Spinictus inermis*, *Echinocephalus* sp., *Microtetrameres* sp., and *Cucullanus* sp. The trematodes were *Paradiplozoon malayense*, *Paradiplozoon barbi*, and *Dactylogyrus* sp.

Keywords

Freshwater fish, Tasik Merah, parasite, fish size



12.7 JTAS Vol. 35 (3) Aug. 2012 Article ID: JTAS-0125-2008

Distribution of Heavy Metal Concentrations in the Different Soft and Hard Tissues of Tropical Mud-Flat Snail *Telescopium telescopium* (Family: Potamididae) Collected From Sepang Besar River

Yap, C. K. and Noorhaidah, A

The concentrations of Cd, Cu, Pb, Fe, Ni and Zn were determined in the different parts of the soft tissues (foot, cephalic tentacle, mantle, muscle, gill, digestive caecum and remaining soft tissues) and three parts of hard tissues or shells (anterior shell, middle shell and posterior shell) of the mud-flat snail *Telescopium telescopium* collected from Sepang Besar River. From the cluster analysis, the dendrogram shows that the three parts of the shells are clustered separately from the different parts of the soft tissues, indicating different mechanisms and strategies of metal accumulation and regulation of heavy metals in the shells from the different soft tissues. Among the different soft tissues, the dendrogram also shows that the digestive caecum is clustered differently from other soft tissues, indicating that this organ is distinctly high in metal accumulation and this may probably suggest a different route of metal sequestration from the rest of the soft tissues. The metal distribution found in the different soft tissues of *T. telescopium* is an important knowledge in establishing this mud-flat gastropod as a promising biomonitor of metal contamination and bioavailability for the intertidal area of Peninsular Malaysia.

Keywords

Telescopium telescopium, metal distribution, different tissues



12.8 JTAS Vol. 36 (4) Nov. 2013 Article ID: JTAS-0218-2009

Variations of Electrical Conductivity between Upstream and Downstream of Langat River, Malaysia: Its Significance as a Single Indicator of Water Quality Deterioration

Yap, C. K.

This paper investigated the potential of using a single chemical parameter namely electrical conductivity (EC) as an indicator of water quality pollution in relation to dissolved oxygen (DO) and suspended solids (SS) which are two of the parameters included in the calculation of Water Quality Index (WQI) in Malaysia based on current scenario. In this study, nine periodic samplings at eight sampling sites along a tropical river which included the polluted downstream and the unpolluted upstream of the Langat River, were conducted between March 1998 and January 1999. The consistent results for the nine month samples (negative and significant correlation between EC vs. DO, and positive and significant correlation between EC vs. SS), indicated that EC could be potentially used as a single chemical parameter to indicate the water quality of tropical rivers such as the Langat River of Malaysia. It is also recommended that EC should be included in the revised WQI in Malaysia in future, in order to better reflect the mineral-related pollution/composition and of the water samples.

Keywords

Electrical conductivity, Langat River, Malaysia



13.0

Universiti Sains Islam Malaysia

13.1 Analytical Methods 5 (23) , pp. 6709-6714, © 2013 The Royal Society of Chemistry.

UV-vis spectrophotometric and artificial neural network for estimation of ammonia in aqueous environment using cobalt(II) ions

Ling Ling, T., Ahmad, M., Yook Heng, L.

This paper reports the results for the quantitative determination of ammonia (NH_3) in aqueous solution by a UV-vis spectrophotometric method and artificial neural network (ANN) intelligence tool. Quantitation of NH_3 was based on the chemical reaction of NH_3 with cobalt(II) (Co^{2+}) ions in basic medium to form a blue hexamminecobaltate(II) ($[\text{Co}(\text{NH}_3)_6]^{2+}$) complex. Characterizations of Co^{2+} ion in solution included photostability, pH effect, response time, Co^{2+} ion concentration effect, dynamic linear range and reproducibility, which were performed using a UV-vis spectrophotometer. The pink cobalt species gradually changed to blue with increasing NH_3 concentration. The absorption calibration curve was linear over the NH_3 concentration range of 0.6-3.5 mM at optimum pH 8 with a reproducibility relative standard deviation (RSD) of <4.0%. The interference effect was found to be negligible for a number of foreign ions present in the reaction medium during NH_3 determination in an aqueous environment. A set of absorbance data for the $[\text{Co}(\text{NH}_3)_6]^{2+}$ complex at selected wavelengths was input for ANN training using a back-propagation algorithm. The trained network with 22 hidden neurons, a 28500 epoch number and 0.001% learning rate has extended the dynamic NH_3 concentration range to 0.6-5.9 mM with a calibration error as low as 0.0649×10^{-3} . The proposed ANN electronic sensor shows promise for NH_3 estimation in unknown water samples based on pattern recognition.



13.2 Ocean & Coastal Management, Volume 78, June 2013, Pages 25-34

Replacing the transit passage regime with freedom of navigation in the Strait of Malacca: A case study with special reference to the Korea Strait

Mohd Hazmi bin Mohd Rusli, Maizatun binti Mustafa, Wan Izatul Asma binti Wan Talaat

The United Nations Convention on the Law of the Sea 1982 (LOSC) prescribes that ships and aircrafts may exercise the unimpeded right of transit passage when navigating or flying over straits used for international navigation. The Straits of Malacca and Singapore are largely categorised as straits that fall under this category. Consistently described as two of the most critical chokepoints in the world, the Straits of Malacca and Singapore are accommodating increasing navigational traffic each year. This has caused difficulties to the littoral States in balancing heavy shipping activities with the protection of the marine environment of these critical straits. This article hence analyse the legal and political implications should the littoral States of the Strait of Malacca, namely Malaysia and Indonesia retract their 12 nautical miles territorial sea claim in the Strait of Malacca to 3 nautical miles, leaving exclusive economic zone (EEZ) or high seas corridor spanning across the Strait, nullifying the application of transit passage regime. At the moment, Japan and South Korea have decided not to extend their territorial claims over the Korea Strait from 3 nautical miles to 12 nautical miles territorial sea limit. As such, this article conducts a specific case study by looking at the arising circumstances should Malaysia and Indonesia follow the Korea Strait approach. This article concludes on whether or not this proposed measure may a viable method to increase the regulatory powers of the littoral States in regulating shipping through the Strait of Malacca.



13.3 Ocean & Coastal Management, Volume 57, March 2012, Pages 79-94

Protecting vital sea lines of communication: A study of the proposed designation of the Straits of Malacca and Singapore as a particularly sensitive sea area

Mohd Hazmi Bin Mohd Rusli

The Strait of Malacca is considerably bordered by Malaysia and Indonesia while the Strait of Singapore is jointly shared by Malaysia, Indonesia and Singapore. Together, both Straits serve not only as two of the most important sea lines of communication in the world, but are important economic lifelines for the coastal population especially in the fisheries and tourism industries. The historical, environmental and socio-economic values of the Straits have resulted in some of the areas within the Straits have been designated as UNESCO World Heritage Sites, RAMSAR Sites and a UNESCO Geopark. Nevertheless, with the increasing shipping traffic in the future, it is feared that the marine environment of the Straits of Malacca and Singapore might be damaged. Focusing on issues pertaining to vessel-source of marine pollution, this article discusses the question on whether or not the Straits of Malacca and Singapore may potentially fit to be designated as a Particularly Sensitive Sea Area. This article concludes by discussing the possible legal and political consequences that may arise out of such a designation.



13.4 Sensors and Actuators, B: Chemical 171-172, pp. 994-1000, © 2012 Published by Elsevier B.V.

A novel optical ammonia sensor based on reflectance measurements for highly polluted and coloured water

Tan, L.L., Ahmad, M., Lee, Y.H.

One of the major problems in the analysis of ammonia (NH_3) using spectrophotometric method is highly coloured water sample. A reflectometric NH_3 sensor based on a facile single-step immobilisation of cobalt(II) (Co^{2+}) ion onto high capacity Dowex HCR-W2 microspheres has been developed to enable the direct NH_3 determination in highly coloured water samples. The combination of Co^{2+} ion-immobilised microspheres via cation exchange chemical reaction and reflectometric technique has improved the optode sensing performance with respect to linear response range and response time. Immobilised Co^{2+} ion, when complexed with NH_3 gave a blue colouration of hexamminecobaltate (II) ($[\text{Co}(\text{NH}_3)_6]^{2+}$) complex at pH 13. The NH_3 sensor reached maximum colour intensity in ~6 min at ambient conditions. The linear calibration curve was 60-290 mM NH_3 with a detection limit of 16 mM NH_3 , which is suitable for direct determination of NH_3 -enriched leachate water samples. A good reproducibility between 5.4 and 5.9% relative standard deviation (RSD) was obtained with the probe and the sensing performance can be regenerated using buffer pH 1. The effect of potential interference ions has been investigated during the quantification of NH_3 in heavily polluted sewage water. The results obtained were in good agreement with those produced by acidimetric reference method.



