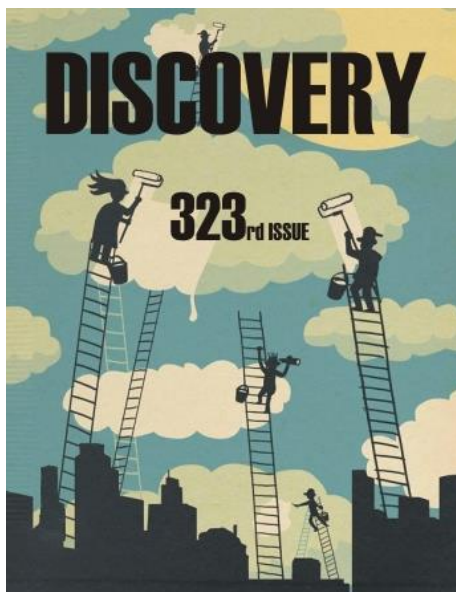


DISCOVERY

About the Cover



The *haor* basin at northeast Bangladesh covers almost one fifth of its total land area, produces about 20 percent of country's total staple food grain (rice) and supports livelihood for twenty million people. However, the areas are regularly affected by flood hits with enormous loss of crops, fodders, and other food commodities, and earning sources that make the people live therein vulnerable. Proper attention is not paid yet to explain the disaster occurs in the areas and overcome from the hazard risks with a holistic model. Therefore, the aim of the study is to explain the progression of vulnerability and hazards situation due to flood shocks in *haor* areas with a popular conceptual framework like the Pressure and Release (PAR) model. Important drivers of the root causes, dynamic pressures and unsafe conditions responsible to progress the vulnerability (Pressure model) are identified through collecting both secondary and primary sources of data from published, unpublished and grey literatures, consulting with various categories of stakeholders, and focus group discussion meeting with flood victim's farmers. The possible determinants (relief drivers) towards the progression of safety and disaster mitigation as a whole are pinpointed in the Release model which can be utilized in the Disaster Risk Reduction (DRR) or Management (DRM) programmes. The geo-morphological setting of *haor* areas and early heavy rain especially in the highly elevated upstream catchments like Cherrapunji, Meghalaya of India, and poor and un-time management of embankment are identified as proximal drivers for early flash flood hit which lead to inundate and damage of pre-matured *Boro* paddy. Early transplantation of *Boro* seedling with cool-tolerant and short life span cultivar which is trying to develop could assist to minimize the disaster risk to a great extent. The determinants can be categorized for performing immediate actions, short and medium term measures and long term planning. The analysis integrates the entire package of both social and physical components, and the results of the study can be utilized in government or policy planning. (Ref: Awal MA. Scaling the pressure and release model to address climate shock hazards and disaster risk reduction approaches in northeast *haor* basin of Bangladesh. DISCOVERY 2022; 58(323):1213-1224).

ENGINEERING

Development of a mini biogas digester for household use

Tanko Bako, Larry Orobome Agbereghe, Abubakar Said Aliyu

A mini biogas digester was designed, developed and evaluated at the Department of Agricultural and Bio-Resources Engineering, Taraba State University, Jalingo. Biogas was generated by co-digesting cow dung and vegetable waste at 25 days retention time. The cow dung was collected from the university farm, while the vegetable waste was collected from the residential settlement around the University campus. The substrate was mixed in the ratio 1:1:1.5 of cow dung, vegetable waste and water. The generated gas was collected in a tire tube using a motorized compressor. The biogas was burnt using a burner to observe the features of the flame produced. The mini biogas digester has a total production cost of thirty one thousands and thirty naira (₦30,030.00) only. The designed biogas digester had a 0.230 m³ PVC tank as the combined digester volume and gas holder volume, 4 inches pipe as inlet for substrate delivery into the digester and 1 inch pipe as outlet for exiting effluents. The design analysis showed the digester size as 0.173 m³ and gas holder size as 0.058 m³. The biogas produced from the experiment showed the good quality combustible biogas yield of 8508.8327 cm³ (0.008509 m³). The gas produced gave a brilliant coloured flame on burning. The results also showed that the residue organic waste from the digester can be used as manures for fertilizing the farm.