14.0

Universiti Sains Malaysia

14.1 3rd International Conference on Managing Rivers in the 21 st Century: Sustainable Solutions for Global Crisis of Flooding, Pollution and Water Scarcity, Pages 607–614, Rivers 2011 6th – 9th December 2011, Penang, Malaysia

Validating flood inundation map for hydrodynamic modelling of an ungauged catchment

Cheng Siang Leow, Rozi Abdullah, Nor Azazi Zakaria

Flood mapping for an ungauged catchment is an extremely difficult task due to the lack of information and hydrological data of which the map can be produced from. More often than not, many flood-prone urban catchments in Malaysia still remained ungauged. Advances in digital photography in recent years have enabled photographs to be used for capturing important information of flood. These photographs can be used to establish information that describes the variation of flood through time and space. This study will attempt to produce reliable flood inundation map for the town of Tanah Merah, Kelantan, which is affected by tropical monsoon flood. A small ungauged catchment, i.e. Sungai Maka was used as the subject of study. 1D hydrodynamic model (InfoWorks) coupled with high resolution Digital Elevation Model (DEM) from Light Detection and Ranging (LiDAR) was used. First, a simple calibration was carried out by adjusting modelling parameters to suit estimated flood depth at various points along the river from flood photographs. The flood extent will then be verified by comparing against satellite image. At the same time, flood records would be retrieved and used as the final verification of the model's accuracy. Preliminary calibration showed that the method used could accurately represent the fluctuation of flood level to an accurate of $R^2 = 0.98$. It is hoped that further results from the study could successfully demonstrate that flood photographs, records and satellite images are highly informative and valuable tools for calibrate and validate flood inundation maps for the many ungauged catchment in Malaysia.

Keywords

Ungauged catchment; flood inundation map; hydrodynamic model; calibration; InfoWorks CS



14.2 **Water Resource Management (2011) 25:2901–2916 Springer Science+Business Media B.V. 2011**

Gene-Expression Programming for the Development of a Stage-Discharge Curve of the Pahang River

Hazi Mohammad Azamathulla, Aminuddin Ab. Ghani,
Cheng Siang Leow, Chun Kiat Chang, Nor Azazi Zakaria

This study presents Gene-Expression Programming (GEP), an extension of Genetic Programming (GP), as an alternative approach to modeling the stagedischarge relationship for the Pahang River. The results are compared to those obtained by more conventional methods, i.e., the stage rating curve (SRC) and regression techniques. Additionally, the explicit formulations of the developed GEP models are presented. The performance of the GEP model was found to be substantially superior to both GP and the conventional models.

Keywords

Flooding, Pahang River, Stage-discharge, GP, GEP, Regression



14.3 Water Resource Management (2011) 25:1537–1544, European Water Resources Association (EWRA), ISSN: 0920-4741 (print version), ISSN: 1573-1650 (electronic version)

Genetic Programming for Predicting Longitudinal Dispersion Coefficients in Streams

Hazi Mohammad Azamathulla , Aminuddin Ab. Ghani

This paper presents a genetic programming (GP) approach to predict the longitudinal dispersion coefficients in natural streams. Published data were compiled from the literature for the dispersion coefficient for a wide range of flow conditions, and they were used for the development and testing of the proposed method. The proposed GP approach produced excellent results ($R^2 = 0.98$ and $RMSE = 0.085$) compared to the existing predictors (Rajeev and Dutta, Hydrol Res 40(6):544–552, 2009, $R^2 = 0.345$ and $RMSE = 1778.6$) for dispersion coefficient.

Keywords

Streams, Rivers, Dispersion, Pollutants, GP



14.4 International Journal of River Basin Management, Vol.1, No.3 (2003), pp.237-251

Flood Inundation Analysis Using HEC-6 and ArcView GIS 3.2a

Shanker Kumar Sinnakaudan, Aminuddin Ab Ghani and Chang Chun Kiat

An integration procedure namely AVHEC6.avx has been created between ArcView GIS 3.2a and HEC-6 hydraulic model to perform flood inundation analysis. The procedure was tested using hydraulic and hydrological data for Pari River channel and floodplain with the reach approximately 4 km long. HEC-6 Model was simulated using Yang sediment transport equation with four flood hydrograph in 12 difference flooding scenarios and subsequent flood inundation maps were produced. The flood plain visualization was further enhanced using the ArcView Spatial Analysis and 3D Analysis. The results of this research clearly show that incorporating floodplain geometric data besides river channel data in the modelling process can produce more accurate flood plain maps. GIS is proven to provide an effective environment for flood inundation mapping and analysis. The research has further extended in the development of an embedded flood risk analysis model that has fully operates in the GIS environment.



14.5 International Journal of River Basin Management, Vol. 10, No. 2 (June 2012), pp. 139–148;
International Association for Hydro-Environment Engineering and Research

Sungai Pahang digital flood mapping: 2007 flood

Aminuddin Ab. Ghani, Chun Kiat Chang, Cheng Siang Leow, Nor Azazi Zakaria

In this study, visits to areas in the sub catchments of Sungai Pahang, including Mentakab, Temerloh, Maran and Pekan, were made throughout the year 2009 to obtain information regarding inundation areas, flood depth, flow discharge and water levels relevant to the 2007 flood. Interviews with local people were also made to ascertain the true picture of the 2007 flood. Analyses of rainfall data, water level, flow discharge and river cross-sectional changes were carried out from data gathering. The development of a digital elevation model (DEM) was made from a combination of digital topographical maps and satellite images which were purchased from Jabatan Ukur dan Pemetaan Malaysia. This visually enhanced DEM was then used for the development of the actual extent of the 2007 flood in the study area. Several options of flood mitigation works are proposed to reduce the impact of a similar flood in the future based on the developed DEM.

Keywords

Flooding; alluvial river; flood mitigation; GIS; Sungai Pahang



14.6 Lakes & Reservoirs: Research and Management 2011 16: 179–184

Sediment and nutrient balance of Bukit Merah Reservoir, Perak (Malaysia)

W. R. Ismail and S. A. M. Najib

The pollutant load to Bukit Merah Reservoir (BMR) from its catchment area was evaluated in this study. BMR is a 40-km² man-made lake located in the district of Kerian, Perak. BMR is divided into the north lake and the south lake by a 4.7-km railway line. The reservoir water is fed by four rivers: Kurau (323.0 km²), Merah (4.25 km²), Jelutong (7.1 km²) and Selarong (3.1 km²), which flow through Pondok Tanjung Forest Reserve (6718 ha). The total quantity of suspended sediment inputs from all four rivers to the BMR was 55 164 t, with almost 93% of the sediment input coming from the Kurau River. The nutrient inputs to BMR in 2008 were about 77 tonnes of phosphate, 24 tonnes of ammonia-N, 3 tonnes of nitrite and 47 tonnes of nitrate. The sediment, nitrate and nitrite inputs were retained in the reservoir. In contrast, the ammonia and phosphate inputs were released from the reservoir. The percentage retention was 78%, 63% and 34% for sediment nitrate and nitrite, respectively. The percentage of release phosphate was about 178, and 25 for ammonia. This study indicates that most of the nutrients entering BMR are from non-point sources and that they are responsible for the impacts of sediment and nutrients on the receiving water body.

Keywords

Bukit Merah Reservoir, Malaysia, nutrient balance, sediment.



14.7 Disaster Prevention and Management Vol. 20 No. 2, 2011 pp. 108-114; Emerald Group Publishing Limited

Modelling of sea level rise and river system

D.Y.S. Mah

Purpose – This paper aims to present a hydrodynamic river modelling by incorporating river flow and sea-level rise interactions. Design/methodology/approach – Predicted sea levels from renowned studies are put to test on flow scenarios of the Sarawak River in the deltaic city of Kuching, Malaysia. Three cases are drawn for investigation, including one extreme flood event, one normal flow with low tide, and another normal flow with spring tide. Findings – The model predicts a worst case that nearly 5-6 km² of urban land along the Lower Sarawak River would be under water due to the rise. Practical implications – Such an indication would draw a clearer picture for strategy and mitigation planning. Originality/value – Generally sea level estimation involves ocean-atmospheric modelling. However, the paper argues here that a river model is credible for practical hydrological site-specific analysis to include increase of sea levels.

Keywords

Coastal regions, Floods, Modelling, Malaysia



14.8 Computing and Applications, December 2013, Volume 23, Issue 7-8, pp 2137-2141

Knowledge extraction from trained neural network scour model at culvert outlets

H. Md. Azamathulla and A. A. M. Haque

Artificial neural networks (ANNs), due to their outstanding capabilities for modeling complex processes, have been successfully applied to a variety of problems in hydraulics. However, one of the major criticisms of ANNs is that they are just black-box models, since a satisfactory explanation of their behavior has not been offered. They, in particular, do not explain easily how the inputs are related to the output and also whether the selected inputs have any significant relationship with an output. In this paper, a perturbation analysis for determining the order of influence of the elements in the input vector on the output vector is discussed. The analyses of the results suggest that each variable in the input vector (d_{50}/d_0 , F_0 , H/d_0 , σg , and W_0/d_0) influences the depth of scour in different ways. However, the magnitude of the influence cannot be clearly quantified by this approach. Further it adds that the selection of input vector based on linear measures between the variables of interest, which is commonly employed, may still include certain spurious elements that only increase the model complexity.

Keywords

Artificial neural networks, Scour depth, Culvert outlets



14.9 **Journal of Hydrology, 2012; 454–455 (2012) 203–207**

Flow discharge prediction in compound channels using linear genetic programming

H. Md. Azamathulla and A. Zahiri

Flow discharge determination in rivers is one of the key elements in mathematical modelling in the design of river engineering projects. Because of the inundation of floodplains and sudden changes in river geometry, flow resistance equations are not applicable for compound channels. Therefore, many approaches have been developed for modification of flow discharge computations. Most of these methods have satisfactory results only in laboratory flumes. Due to the ability to model complex phenomena, the artificial intelligence methods have recently been employed for wide applications in various fields of water engineering. Linear genetic programming (LGP), a branch of artificial intelligence methods, is able to optimise the model structure and its components and to derive an explicit equation based on the variables of the phenomena. In this paper, a precise dimensionless equation has been derived for prediction of flood discharge using LGP. The proposed model was developed using published data compiled for stage–discharge data sets for 394 laboratories, and field of 30 compound channels. The results indicate that the LGP model has a better performance than the existing models.

Keywords

Linear genetic programming, Stage–discharge curve, Flooded rivers, Floodplains



14.10 3rd International Conference on Managing Rivers in the 21st Century: Sustainable Solutions for Global Crisis of Flooding, Pollution and Water Scarcity Rivers 2011, 6th-9th December 2011, Penang, Pages 784-790

Application of mathematical and physical modeling to resolve sedimentation at Ijok intake

Noor Fareezianna Noor Shahidan, Zorkeflee Abu Hasan

This paper describes the usability of mathematical and physical model for simulation of sediment pattern near the Ijok Intake, Ijok River, Perak. Ijok Intake is facing sedimentation problem at the inlet that reduced the flow capacity into Ijok Canal. Therefore, CCHE2D as two-dimensional model was used to represent mathematical simulation in this paper, while physical model was designed and constructed with a 1:15 undistorted scale at REDAC physical model laboratory. The comparative study using both models was performed by running simulation without and with an intake structure. Results proved that sediments were accumulated in front of intake structure, where good agreement was obtained between mathematical and physical simulations. Moreover, analyses indicated that CCHE2D as two-dimensional model was able to predict the sediment pattern as similar as physical model. Further simulation with design work of dike structure was carried out using CCHE2D model, and result showed that proposed dike can reduce and control sediment near an intake structure. Thus, it can be concluded that, combination of physical and mathematical model can give advantages in analyzing the river sedimentation near an intake structure for design mitigation works.

Keywords

Sedimentation; intake structure; mathematical model; physical model; CCHE2D; design work.



14.11 International Journal of River Basin Management, Volume 11, Issue 1, 2013

Estimation of dimension and time variation of local scour at short abutment

Reza Mohammadpour , Aminuddin AB. Ghani & Hazi Mohammad Azamathulla

Accurate prediction of the local scour at abutments is an important criterion to design a safe depth for the bridge foundation. In this paper, the dimension and variation of local scour with time at a vertical-wall abutment were investigated experimentally under clear-water conditions. The multiple linear regression (MLR), gene expression programming (GEP) and artificial neural networks (ANNs), feed forward back propagation and radial basis function were used to predict the time variation of scour depth at a short abutment. Results indicated that the dimension of the scour hole in the x-direction ranged from 3L to 5L upstream and downstream of the abutment, respectively, and also 4L in the y-direction. Statistical analysis showed that, although the ANNs technique produced better results ($R^2 = 0.997$, RMSE = 0.0113 and MAE = 0.0071) in comparison with the GEP ($R^2 = 0.959$, RMSE = 0.068 and MAE = 0.044) and MLR techniques ($R^2 = 0.958$, RMSE = 0.059 and MAE = 0.041), both GEP and MLR are more practical methods. Finally, sensitivity analysis indicated that the local scour was greatly affected by the three studied parameters in the following order, time ratio (t/t_e), abutment length ratio (L/y), velocity ratio (U/U_c).

Keywords

Abutment scour; temporal scour; scour hole dimension; gene expression programming; artificial neural networks



14.12 **Water Science & Technology, 2012; 66(10):2170-6; IWA Publishing 2012**

Flow and sediment yield simulations for Bukit Merah Reservoir catchment, Malaysia: a case study

Zorkeflee Abu Hasan, Nuramidah Hamidon,
Mohd Suffian Yusof and Aminuddin Ab Ghani

Bukit Merah Reservoir is the main potable and irrigation water source for Kerian District, Perak State, Malaysia. For the past two decades, the reservoir has experienced water stress. Land-use activities have been identified as the contributor of the sedimentation. The Soil and Water Assessment Tool (SWAT) was used to simulate and quantify the impacts of land-use change in the reservoir watershed. The SWAT was calibrated and two scenarios were constructed representing projected land use in the year 2015 and hypothetical land use to represent extensive land-use change in the catchment area. The simulation results based on 17 years of rainfall records indicate that average water quantity will not be significantly affected but the ground water storage will decrease and suspended sediment will increase. Ground water decrease and sediment yield increase will exacerbate the Bukit Merah Reservoir operation problem.

Keywords

Bukit Merah Reservoir, sedimentation, simulation, soil and water assessment tool



14.13 **Ecotoxical Environment Saf. 2011 Jul; 74(5): 1195-202. Doi: 10.1016/j.ecoenv.2011.2011.02.022.Epub 2011 Mar 17. © 2011 Elsevier Inc. All rights reserved.**

Influence of agricultural, industrial, and anthropogenic stresses on the distribution and diversity of macroinvertebrates in Juru River Basin, Penang, Malaysia.

Al-Shami SA, Md Rawi CS, Ahmad AH, Abdul Hamid S and Mohd Nor SA.

Abundance and diversity of benthic macroinvertebrates as well as physico-chemical parameters were investigated in five rivers of the Juru River Basin in northern Peninsula Malaysia: Ceruk Tok Kun River (CTKR), Pasir River (PR), Permatang Rawa River (PRR), Kilang Ubi River (KUR), and Juru River (JR). The physico-chemical parameters and calculated water quality index (WQI) were significantly different among the investigated rivers (ANOVA, $P < 0.05$). The WQI classified CTKR, PR, and JR into class III (slightly polluted). However, PRR and KUR fell into class IV (polluted). High diversity and abundance of macroinvertebrates, especially the intolerant taxa, Ephemeroptera, Plecoptera, and Trichoptera, were observed in the least polluted river, CTKR. Decreasing abundance of macroinvertebrates followed the deterioration of river water quality with the least number of the most tolerant taxa collected from PR. On the basis of composition and sensitivity of macroinvertebrates to pollutants in each river, the highest Biological Monitoring Working Party (BMWP) index score of 93 was reported in CTKR (good water quality). BMWP scores in PRR and JR were 38.7 and 20.1, respectively, classifying both of them into "moderate water quality" category. Poor water quality was reported in PR and KUR. The outcome of the multivariate analysis (CCA) was highly satisfactory, explaining 43.32% of the variance for the assemblages of macroinvertebrates as influenced by 19 physical and chemical variables. According to the CCA model, we assert that there were three levels of stresses on macroinvertebrate communities in the investigated rivers: Level 1, characterized of undisturbed or slightly polluted as in the case of CTKR; Level 2, characterized by a lower habitat quality (the JR) compared to the CTKR; and Level 3 showed severe environmental stresses (PRR, PR, and KUR) primarily contributed by agricultural, industrial, and municipal discharges.



14.14 Environmentalist (2012) 32:28-34

Temporal distribution of Ephemeroptera, Plecoptera and Trichoptera (EPT) adults at a tropical forest stream: response to seasonal variations

Abdul Hamid Suhaila, Md Rawi Che Salmah, Salman Abdo Al-Shami

Temporal changes in Ephemeroptera, Plecoptera and Trichoptera (EPT) abundance were investigated monthly from January to December 2008 at a tropical forest stream of Tupah River (TR) at Gunung Jerai Forest Reserve, Malaysia. A total of 1,689 adult individuals belong to 16 families of EPT were collected from TR. EPT populations peaked in May, June and December. Mean EPT abundance was significantly different among months (Kruskal–Wallis test, $P < 0.05$). Among the three orders, Trichoptera had the most diverse community with eight families reported, followed by Ephemeroptera (six families) and Plecoptera (two families). The family Baetidae was the most abundant ephemeropteran. Meanwhile, caddisfly families Hydropsychidae, Leptoceridae and Lepidostomatidae were abundant at TR. However, plecopterans were mainly represented by Perlidae. There was significant difference in abundance ($t = 4.863$, $P < 0.05$) and diversity ($t = 7.857$, $P < 0.05$) of EPT adults between dry and wet seasons. Interestingly, abundance of EPT adults was higher in the dry season compared to the wet season. Consequently, seasonality impact on abundance of EPT adults at TR was obvious. The adult population of Trichoptera was dominant during the dry season. However, adults of Ephemeroptera were abundant during the wet season.