Discovery, 2022, 58(323), 1147-1154

SOCIAL SCIENCE

Implementation of Development Projects of Union Parishad in Bangladesh: Constraints and Prospects

Md. Al – Fahad Bhuiyan

Projects are frequently acknowledged as effective development tools. Governmental organizations and Local Government Institutions in Bangladesh carry out public development initiatives (LGIs). Resources produced locally are in little supply, hence the central government serves as the primary source of funding for local governments as they carry out development programs at the Union level. The primary goal of government spending is to satisfy the general populace. The government heavily funds rural development through LGIs. Local powerful stakeholders attempt to influence UP politically, socially, and economically out of self-interest. One of Bangladesh's main development priorities is the development of rural infrastructure. The study's goals are to look into the degree of local residents' satisfaction with the projects and the distribution of monies used to carry out UP projects. A mixed strategy was used. Using primary and secondary data, both qualitative and quantitative methodologies were used. The result implies that project management effectiveness (in terms of time, money, and scope) does not guarantee project success (in terms of the satisfaction of the local population). It is dependent on additional factors. They consist of the service value the project adds and user involvement in the project's execution.

Discovery, 2022, 58(323), 1155-1161

Insurgency in the Niger Delta and impacts on Foreign Direct Investment (FDI): Issues and Policy Options

Williams Glad Ule

This work investigated insurgency and its impact on foreign direct investment (FDI) in Niger-Delta. The framework adopted was Marxist Political Economy. The theory examines the rules that regulate production and accumulation in society, as well as the state's role in global capitalism. The paper argues that FDI into the oil-rich Niger-Delta caused disruption of people's livelihoods, marginalization, and social exclusion, all of which acted as stumbling blocks for foreign capital in the region. It shows that this was the dialectical result of the oil majors and Nigerian government's accumulation crisis. The insurgents arose to agitate against oil rents from the oil multinationals and the Nigerian government. Due to the destruction of oil main assets, production deficits, and revenue accruable to the corporations and the federal government, insurgency had a detrimental effect on FDI in the Niger-Delta. This increased oil majors' production costs and caused capital flight, pushing them to declare force majeure, citing insecurity as the primary reason. The paper demonstrates that the relationship between insurgency and FDI is complex. It calls for a genuine commitment from the Nigerian government and other stakeholders to face the Niger-Delta matter head on, enshrining good governance, transparency, and accountability in the oil business, and creating job opportunities for Niger-Delta youths to curb insurgency.

Discovery, 2022, 58(323), 1162-1170

MEDICINE

A nutritional supplement protects substantia nigra neurons against neurotoxicity induced by rotenone

Omar M.E. Abdel-Salam, Marwa El-Sayed El-Shamarka, Nermeen Shaffie

Oxidative stress is major contributing factor to dopaminergic cell death in Parkinson's disease (PD). In this study, the effect of the multivitamin and polyunsaturated fatty acids (PUFAs) containing nutritional supplement "Ensure" on oxidative stress and neuronal damage in the rotenone-induced PD was studied. Mice were treated with rotenone (1.5 mg/kg, subcutaneously), every

other day for two weeks together with the vehicle, Ensure (1 or 2 g/kg) or L-dopa (25 mg/kg) orally once a day. Biomarkers of oxidative stress, namely, malondialdehyde (MDA), nitric oxide and reduced glutathione were measured in brain homogenates. Testing for neuromuscular strength, motor incoordination and imbalance was done as well as histological study of the brain. Results showed that the level of MDA, an index of lipid peroxidation and nitric oxide were significantly increased along with marked decrease in reduced glutathione content in brain after rotenone injection. Rotenone-treated mice exhibited weakness of grip strength, and impairment of motor balance and coordination. The histological study demonstrated a reduction in size and number of substantia nigra pigmented cells and deeply stained degenerated neurons in cerebral cortex and hippocampus. Ensure treatment reduced lipid peroxidation (MDA), nitric oxide, and increased brain reduced glutathione content. It also improved motor deficits in rotenone groups. Ensure reduced histological damage evidenced by marked amelioration of the rotenone-induced neurodegenerative changes in a dose-dependent manner. These results suggest that multivitamin and PUFAs supplementation may be useful adjunctive therapy in patients with PD by virtue of an antioxidant action.