Keywords

EPT, Tropical forest stream, Malaysia, Tropical seasonality



14.15 Toxicological & Environmental Chemistry Vol. 94, No. 6, July 2012, 1188–1198

Effects of herbicides on Odonata communities in a rice agroecosystem

Che Salmah Md Rawia, Salman Abdo Al-Shamia,
Amir Shah Ruddin Md Shah, Abu Hassan Ahmad and Azmi Man

The effects of the five herbicides propanil, quinclorac, molinate/propanil, 2,4-D amine, and bensulfuron on Odonata diversity and abundance at the experimental rice plots was investigated. A total of 13 Odonata morphospecies belonging to two families have been identified. Treated plots exhibited higher species richness (up to 12 species) than the control plot (8 species). *Ishnura* spp. was the most abundant species in the treated plots with a mean density of 194.2 individuals per m², (ind m⁻²) followed by *Brachythemis contaminata* (152 ind m⁻²) and *Agriocnemis* spp. (124 ind m⁻²). In the control plots, *Agriocnemis* spp. was the dominant species (153 ind m⁻²) followed by *Ishnura* spp. (143 ind m⁻²) and *Neurothemis fluctuans* (59 ind m⁻²). In the propanil-treated plot, the highest number of odonate species (10 species) was recorded followed by the plots treated with quinclorax and molinate/propanil (9 species). On the 2,4-D amine or bensulfuron-treated plots as well as the control plot, only eight odonate species were recorded. This study revealed that herbicide application had a positive effect on Odonata diversity. This seems reasonable as Odonata are non-target organisms for herbicides. Furthermore, the decomposed weeds resulting from herbicide application would enrich the water with necessary organic matter.

Keywords

herbicides; Odonata; rice field; agroecosystem; Malaysia



14.16 Asian Economic and Social Society, Volume 2 No. 3 September, 2012. ISSN (P): 2304-1455, ISSN (E): 2224-4433

Diversity of Aquatic Insects in Keniam River, National Park, Pahang, Malaysia

Mohd Rasdi Z., Fauziah, I., Ismail R., Mohd Hafezan S., Fairuz K.,
Hazmi, A. D. and Che Salmah M. R.

The study on biodiversity of aquatic insects was carried out covering the area of Kuala Keniam to Kuala Perikai River, National Park, Pahang, Malaysia. The macro invertebrate community was found in the different types of micro-habitat and various flowing speed levels in good quality of water of Keniam Rivers consisted mainly of aquatic insects. There are large numbers and wide species of aquatic insects in aquatic habitats make them of great ecological importance. There are three divided strata with total of nine sampling location were carried out within several varieties of microhabitats such as sandy, cobble, gravel, leaf and the pool area. The aquatic insects were collected and sampled by using a D-framed aquatic kick net. There was a wide variety of aquatic insects belonging to at least 8 orders in the study area. The orders of insect were Odonata, Coleoptera, Diptera, Trichoptera, Thysanura, Orthoptera, Hemiptera and Ephemeroptera. Throughout the study period, there is range from total of 140 to 604 individuals of aquatic insect trapped monthly and collected in Keniam River from September 2009 to December 2010. Some group of aquatic insects were found significant ($P < 0.05$) different abundance between strata and sampling dates as well as habitat on the diversity of aquatic insects in Keniam River. The abundance and distribution of aquatic insects species were varied and not constant from one month to another during the study period due to biotic and abiotic factors. Species diversity of aquatic insects varied in different strata of the Keniam River. This indicates the richness and diverse groups of aquatic insects in the study area. It adds to the fact that the undisturbed habitat quality is most suitable for insects to breed and multiply under the natural ecosystem with abundant food supply. Moving upstream from Kuala Perikai to lower stream to Kuala Keniam, one can observe various types of habitats for aquatic insects to live.

Keywords

Aquatic Insect, biodiversity, Habitat quality, Keniam River



14.17 Wetland Science, Vol. 9 No.3, Sept 2011

Seasonal Changes in Mayfly Communities and Abundance in Relation to Water Physicochemistry in Two Rivers at Different Elevations in Northern Peninsular Malaysia

Suhaila Abdul Hamid, Mohd Ravi Che Salmah, Hamady Dieng,
Abu Hassan Ahmad, Tomomitsu Satho, Fumio Miake

A field study was performed at rivers in Gunung Jerai forest reserve (Kedah, Malaysia) to assess seasonal changes in mayfly community structure and abundance in relation to altitude and water physicochemistry. Rivers at lower (Batu Hampar River) and higher (Teroi River) elevations were visited through dry and wet seasons in September 2007 to August 2008. Monthly visits were made to 20 sites on each river, and water and aquatic insects were sampled using D-pond aquatic nets. Water was warmer, more acid, and more turbid in Teroi River during wet season. Ammonia was the only nutrient exhibiting significant seasonal variations (greater during wet season). Chemical oxygen demand content was higher in Teroi River where biochemical oxygen demand content was low during wet season. Species richness was higher in Batu Hampar River, but displayed seasonal variations only in Teroi River. Among the eight families encountered, Baetidae was the commonest. Baetid abundance was usually high during wet season, and those belonging to the dominant genus (*Baetis*) were more abundant in Teroi River. Heptageniidae was the second commonest family; its predominant genus, *Thalerospyrus* was more abundant in Teroi River during dry season. Caenidae, Leptophlebiidae and Oligoneuriidae were only found in Batu Hampar River where their abundances peaked during dry season, i.e., *Habrophlebiodes* sp. and *Isonychia* sp. Ephemerellidae and Teloganodidae occurred only in Teroi River, with the first found only during dry season. Mayflies were recorded under very distinct physicochemical conditions, illustrating their potential usefulness for assessing water quality. Caenids, leptophlebids, oligoneurids ephemerellids and teloganodids seem to be particularly sensitive to temperature, acidity, turbidity, chemical oxygen demand and biochemical oxygen demand, parameters that varied with river altitude.

Keywords

river, ephemeroptera, abundance, altitude, season, physicochemistry



The Recovery of Two Long-logged Headwaters in Temengor Reservoir, Perak, Malaysia

Zarul Hazrin Hashim, Amir Shah Ruddin Md Shah, Khoo Khay Huat,
Shahrul Anuar Md. Sah, Mashhor Mansor

A study on water quality of the two long-logged and abandoned headwaters in Temengor Reservoir was conducted to determine their natural recovery. In this study, we used National Water Quality Standards for Malaysia prepared by Malaysian Department of Environment as an indicator for water quality recovery. The parameters measured were dissolved oxygen (mg/L), water temperature (°C), pH, conductivity (mS/cm), total dissolved solids (mg/L), water velocity (m/s), ortho-phosphate ($\text{PO}_4\text{—P}$), nitrite-nitrogen ($\text{NO}_2\text{—N}$), nitrate-nitrogen ($\text{NO}_3\text{—N}$) and alkalinity. In general, water quality in Sungai Enam and Sungai Telang were in Class I, indicating water quality in both streams have recovered. Based on the t-test, Sungai Enam and Sungai Telang differed significantly in all parameters except for dissolved oxygen, $\text{NO}_2\text{—N}$ and $\text{NO}_3\text{—N}$. In spatial analyses (upper, middle and lower reaches comparisons), the two-way ANOVA analysis shows that there were significant differences in all studied parameters between the two rivers except for dissolved oxygen, total dissolved solids, $\text{NO}_2\text{—N}$ and $\text{NO}_3\text{—N}$. Stream flow, hydrologic pathways, geomorphology, physical and environmental characteristics are essential elements in understanding the dynamics of water systems in Sungai Enam and Sungai Telang. Due to the recovery, these two headwaters are thus suitable for fish conservation and restoration sites.

Keywords

water quality, Temengor Reservoir, hydrology, nutrient, headwaters



14.19 Check List 8(1): 027-031, 2012; Check List, Journal of Species List and distribution

Fishes of Sungai Enam and Sungai Telang in Temengor Reservoir, Perak, Malaysia

Zarul Hazrin Hashim, Amir Shah Ruddin Md. Shah, Mohd. Syaiful Mohammad,
Mashhor Mansor and Shahrul Anuar Mohd. Sah

An inventory study of fishes was carried out from June 2003 to May 2004 at Sungai Enam and Sungai Telang, which was last logged 40 years ago. In spite of the negative impacts of logging, the study recorded a total of 21 fish species in these headwaters, comprising nine families. Sungai Telang recorded 19 species with 11 species classified as "locally rare", whereas Sungai Enam recorded 11 species with nine species classified as "locally rare". When species from previous studies were included, the total number of species recorded in Sungai Enam and Sungai Telang was 28 and 27 species respectively. The presence of *Devario regina*, *Neolissochilus soroides* and *Poropuntius smedleyi* in all inventory studies conducted indicate that both headwaters are healthy, and function as sources of clean water, nutrient supplies and fish recruits for Temengor Reservoir.



14.20 Check List 8(3): 408-413, 2012, Check List, Journal of Species List and distribution

Fish Checklist of Perak River, Malaysia

Zarul Hazrin Hashim, Rosli Yeop Zainuddin, Amir Shah Ruddin Md. Shah,
Shahrul Anuar Mohd.Sah, Mohd. Syaiful Mohammad and Mashhor Mansor

Out of the 1000 species of freshwater fish documented in the South-East Asian Tropics, 420 species can be found in Malaysia. Based on experimental gill net studies, Perak River recorded a total of 107 fish species, which comprises of 33 families with Cyprinidae as the dominant family, with 43 species. The fluctuating number of species and species replacement in the upstream direction in this river reflects the orientation of the River Continuum Concept. Gradient changes of salinity, habitat heterogeneity, water velocity and riverbed materials are some of the factors that may contribute to the fluctuation and species replacement.