Discovery, 2022, 58(323), 1171-1183

Utilization of traditional birth attendants in Ondo state, Nigeria

Oluwadamisi Tayo-Ladega, Ilugbami Joseph Olanrewaju, Adetayo Olaniyi Adeniran

Background: Evidence from the Demographic and Health Survey of Nigeria found that significant number of pregnant women in Nigeria especially in rural areas seek maternal health care from traditional birth attendants (TBAs) than the skilled birth attendants (SBAs) because of certain factors. This high level of visit to TBAs was found to be among the cause of maternal death that occurs mostly in the rural areas. Due to the fact that there are few studies conducted to unravel the current situation, this study is conducted to determine the common reasons why women engage traditional birth attendants for prenatal care in selected Nigerian towns in Ondo State, and to provide policy suggestions. Qualitative approach using interviews was employed. The interview was targeted at men and women, and the major thematic research areas were explored. The study covered four towns: Isarun, Ero, Ipogun, and Ibulesoro, all in the Ifedore Local Government Area of Ondo State, Nigeria. Sixteen participants (women) were interviewed in the study. Those participants were those that made use of the TBAs. **Results:** It was revealed in this study that traditional birth attendants were consulted and utilized by the maternal patients in the study areas for different reasons, including ease of access to TBAs, cultural customs and traditions, the effectiveness of traditional medicines, the welcoming attitude of traditional birth attendants, and higher expenses of services in health facilities. **Conclusions:** The continuous consultation and utilisation of TBA is a significant impediment to Nigeria's efforts to attain sustainable development goals (SDGs) 3. Hence, critically addressing the reasons why traditional birth attendants were employed by the maternal patients in the study areas will enhance more utilisation of SBAs and reduce the rate of maternal mortality in Nigeria, especially in towns and villages.

Discovery, 2022, 58(323), 1184-1193

SCIENCE

Comparison of Temperature Effect on Bacteria Growth in Crude Oil Degradation in Bioreactor of Water Media

Okirie FU, Ukpaka CP, Dagde KK, Amadi SA

Comparison on the effect of temperature on bacteria growth upon crude oil degradation was monitored in water media (salt and fresh water media). The experimental investigation reveals the following organisms *Bacillus pumilus*, *Bacillus nealsoni*, *Bacillus Licheniformis*, *Klebsiella singaporensis* and *Erwinia raphanistrum* isolated and identified from crude oil, *Edwardsiella ictaluri*, *Klebsiella aerogens*, *Brevibacillus laterosporus*, *Bacillus alcalophilus*, *Bacillus brevis*, *Tatumella ptyseos* and *Bacillus acidideler* for fresh water medium and for salt water medium *Paenibacillus pectinilyticus*, *Bacillus niacin*, *Yersinia mollareti*, *Pectabacterium betavasculonm*, *Bacillus smithi*, *Bacillus siamensis* and *Bacillus cereus*. These organisms were cultured and inoculated into the bioreactor designed and fabricated at elevated height with the temperature of the process regulated within the range of 15°C to 120°C. The growth of each bacteria was monitored with increase on the functional temperature and research predicted no lag phase and decline phase within 15°C to 45°C for all rather increase in microbial was experienced. However, as temperature increased above 45°C all the mesophilic organisms decline. This phenomena was experienced at 75°C for bacteria optimum allowable operating temperature of thermophilic and super thermophilic of 105°C, the investigation reveals that at temperature up to 120°C bacteria as organism survives but the active site of the bacteria are highly inhibited to catalyzed the reaction process. This research predicted that bacteria of salt water medium performance was higher than the fresh water medium because of the ability to withstand the effect of temperature upon crude oil degradation.