15.0

Universiti Teknikal Malaysia

15.1 Applied Mechanics and Materials, 2013, © (2013) Trans Tech Publications, Switzerland.

Research development of energy efficient water hydraulics manipulator for underwater application

Yusof, A.A., Wasbari, F., Qadafie Ibrahim, M.

This paper presents research development of water hydraulics manipulator test rig for underwater application at Centre for Advanced Research on Energy, Faculty of Mechanical Engineering, Universiti Teknikal Malaysia Melaka. The test rig is designed in order to study the effectiveness of using water hydraulics system for underwater manipulation application. With objectives to promote sustainability and energy saving, the manipulator system is targeted for usage in an underwater scenario, possibly on small submarines or underwater remotely operated vehicles (ROVs). Underwater vehicles normally utilize the use of oil hydraulics for propulsion, manipulation and instrument control. The research on underwater manipulator that uses the surrounding sea water itself as the power and energy carrier for control is now possible with the current development in water hydraulics technology.



15.2 Jurnal Teknologi (Sciences and Engineering), 2013, © 2013 Penerbit UTM Press. All rights reserved.

Water content estimation in soils using novel planar electromagnetic sensor arrays

Md Yunus, M.A., Hisyam Mohamad, S., Nor, A.S.M., Izran, M.H., Ibrahim, S.

Agriculture is one of the important sectors for food supplies. Therefore, a tool for monitoring the agro-environment is important in order to maintain the permanence of agricultural soils. This paper suggests an alternative method for the detection of water content in soils by developing a sensor array with a combination of planar meander and interdigital electromagnetic sensors. The study involved sensor array fabrication using the printed circuit board (PCB) method. The experimental setup consisted of a frequency waveform generator and a signal oscilloscope to collect and analyse the sensors' output, with VEE Agilent software used to establish the interface. A set of experiments was conducted to determine the relationship between the sensors' output and the soils' parameters. The performance of the system was observed where the sensors were tested with the addition of various kinds of soil samples with different concentrations of water content. The sensitivity of the developed sensors was evaluated where the best sensor was selected. Based on the outcomes of the experiments, the Y sensor array placement has the highest sensitivity and can be used to measure the water content in the soils where the data accuracy is compared.



15.3 Applied Mechanics and Materials, 2013, © (2013) Trans Tech Publications, Switzerland.

ANFIS modelling of carbon removal in domestic wastewater treatment plant

Gaya, M.S., Wahab, N.A., Sam, Y.M., Anuar, A.N., Samsuddin, S.I.

Modelling of an ill-defined system such as the wastewater treatment plant is quite tedious and difficult. However, successful and optimal operation of the system relied upon a suitable model. Most of the available developed models were applied to industrial wastewater treatment plants. This paper presents adaptive neuro fuzzy inference system (ANFIS) model for carbon removal in the Bunu domestic wastewater treatment plant in Kuala Lumpur, Malaysia. For comparison feed-forward neural network (FFNN) was used. Simulation results revealed that ANFIS model is slightly better than the FFNN model, thus proving that the model is a reliable and valuable tool for the wastewater treatment plant.



15.4 Proceedings of the 2013 IEEE 8th Conference on Industrial Electronics and Applications, ICIEA 2013, © 2013 IEEE.

A study on controller design strategies for TITO plant

Samsudin, S.I., Rahmat, M.F., Wahab, N.A., Razali, M.C., Gaya, M.S.

The work studies on the performance of diagonal and multivariable PI control strategies applied to two-input two-output (TITO) nonlinear wastewater treatment plant (WWTP). WWTP is highly known with the variation and uncertainty of the parameters, making them a challenge to be controlled. Thus, simpler control strategies are always demanded. An adaptive interaction algorithm is used in tuning the diagonal PI controller while Davison and Penttinen-Koivo methods are applied in multivariable PI controller. It was observed that the simulated diagonal PI controller perform well in tracking the substrate and dissolve oxygen concentrations while the disturbances are well compensated by multivariable PI controllers.



15.5 Proceedings of the 2013 IEEE 8th Conference on Industrial Electronics and Applications, ICIEA 2013, © 2013 IEEE.

Application of adaptive decentralized PI controller for activated sludge process

Samsudin, S.I., Rahmat, M.F., Wahab, N.A., Gaya, M.S., Razali, M.C.

This paper presents the application of adaptive decentralized PI controller to nonlinear activated sludge wastewater treatment plant (WWTP). Tuning of WWTP is a challenging task due to the variation and the high uncertainty of the parameters. Thus, a simple tuning method is applied in satisfying straighten effluent quality and hence optimizing the nitrogen removal of the plant. The PI controller parameters are adjusted directly by updating algorithm developed based on adaptive interaction algorithm theory. It was observed that the decentralized PI with approximate Frechet tuning algorithm offers an attractive tuning task for multivariable WWTP with improvement in energy saving and effluent violations of Benchmark Simulation Model No. 1.



15.6 Proceedings - 2013 IEEE 9th International Colloquium on Signal Processing and its Applications, CSPA 2013, © 2013 IEEE.

ANFIS inverse control of dissolved oxygen in an activated sludge process

Gaya, M.S., Wahab, N.A., Sam, Y.M., Samsuddin, S.I.

The activated sludge process is the main versatile technology currently in use for wastewater treatment system. Dissolved oxygen (DO) is the key element in the process due to its significance influence upon the bacteria responsible for decomposing the organic pollutants in the wastewater. However, the non-linear nature of DO couple with the time-varying oxygen transfer rate makes the DO control quite complex. This paper presents an adaptive neuro fuzzy inference system (ANFIS) inverse control of dissolved oxygen in an activated sludge process. The performance of the proposed technique is illustrated with tracking of dissolved oxygen reference trajectory and for comparison PI controller is used. The simulation results revealed the effectiveness and the accuracy of the proposed controller in tracking the DO set point. The controller is valuable for an activated sludge process.



15.7 International Journal on Smart Sensing and Intelligent Systems, 2013

A simplified model structure for an activated sludge system

Gaya, M.S., Wahab, N.A., Sam, Y.M., Samsuddin, S.I., Razali, M.C.

Activated sludge system is the essential technology in use for municipal wastewater treatment plant. The system design for pollutants removal, safety analysis and experimentation relied upon an effective, straightforward and reliable model. However, most of the available models are too complex to use for control purposes either practically or via simulation. Therefore, vehement need for a simplistic and efficient model could not be avoided. This paper presents a simplified model structure for an activated sludge system using neuro-fuzzy system. Efficiency, ease of use, effectiveness and fast convergence are some of the alluring qualities of neuro-fuzzy technique. Building a reliable and flexible model requires validation with full scale or experimental data. Therefore, with the use of the full-scale data from the domestic wastewater treatment plant in Malaysia, the validation was achieved. For comparison, auto regressive with exogenous input (ARX) model was used. Simulation studies showed that the proposed method produced promising results, thus revealing the technique is effective and robust in modelling the activated sludge system.



15.8 Applied Mechanics and Materials, 2013, © (2013) Trans Tech Publications, Switzerland.

Promoting sustainability through water hydraulic technology -the effect of water hydraulic in industrial scissor lift-

Yusof, A.A., Mat, S., Din, A.T.

Sustainability concern has brought the idea of exploring the possibility of using water as the hydraulic medium to transfer energy. The abundant resource of water, and its characteristic involving hygiene, safety and low maintenance cost provides a fascinating perspective of choosing water over hydraulic oil, due to concerns over oil disposal, contamination, costly maintenance and flammability. However, in contrast, its low boiling temperature, low viscosity, and simple molecular structure could pose danger to the operation of the hydraulic system. In order to identify these limitations, an experimental study is carried out to explore the effect of water hydraulic system. A test rig of scissor lift is fabricated and put into test by replacing the hydraulic oil with reverse osmosis water. It is found that the water hydraulic scissor lift managed to lift up to 400 kg of load, with workable water temperature of 41.4°C.



15.9 Proceedings - 2012 IEEE International Conference on Control System, Computing and Engineering, ICCSCE 2012, © 2012 IEEE.

Neuro-fuzzy modelling of wastewater treatment system

Gaya, M.S., Wahab, N.A., Sam, Y.M., Razali, M.C., Samsudin, S.I.

Wastewater treatment system is highly uncertain and intricate system. Suitable model is a key to smooth and optimal operation of the system. The available wastewater treatment system models are too difficult to use and costly to experiment. This paper presents neuro-fuzzy modelling of wastewater treatment system. Adaptability, smoothness, effectiveness, reliability, less computational and empirical experimentation costs are some of the advantages of neuro-fuzzy approach. Simulation studies show that the proposed neuro-fuzzy technique yielded outstanding results. Thus, proven the technique is an efficient and valuable tool for modelling wastewater treatment system.



15.10 Australian Journal of Basic and Applied Sciences, 2011

Control strategies of wastewater treatment plants

Rahmat, M.F., Samsudin, S.I., Wahab, N.A., Salim, S.N.S., Gaya, M.S.

The objective of the current study is to investigate various control strategies implemented to wastewater treatment plants. The paper starts with discussion in modeling part of wastewater system and continues with designation of control objectives and control parameters. Subsequently, the implementations of common control structures including feedback, feedforward-feedback, supervisory and hierarchical controls are explained. The study is exclusively emphasized on four control techniques. Model predictive control performs superior control in optimizing nitrogen removal based on predictions of future behavior of wastewater systems. The performances of PID control in dissolve oxygen and nitrate control is improved significantly with multivariable configuration. Similar results achieved by data-driven approach compared to default PI simulation. Finally, artificial neural networks are commonly suggested for modeling and prediction purposes. A study is emphasized on Benchmark Simulation Model No. 1. The paper serve as a reference and for future research improvements in developing new advanced control techniques for wastewater field that aims in achieving stringent effluent quality standards.



16.0

Universiti Teknologi MARA, Malaysia

16.1 Journal of Cleaner Production, Volume 67, 15 March 2014, Pages 58-61

Treatment of effluents from palm oil mill process to achieve river water quality for reuse as recycled water in a zero emission system

Mohd Ridzuan Othman, Mohd Ali Hassan, Yoshihito Shirai,
Azhari Samsu Baharuddin, Ahmad Amiruddin Mohd Ali, Juferi Idris

A major problem facing the palm oil industry is the need to use fresh river water for processing which leads to the discharge of treated palm oil mill effluent (POME) to the river daily. In this paper, we propose a practical solution using activated carbon and selected coagulants for the zero emission of POME final discharge, using river water quality as the benchmark. The target was on the reduction of chemical oxygen demand (COD) and suspended solids (SS) to meet river water quality for recycling and reuse of the POME final discharge as boiler feed water to fulfil the zero emission concept. Our results showed that a new two-step process, based on adsorption of organic pollutants on activated carbon (AC), with a ratio of 10 g AC per 1 L of wastewater (POME), followed by coagulation using a ratio of 0.6 g of polyaluminium chloride per 1 L of treated POME, was the best treatment. By using this new proposed treatment the final COD and SS of resulted residual water from palm oil mill process were 10 mg L⁻¹ and 2 mg L⁻¹, respectively, which is better than river water quality. Therefore the objective of zero emission of POME final discharge can be achieved.



16.2 Solar Energy, Volume 93, July 2013, Pages 63-71

The application of a solar still in domestic and industrial wastewater treatment

Rada Zarasvand Asadi, Fatihah Suja, Mohd Hafidz Ruslan, Nurul'ain Abd Jalil

A study on the treatment of sanitary and industrial wastewater by solar still was conducted in Malaysia by UKM (Universiti Kebangsaan Malaysia) University during November and December 2011 and January 2012. The experiment was performed by feeding three types of wastewater into a solar still. The pilot-scale solar still consisted of a stepped type solar still with an effective area of 0.8 m². The characteristics of the raw wastewaters indicated that the chemical oxygen demand (COD) was high at 425 mg/L for sanitary wastewater and 2650 mg/L for diluted industrial wastewater and that the maximum turbidity was between 150 and 820 NTU (Nephelometric Turbidity Units) for both types of wastewater. The results showed that the condensate COD was between 2 and 86 mg/L for the different types of feed. The COD removal efficiency of the still was greater than $86.83 \pm 3.45\%$. It was shown that the condensate quality in terms of total dissolved solids (TDSs), total suspended solids (TSSs), COD and turbidity matched the quality of high-grade water and it is suitable to discharge to surface water. The method was also successful in removing bacteria. Heterotrophic bacteria counts were enumerated to determine the inactivation percentage of HPC (Heterotrophic plate counts). A reduction greater than $86.75 \pm 10.88\%$ for HPC was achieved.



16.3 The Journal of Supercritical Fluids, Volume 79, July 2013, Pages 73-75

Influence of impurities on biodiesel production from *Jatropha curcas* L. by supercritical methyl acetate process

Noorzalila Muhammad Niza, Kok Tat Tan, Keat Teong Lee, Zainal Ahmad

Generally, water and free fatty acid (FFA) content in oils could cause a serious problem during conventional transesterification such as saponification. Thus, without any pre-treatment, vegetable oil, especially with high FFA content, will be affected. In this study, a non-catalytic supercritical methyl acetate (SCMA) process was utilized to produce biodiesel from *Jatropha curcas* L. oil. The effects of water and FFA content on the yield of biodiesel were investigated. The results obtained for the effects of water on the yield of biodiesel were compared with the supercritical methanol (SCM) process and conventional catalytic reaction. Results revealed that the catalytic reaction suffers from low yield with the presence of high water content in oil. Meanwhile, the yield of both the SCM and SCMA reactions were found to increase slightly with the increment of water content in the mixture. On the other hand, the results for the effect of FFA on the yield of biodiesel were compared with the SCM reaction. It was found that the presence of FFA has a negligible effect in both the SCMA and SCM reactions. These findings demonstrate that pre-treatment procedures are not necessary in the SCMA process for *Jatropha* oil which normally contains a high FFA content.



16.4 Social and Behavioral Sciences, Volume 49, 2012, Pages 147-155

Functional Dimension at 'Kuala Lumpur Waterfront'

Nurul Syala Abdul Latip, Shuhana Shamsudin, Mohd Shahir Liew

Kuala Lumpur waterfront used to be busy with activities when it was once a trading post for the export of tin. The activity at the waterfront has changed over the years along with the city development. This research investigates the level of contextual integration between the waterfront and the urban rivers in terms of its functional dimension. Technique adopted is field observations (building use survey and time interval observation). All researched zones have medium level of contextual integration which depends much on the continuity of activities, their positioning location, accessibility and the provision of space and facilities.



17.0

Universiti Tenaga Nasional, Malaysia

17.1 Research and Development (SCOReD), 2011 IEEE Student Conference on, Issue Date: 19-20 Dec. 2011, Page(s):277 - 282 Print ISBN:978-1-4673-0099-5 INSPEC Accession Number:12542444 Cyberjaya Digital Object Identifier, 2011 IEEE Student Conference on 19-20 Dec. 2011 © 2011 IEEE

Signal analysis to detect water tree location in polymeric underground cables

Tze Mei Kuan; Ariffin, A.M.; Sulaiman, S.

This paper discusses the analysis of signals generated from a set-up to detect water tree location in polymeric underground cables using PSpice simulation tool. The set-up is executed by implementing the time domain reflectometry (TDR) method in analysing the signals. To locate the water tree in a cable, signals are generated from both ideal and degraded XLPE cables due to water treeing. All results are then compiled, analysed and discussed further in this paper to study how water trees can be located along the cable using this method.



17.2 Dept of Electronics and Communication Engineering, Volume 2. Issue 1, Oct 2011, World journal of engineering

SOM Based Segmentation Method to Identify Water Region in LANDSAT Images

Win Kong, Tiagrajah V. J.

The objective of this research is to identify the water region from LANDSAT satellite image. Water resources are sources of water that are useful or potentially useful to humans. Uses of water include agriculture, industrial, household, recreational, transportation and environmental activities. Surveying of water region and research on its feature is very basic step for many planning, especially for countries like Indonesia, where the rapid economic growth has caused increasing competition for water. Identifying water region from satellite images is one of the grand steps of water resources management for a country. In this paper, the segmentation algorithm based on SOM (self-organizing map) neural network with compression pre-processing by wavelet transform and image smoothing using Gaussian low-pass frequency domain filters is presented. Firstly, the input image is blurred using Gaussian low-pass frequency domain filter. Then wavelet decomposition is used for obtaining compressed image without affecting other features. Next, SOM neural network is trained with the approximation image, which can improve the representation of training. Finally, trained neural network classify pixels of original image by using K-mean algorithm.

Keywords

Segmentation, Water Region Extraction



17.3 Vol 3, No 1 (2011), (Journal of Energy & Environment, copyright UNITEN)

Performance of Newly Developed Integrated Space Conditioning and Domestic Water Heating Device

M.M. Rahman, H.Y. Rahman

This paper presents the performance of the recently developed integrated space condition and domestic water heating device. A conventional split type air conditioner is modified to reclaim the superheated portion of the heat leaving the compressor to be utilized to heat up water for domestic purposes. The experimental investigation revealed that this device could heat up water from room temperature to 82°C within 9 hours of operation (8:00 am to 5:00 pm) at the same time cool down the room air to the desired level. By using this type of energy recovery device, compressor efficiency can be improved and at the same time, hot water for domestic purposes can continuously be obtained free of charge. The end result is expected to be faster cooling and prolonged compressor life. This system is simple yet affordable and able to save water heating cost and environment friendly, i.e., less heat is rejected to the environment.

Keywords

Waste heat recovery; Space conditioning; Domestic water heating; Environment friendly



17.4 12nd International Conference on Urban Drainage, Porto Alegre, Brazil, 10-15 September 2011

Application of Water Sensitive Urban Design at Local Scale in Kuala Lumpur

Lariyah M.S., Mohd Nor M.D., Mohamed Roseli, Z.A., Zulkefli M., Amirah Hanim M.P.