Discovery, 2022, 58(323), 1194-1203

Extraction of eco-friendly natural dye from clitoria plant and its application in textile by economic methods

Abd El-Samie FS, Ali NF, Abd El-Salam IS, Bayad Gh Y

Clitoria plant which grows widely and wildy in Sudan as a forage crop its seeds were obtained from the Sudanese Ministry of Agriculture in order to study on extracting a natural dye from its flowers for the first time in Egypt . Where, natural dyes from plants have been given much interest in recent years due to the threat and harmful effects arised by synthetic dyes and environmental awareness created by researchers. In conjunction with the increasing public awareness of the infectious diseases.

Several researches are developed hygienic fabrics by using natural dyes as substitute of synthetic dyes. The current investigation was carried out by application of natural dye produced from clitoria plant for dyeing wool fibers for studying its effects on wool quality and antimicrobial resistance. Antimicrobial activity is investigated against a broad range of microorganisms including bacteria, yeast and fungi. By using innovation technique to save energy and time. The obtmizing conditions as concentration, temperatut, pH and the time of dyeing were studied. The fastness properties were also studied. The fibers dyed with the investigated dye, and the antimicrobial activity was recorded. The wool materials showed antimicrobial effects by killing and/or suppressing growth of a broad spectrum of microbes such as *Bacillus subtilus*, *Escherichia coli*, *Candida albicans* and *Aspergillus niger*. The results recorded good color strength (K/S) and fastness properties. Application was reflected positively on the zones of growth inhibition of wool fibers *E. Coli* gave the highest diameter of the inhibition zone. On the hand, the applied pigment and the nano forms showed minimum effect on *C. Alibican* and *A niger*.

Discovery, 2022, 58(323), 1204-1212

Scaling the pressure and release model to address climate shock hazards and disaster risk reduction approaches in northeast haor basin of Bangladesh

Awal MA

The *haor* basin at northeast Bangladesh covers almost one fifth of its total land area, produces about 20 percent of country's total staple food grain (rice) and supports livelihood for twenty million people. However, the areas are regularly affected by flood hits with enormous loss of crops, fodders, and other food commodities, and earning sources that make the people live therein vulnerable. Proper attention is not paid yet to explain the disaster occurs in the areas and overcome from the hazard risks with a holistic model. Therefore, the aim of the study is to explain the progression of vulnerability and hazards situation due to flood shocks in *haor* areas with a popular conceptual framework like the Pressure and Release (PAR) model. Important drivers of the root causes, dynamic pressures and unsafe conditions responsible to progress the vulnerability (Pressure model) are identified through collecting both secondary and primary sources of data from published, unpublished and grey literatures, consulting with various categories of stakeholders, and focus group discussion meeting with flood victim's farmers. The possible determinants (relief drivers) towards the progression of safety and disaster mitigation as a whole are pinpointed in the Release model which can be utilized in the Disaster Risk Reduction (DRR) or Management (DRM) programmes. The geo-morphological setting of *haor* areas and early heavy rain especially in the highly elevated upstream catchments like Cherrapunji, Meghalaya of India, and poor and un-time management of embankment are identified as proximal drivers for early flash flood hit which lead to inundate and damage of pre-matured *Boro* paddy. Early transplantation of *Boro* seedling with cool-tolerant and short life span cultivar which is trying to develop could assist to minimize the disaster risk to a great extent. The determinants can be categorized for performing immediate actions, short and medium term measures and long term planning. The analysis integrates the entire package of both social and physical components, and the results of the study can be utilized in government or policy planning.