Integrated urban stormwater management is rapidly evolving and has become a public concern in Malaysia. The integrated approach to manage urban water such as the water sensitive urban design (WSUD) that caters to the sustainable management and improvement of water quality entering urban rivers; opportunities for stormwater and greywater harvesting and reuse; and innovative reductions in potable water demand is widely accepted in the country. Realising the importance of the said approach, the Humid Tropics Centre (HTC) has initiated the construction of Water Sensitive Urban Design (WSUD) components to become an example of lot scale application in urban area in the tropics as well as acting as a pilot learning show case. The project demonstrates typical examples of various WSUD components and utilizes on-site rainwater reuse, greywater reuse and stormwater retention to control the quantity and quality of the discharge from the site in accordance with the practice imposed upon by the Department of Irrigation and Drainage Malaysia (DID). The typical components of the WSUD include rainwater tank and green roof, greywater reuse system, bioretention, wetland, and porous pavement all linked together as a source control. The first part of this paper examines the conceptual development of WSUD system with the objectives to protect and enhance the hydro ecological values without compromising the local government authority's requirements pertaining sustainable urban development. All issues pertaining to the realisation of the concept, the detailed design and the construction phases are also described. A preliminary result achieved by monitoring a selected component of WSUD in terms of hydraulic conductivity and overall performance under the influence of high intensity rainfall is also discussed in the paper.

Keywords

Best management practices; humid tropics; urban catchment management and water quality improvement; Water Sensitive Urban Design (WSUD)



17.5 European Journal of Scientific Research; Dec2009, Vol. 38 Issue 1, p38
Academic Journal

Expert System for Mitigating Erosion and Sedimentation Due to Storm Water During Construction Activities in Malaysia

Al-Ani, Ibrahiem Abdul Razak; Sidek, Lariyah Mohd; Basri, Noor Ezlin Ahmad

In this paper, a concise review on the history and application of artificial intelligence and expert system is presented. A review of the effect of erosion and sedimentation that are associated with construction activities on the adjacent water bodies is also presented. The various considerations that must be dealt with in order to ensure a sound and systematic environment for expert system development is also presented. The main features of the development of an artificial intelligence expert system for mitigating erosion and sedimentation during construction activities to the adjacent water bodies were also taken in to consideration in this paper.

Keywords

ARTIFICIAL intelligence; EXPERT systems (Computer science); SEDIMENTATION & deposition; SOIL erosion; BODIES of water



17.6 Volume 2, Issue 5, 2011 pp.853-862 Journal homepage: www.IJEE.IEEFoundation.org ISSN 2076-2895 (Print), ISSN 2076-2909 (Online) ©2011 International Energy & Environment Foundation. All rights reserved.

Multi criteria analysis in environmental management: Selecting the best stormwater erosion and sediment control measure in Malaysian construction sites

Ibrahiem Abdul Razak Al-Hadu, Lariyah Mohd Sidek,
Mohamed Nor Mohamed Desa, Noor Ezlin Ahmad Basri

Malaysia located in a tropical region which is interested with a heavy rainfall through the whole seasons of the year. Construction stages usually associated with soil disturbing due to land clearing and grading activities, this combined with the tropical climate in Malaysia, will generate an enormous amount of soil to be eroded and then deposited in the adjacent water bodies. There are many kinds of mitigation measures used so as to reduce the impact of erosion and sedimentation that are generated due to the stormwater in construction sites. This paper presents the application of Multi Criteria Analysis (MCA) tool in choosing the best stormwater control measure by depending on specified criteria and criterion weight. The results obtained from the application of MCA in stormwater pollution control have many benefits to the contractors, consultants and decision makers by making them able to select the best control measure for every stage of construction.

Keywords

Weighted sum technique; Multi criteria analysis; Erosion and sedimentation control; Construction sites; Water pollution.



17.7 **Journal of Environmental Science and Technology.2012;5(5):381-388. © 2012 Asian Network for Scientific Information.**

Knowledge-based expert system for stormwater management in Malaysia

Ibrahiem Abdul Razak Al-Ani; Lariyah Mohd Sidek;
Mohamed M.N. Desa; N.E. Ahmad Basri

Stormwater is usually susceptible to be polluted due to land disturbance activities like earth work and land clearing. Land clearing and earthwork activities combined with heavy rainfall. And the widely varied topography in Malaysia can result in severe soil loss and sediment generation. Recently knowledge-based systems have been used in many fields especially when human expertise and data are limited. In the current study, a knowledge-based expert system was developed for stormwater management stormwater in Malaysia. This system called the Stormwater Management Control Expert System (SMCES), was developed using the Wcrosoft Visual Basic 6 environment. The SMCES system can be used by engineers, contractors and decision makers for stormwater management control in Malaysia.



17.8 **Electronic Journal of Biotechnology ISSN: 0717-3458 Vol. 8 No. 1, Issue of April 15, 2005**
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Removal of heavy metal from industrial wastewater using chitosan coated oil palm shell charcoal

Saifuddin M. Nomanbhay, Kumaran Palanisamy

This research focuses on understanding biosorption process and developing a cost effective technology for treatment of heavy metals-contaminated industrial wastewater. A new composite biosorbent has been prepared by coating chitosan onto acid treated oil palm shell charcoal (AOPSC). Chitosan loading on the AOPSC support is about 21% by weight. The shape of the adsorbent is nearly spherical with particle diameter ranging 100~150 μm . The adsorption capacity of the composite biosorbent was evaluated by measuring the extent of adsorption of chromium metal ions from water under equilibrium conditions at 25°C. Using Langmuir isotherm model, the equilibrium data yielded the following ultimate capacity values for the coated biosorbent on a per gram basis of chitosan: 154 mg Cr/g. Bioconversion of Cr (VI) to Cr (III) by chitosan was also observed and had been shown previously in other studies using plant tissues and mineral surfaces. After the biosorbent was saturated with the metal ions, the adsorbent was regenerated with 0.1 M sodium hydroxide. Maximum desorption of the metal takes place within 5 bed volumes while complete desorption occurs within 10 bed volumes. Details of preparation of the biosorbent, characterization, and adsorption studies are presented. Dominant sorption mechanisms are ionic interactions and complexation.

Keywords

chitosan bioabsorbent, chromium (III), chromium (IV), heavy metal adsorption, oil palm shell charcoal.



17.9 2012 International Conference on Date of Conference: 23-27 Sept. 2012, copyright IEEEXplore Page(s):1163 - 1166 Print ISBN:978-1-4673-1019-2 INSPEC Accession Number:13265331

Condition Monitoring and Diagnosis (CMD).

Ariffin, A.M., Kuan, T.M., Sulaiman, S., Illias, H.A.

Polymeric-insulated power cables are often subjected to multiple sources of degradation. Generally, the main cause for electrical breakdown in this type of cable insulation is usually due to the microscopic impurities and defects located in the bulk, or even at the interfaces of the material. When the dielectric is subjected to a high electrical stress, imperfections such as protrusions, contaminants and microvoids, will all act as points where the electric field is enhanced; increasing the likelihood that degradation processes will be initiated. The intensification of electric field within the insulating material can cause localized discharge to occur continuously, and thus tree-like channels can be developed in the long-run. This paper attempts to investigate whether the existence of water tree region can be detected within polymeric-insulated cables, and the proposed method for the detection mechanism is the time domain reflectometry (TDR). When water trees are present within an insulation system, the characteristic impedance of the material also changes so this can cause reflection of signal propagating along the cable. It was found that there is a difference in TDR signals between un-degraded cable and water tree degraded cable. It is hoped that the difference in these time domain signals can actually assist in determining the location where the presence of water trees can be considered as significant.



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SOM based segmentation method for water region detection in satellite images

V. J. Tiagrajah¹, Kong Win¹

There is increasing desire and need in research of water region detection owing to the unexpected natural disaster that lead to financial, environment and human losses. Surveying of water region and research on its feature is very basic step for many planning, especially for countries like Japan, where tsunami has caused the changes on water region in March, 2011. Essentially, identifying water region from satellite images is one of the grand steps of water resources management for a country. Professional and academic institutions play a vital role in the management of water resources as they are instrumental in research. The objective of this paper is to identify the water region from satellite image. In this paper, the segmentation algorithm based on SOM (self-organizing map) neural network with compression pre-processing by wavelet transform and image smoothing using Gaussian low-pass frequency domain filters are presented.

Keywords

Satellite image, SOM neural network, Water region segmentation



17.11 IOP Conference Series: Earth and Environmental Science Volume 16 conference 1
M S Lariyah et al 2013 IOP Conf. Ser.: Earth Environ. Sci. 16 012044 doi:10.1088/1755-
1315/16/1/012044, Issue 1 (2013)

Numerical modelling dam break analysis for water supply project

M S Lariyah, M Vikneswaran, B Hidayah, Z C Muda, S Thiruchelvam,
A K Abd Isham and H Rohani

Dam provides many benefits to the society, but it can also cause extensive damage to downstream area when it fails. Dam failure can cause extensive damage to properties and loss of human life due to short warning time available. In general, dam spillway was designed to drain the maximum discharge from the dam during the Probable Maximum Flood (PMF). The spillway is functioned to prevent the dam from failure due to overtopping, which can lead to the dam failure. Dam failure will result in large volume of water travelling at very high velocity to the downstream area of the dam. It can cause extensive property damage, destruction of important facilities, and significant loss of human life along the way. Due to the potential of high hazard it poses to the downstream area, a dam break analysis is considered very essential. This paper focuses into the dam failure analysis for Kahang Dam by prediction of breach flow hydrographs and generation of inundation map at downstream area. From the PMF scenario simulation, the maximum inflow is 525.12 m³/s and peak discharge from the dam during dam failure is 6188m³/s. The results are able to provide information for preparation of Emergency Response Plan (PMF), in which appropriate steps can be taken by relevant authorities to avoid significant loss of human lives.

Keywords

Irrigation; dams , Water quality and water resources , Hydroelectric, hydrothermal, geothermal and wind power , Gg Impact of natural and man-made disasters Environmental and Earth science



17.12

Conference Series: Earth and Environmental Science Volume 16 conference 1
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doi:10.1088/1755-1315/16/1/012020

Constructed Rain Garden Systems for Stormwater Quality Control under Tropical Climates

Lariyah Mohd Sidek, Norshafa Elyza Muha, Nur Asmaliza Md Noor and Hidayah Basri

Malaysia has taken an integrated approach to manage storm water that is increasingly becoming a problem in big cities. Rain gardens are recommended as green technology for a new storm water management in Malaysia. The approach is applied in urban planning and design that integrates the total water cycle management into the development process areas. Rain gardens have been effective in reducing peak discharge and consistently reduce the number of storm water pollutants. This paper will examine some of guidelines, laboratory studies and field monitoring that shows great potential and benefit of rain garden. The preliminary results for rain garden performance were reported in this paper. The findings from this research will open avenues for researchers to advance the knowledge in rain garden systems to achieve the sustainable development in Malaysia.

Keywords

Water in the atmosphere (humidity, clouds, evaporation, precipitation), Precipitation Storms, Tropical meteorology, Environmental studies, Water quality and water resources



17.13 IOP Conference Series: Earth and Environmental Science Volume 16 conference 1
M A Malek et al 2013 IOP Conf. Ser.: Earth Environ. Sci. 16 012123 doi:10.1088/1755-
1315/16/1/012123

Water security and its challenges for Malaysia

M A Malek, M A M Nor and Leong Y P

Water Security in Malaysia is a national issue. The Malaysian water services industry faces issues which need to be tackled immediately for it to be viable and sustainable. Among them are the decentralized water services sector, ineffective governance structure, unsustainable tariffs, huge investments required to develop the water supply and sewerage infrastructure, inefficient operation by the operators and high non-revenue water (NRW) losses. In Malaysia, the "Sectorial" approach embedded in the present water management system and its transformation towards "Integrated Water Resources Management" (IWRM), is still in a state of inertia. This paper presents the need to transform, from a "Supply" Management mode (a characteristic of a developing country) to a "Water Demand" Management mode (a characteristic of a developed country). Issues on "Water Demand" Management for the Environment which can be a threat to the need for sustainable development for biodiversity are highlighted here. Reliable water accounting systems are found still lacking in this country, especially in the Agriculture and Environmental Sectors, where figures are still highly based on "traditional" assumptions. Water Quality deterioration remains an issue especially for the Water Supply and Environment Sectors. Available surface water resource is depleting in many regions and states in the Peninsular. Apart from the Reduce, Reuse and Recycle (3R) option for surface water, another option would be to begin a concerted effort for groundwater exploitation. However there are still grey areas of knowledge in the groundwater resources in this country for affirmative decisions and development of appropriate policies. It is also found that, there are no concerted plans to prepare the public for the change from "Supply" Management to "Demand" Management. In a developed nation, this change is through stakeholder platforms and supported by appropriate policies, rules and regulations that are based on validated Sciences, Technologies and Innovations (STI). Transforming from "Supply" Management to "Demand" Management is a formidable task. This requires the wisdom and knowledge of all experts in the Water Resources Sector.

Keywords

Environmental studies, Environmental and Earth science



18.0

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Water status detection by free-dipping method using chitosan based sensor

Nasution, T., Nainggolan, I., Nasruddin, M.N., Isnen, M., Handinata, O.

A film sensor based on chitosan that is capable to evidence the different water status has been successfully fabricated by an electrochemical deposition technique. Main objective of this study is to utilize the chitosan as an advanced sensing material to detect the water's conductivity. The presence of amino group in chitosan molecular structure has enabled the chitosan film sensor to detect the water's conductivity by a novel free-dipping method. The result showed that the output voltage of chitosan film sensor was in range of 190 to 206 mV upon exposed to the river water. For the exposure of drinking water, the output voltage was 120 mV and when exposed to treated water, the output voltage was in the range 69 to 72 mV. While the exposure of aquadest, the output voltage of chitosan film sensor had the value from 121 to 134 mV. Therefore, the chitosan film sensor was able to show a different output voltage values for each type of water sample.



19.0

Water Watch Penang, Malaysia

19.1 **Int. J. of Emergency Management 2003 Vol.1, No.3 pp.205 – 214, Int. J. of Emergency Management, 2003 Vol.1, No.3, pp.205 - 214**

The Malaysian Flood Hazard Management Program

Pin-Shuo Liu, Ngai Weng Chan

Flooding is the most severe hazard in Malaysia, a country experiencing a wet equatorial climate with heavy seasonal monsoon rains. In the past, nature took care of itself as vast expanses of forests and wetlands soaked up rainfall excess and delayed the flow of water into rivers. Indigenous peoples are also well adapted to seasonal floods, as their lifestyles and livelihood on floodplains have evolved over centuries as adaptations to floods. Officially, Malaysian flood management is based on structural and technological measures to "control" floods. This is, however, only partly successful, as non-structural measures are under-employed. Moreover, the application of high-tech solutions can only be effective if the public/victims understand it, cooperate and respond effectively to them. Often, sophisticated (imported) engineering structures and flood control systems are alien to the public, who are only accustomed to traditional systems. Costly structural schemes give rise to a false sense of security and may in fact be more costly to victims. Frequent failures of structural schemes often lead to a lack of confidence on the part of victims. Flood hazard in the country is also dominated by a top-down approach, with little input from locals/victims who have vast knowledge of floods and proven traditional coping mechanisms. Thus, there is a need to integrate the official flood management program with traditional systems to save lives and maximise flood-loss reduction. There is also a need for Malaysia to integrate the concept of sustainable development into its development policies towards flood hazard reduction.

Keywords

Malaysia; flood hazard management; flood forecasting; flood warning; traditional flood coping mechanisms.



19.2 (<http://www.waterwatchpenang.org/women-s-role-in-water-conservation-in-malaysia.html>) Copyright © 2007-2008 Water Watch Penang.

Women's Role in Water Conservation in Malaysia

Chan Ngai Weng and Vilas Nittivatananon

In recent decades, water problems have escalated in Malaysia due to climate change and socio-political reasons caused by population explosion. Increasingly, water supply lags further and further behind water demand. As the total quantity of available water is finite but demand increasing at geometrical rates, Malaysia is facing water problems which have severe impacts, particularly on women. Interestingly, however, being water managers both at home and in the office, women wield tremendous influence on the ways families use and conserve water. Ineffective top-down water management has necessitated the need for consumers, especially women, to play a more active role in water conservation, notably via water demand management (WDM). The role of women is pivotal in curbing domestic wastage, but ensuring wise use and conservation. Since domestic consumers use roughly more than half of the country's total water demand, WDM is a vital conservation tool. Women are the managers of the family's water budget. Because of the fact that women use water for most of the domestic chores in the home, they are considered vitally important in water conservation. Women also make decision on the installation of water saving devices. When women save water in the home, they also educate their children and family members about the importance of water conservation. Finally, women themselves need to cut down on water use via substitution of water-saving methods and other personal adjustments. Women who work can similarly exert their influence in the office by impressing upon colleagues and the employer about the benefits of water conservation. This paper attempts to show that water consumers (particularly women) can manage water via WDM in addressing water shortages. All water users need to be involved in a bottom-up approach in a sustained national WDM initiative whereby women are the key players towards achieving sustainable management of water resources.

Keywords

Women in water, Water Demand Management, Water Saving, Domestic Water Audit



19.3 (<http://www.waterwatchpenang.org/the-role-of-gender-in-domestic-water-conservation-in-malaysia.html>) Copyright © 2007-2008 Water Watch Penang.

The Role of Gender in Domestic Water Conservation in Malaysia

Chan Ngai Weng

While the role of gender in water management is vital in many countries experiencing water scarcity, such as in the African continent and Indian Sub-continent, it is rather undefined in the case of Malaysia. This is strange considering the escalation of water problems in the country in recent decades due to climate change and social, political and economic reasons. Though the country is rich in water resources, mismanagement causes water supply to lag far behind water demand. As a result, Malaysia is facing water problems which have severe impacts, particularly on gender. This paper demonstrates that women are the main water managers both at home and in the office, and they wield tremendous influence on the ways families and businesses use and conserve water. Increasing water problems has necessitated the need for consumers, especially women, to play a more active role in water conservation, notably via domestic water audit and other water demand management (WDM) tools. The role of women is pivotal in curbing domestic wastage, but ensuring wise use and conservation. Since domestic consumers use roughly more than half of the country's total water demand, WDM is a vital conservation tool. Women are the managers of the family's water budget. Because of the fact that women use water for most of the domestic chores in the home, they are considered vitally important in water conservation. Women also make decision on the installation of water saving devices. When women save water in the home, they also educate their children and family members about the importance of water conservation. Finally, women themselves need to cut down on water use via substitution of water-saving methods and other personal adjustments. Women who work can similarly exert their influence in the office by impressing upon colleagues and the employer about the benefits of water conservation. Overall, water conservation via involvement of the public can be effective when women are actively involved as they are the key players towards achieving sustainable management of water resources.

Keywords

Women in water, Water Demand Management, Water Saving, Domestic Water Audit



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