Discovery, 2022, 58(323), 1213-1224

Phytochemical screening and Antimicrobial analysis of *Moringa oleifera* and *Acalypha wilkesiana* plants

Juliana Chineze Obi, Augustine Enajite Usiakpebru

Two varieties of medicinal plants (*Moringa oleifera* and *Acalypha wilkesiana*) which were obtained from different locations in Asaba, Oshimili South Local Government Area of Delta State, Nigeria were studied. The extractions were carried out using methanol solvent and the extracts obtained were washed and oven dried at temperature of 35°C. These extracts were further subjected to qualitative and quantitative analysis and the pytochemical screening revealed the different chemical constituents present in them. Amazingly, the phytochemical analysis showed that *Moringa oleifera* had the highest percentage yields of alkaloids (8.56%). The antimicrobial susceptibility and microbial inhibition tests are further proof of their high level of potency.

Discovery, 2022, 58(323), 1225-1229

Exploring adaptation gaps among the stakeholders to flood shocks in *haor* agriculture of Bangladesh

Awal MA

Haor areas at northeast Bangladesh face early flash flood during pre-monsoon season every year that destroy the staple mono crop *Boro* paddy with enormous loss of live and livelihoods in the areas. Despite many studies conducted regarding the matter but no study is associated to explore the adaptation gaps among the stakeholders on crop loss in *haor* areas. Therefore, the study was carried out to find out the farmer's perception and adaptation gaps in rice production affected by the flood shocks in *haor* areas. Both secondary and primary sources of information were collected. Secondary data were collected through the review analysis from books, booklets, published and unpublished reports, and grey literatures. Primary data were collected through interviewing with the various kinds of stakeholders like farmers, researchers, policy makers and extension agencies associated with *haor* agriculture. The main crop of *haor* areas is the *Boro* paddy cultivated from January to May. Thus an early flash flood of two weeks duration could destroy the entire production of standing paddy where the affected farmers do not find any other alternative to support livelihoods. The early flash flood that usually hits during early April which often continues to the monsoon flood till the month of September or even October. The *haor* farmers are advised by the policy makers, researchers and extension workers to cultivate the BRRI Dhan28 variety (grain yield 5.5-6.0 t/ha) in the early flash flood prone areas but to get higher yield they often practice the

cultivation with the BRRI Dhan29 variety (yield 7.5 t/ha) whose life duration (160 days) is 20 days longer than the previous one. Therefore, the *Boro* paddy cultivated with BRRI Dhan29 is affected by the early flash flood. The loss of *Boro* paddy would be avoided through advancing the transplantation of this crop by 3 to 4 weeks. However, cool injury to the rice plants is the main barrier to do this. The development of cool tolerant *Boro* variety with short-duration characteristics is underway as expressed by the chief scientists working in the Bangladesh Rice Research Institute (BRRI) and Bangladesh Institute of Nuclear Agriculture (BINA). Until that some promising cool-tolerant rice genotypes can be imported from Asian regions like Nepal, Bhutan, India, Japan and Korea under the 'seeds without borders' initiative. The loss of *Boro* paddy can be compensated in favour of farmers through adopting crop insurance policy with providing some public subsidy as premium. Varietal purity should be maintained to achieve higher yield of paddy. The harvest of *Boro* paddy should be facilitated with mechanical harvesters for quick harvest in ahead of an early shock of flash flood. Cultivation of *Aman* paddy is scattered in the areas especially in the periphery of *haors* which is also affected by the long monsoon flood. Submergence resistant *Aman* rice cultivars like BRRI Dhan51, BRRI Dhan52, BINA Dhan 11, BINA Dhan12 and like others which could tolerate about 2 to 3 weeks of submergences can be practiced there with some successes.

Discovery, 2022, 58(323), 1230-1244

Chitosan/vitamin C combination protects against hepatocellular damage caused by carbon tetrachloride in rats

Omar M E Abdel Salam, Nermeen Shaffie, Amany A Sleem

Chitosan is derived from chitin, a polysaccharide found in the exoskeleton of shellfish. In this study the effect of chitosan/vitamin C combination (CS/Vit C) on liver damage caused by the hepatotoxic agent carbon tetrachloride (CCl₄) in rats was examined. Rats were treated with CCl₄-olive oil (1:1, v/v) at a dose of 2.8 ml/kg by gavage. Chitosan/vitamin C at doses of 54 or 108 mg/kg (vitamin C content 9 and 18 mg/kg) was given once daily orally for one week, starting at time of administration of CCl₄. Hepatic injury was assessed by measuring the activities of aspartate aminotransferase (AST), alanine aminotransferase (ALT) and alkaline phosphatase (ALP) activities in serum. Oxidative stress biomarkers: lipid peroxidation (malondialdehyde; MDA), reduced glutathione (GSH), and nitric oxide levels were measured in the liver. Additionally, paraoxonase 1 (PON-1) activity was determined in the liver and serum. Haematoxylin and eosin staining of liver sections, immunohistochemical staining of anti-caspase-3 antibodies and DNA ploidy studies were also done. Results showed that CS/Vit C given to CCl₄-treated rats exerted hepatic protective effect, causing a significant decrease in the CCl₄-induced elevation in serum aminotransferases and alkaline phosphatase activities. Moreover, CS/Vit C caused a significant decrease in hepatic MDA and nitric oxide levels along with significant increase in reduced glutathione content. The histopathologic study revealed marked amelioration of vacuolar degeneration and necrosis in CS/Vit C -treated rats compared with the CCl₄ controls. Chitosan/vitamin C exerted marked antiapoptotic effect decreasing caspase-3 stained liver cells and protected against the CCl₄- induced decrease in DNA values (hypoploidy). These results suggested that CS/Vit C via its antioxidant and apoptotic actions might be a useful agent in the treatment of liver disease.

Discovery, 2022, 58(323), 1245-1255

Domestic solid waste disposal practice among the residents of a municipality area: A case study on Pabna municipality

Md Khorshed Alam, Ashraf Uddin Fahim, Md Tanzim Hasan Mahi, Md Rakibul Islam Sabbir, Sunjida Jahan Lina

Background: All across the world, solid waste is a part of everyone's daily existence. Municipal solid waste refers to the majority of non-hazardous solid waste from a city, town, or village that requires frequent collection and transfer to a processing or disposal location. Solid waste management is critical in every community in Bangladesh because it prevents households from being exposed to the dangerous effects of solid waste. Rapid population growth exacerbates the problem of solid waste management. According to a survey, Bangladesh generates roughly 22.4 million tons of waste per year. When waste is not adequately collected and disposed of, the rate of waste generation is predicted to climb to 220 kg/cap/year in 2025, posing major environmental and health hazards. *Methods:* Direct interviews guided by questionnaires were utilized to gather data for this study, which assessed consumers' trash disposal practices and satisfaction with waste disposal facilities. Purposive sampling or judgmental sampling should be used in this research. Because the purpose of this study is to determine the users' waste disposal capabilities, the researcher should gather data from households that regularly dispose of waste. A total of 384 people was considered for sampling out of a total of 144440 people. Each factor's level of satisfaction was scored using a 5-point Likert scale, ranging from strongly agree to strongly disagree. The Pearson Correlation Matrix (PCM) was utilized to evaluate the association between waste disposal service parameters. *Result and Conclusion:* Increased domestic and household activities in urban areas are linked to the generation of large amounts of domestic waste, according to this study. Some of this garbage is clearly dumped on the streets, drains, pits, and adjacent vegetation. In their neighborhood, about 83.3 percent of respondents discovered inappropriate dumping sites. Almost 46.9% of those polled agreed that the neighborhood lacked an appropriate dustbin. Almost 63 percent of respondents said that the waste container is in the way of walking, implying that people discard their garbage on the streets. Solid waste management services were dissatisfied in 70.3 percent of the community's houses. The majority of respondents were dissatisfied with garbage collection patterns as well as the high cost of employing private collectors.

Discovery, 2022, 58(323), 1256-1265