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Study of Fluorescence and Computational Analysis on Advanced Glycation of Bovine Serum Albumin with Glucose

Chiru Chand HANEDA, Santu Bhunia, Arindam Bankura, Koushik Chandra¹

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ABSTRACT

The non-enzymatic protein glycation (NEG) of Bovine Serum Albumin (BSA) is a deleterious physiological and pathophysiological process between glucose as reducing sugar and ε-amino group of lysine of protein resulting the formation of Advanced Glycation End Products (AGEs). The processes are associated with aging, diabetes, neurodegenerative diseases, chronic renal failure etc. Glycation becomes complicated under chronic hyperglycemia and oxidative stress. Glucose mediated glycation is relatively slow even in increase in concentration of glucose concentration in reference to BSA. From the fluorescence data, a mechanism of AGEs formation using glucose as substrate is explained by Computational Study with all optimized reactants and transition states. Our study indicates that LYS 524 is more susceptible for AGE formation among other lysine residues. Molecular docking analysis also illustrates that the LYS524 residue is prone to adopt an energetically feasible conformation for binding.

Key words: Glycation, AGEs, diabetic complications, Computational Study, Molecular docking

Introduction

Protein non-enzymatic glycation (NEG) is an assorted complex cascade reactions involving incessant condensation followed by rearrangement and oxidative modification. It originates from non-enzymatic reaction between the carbonyl group of reducing sugar (glucose) and free amino group (lysine) of protein. Schiff base is the initial product which subsequently rearranges to ketosamine or Amadori, Hynes and Maillard products that evolves multiple reactive intermediates (V.L. Bodiga et al. 2013, A. Schmitt et al. 2005). These undergo further oxidation to form variety of organic and heterocycles compounds along with cross-linked macromolecules, commonly termed as advanced glycation end products or AGEs (S. Ashoor et al. 1984, Ulneh, P. 2001, **Figure 1**). The formation of AGEs is essentially augmented under prolonged hyperglycemia and oxidative stress.

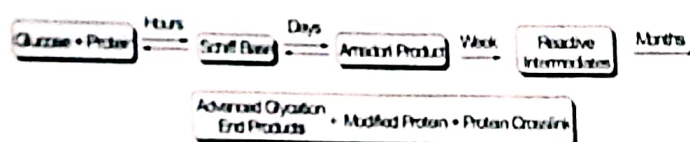


Figure 1: Steps of non-enzymatic glycation

Though glucose, among reducing monosaccharide, is the least reactive, the emergence of glucose can limit the potentially deleterious NEG. Apart from direct NEG between protein and sugar, glucose can enolize and reduces molecular oxygen (O₂) under physiological conditions, yielding H₂O₂ and free radicals and dicarbonyl such as α-ketoaldehyde through glycooxidation. The parallel and sequential degradation cascade of glucose to dicarbonyls leads to intermolecular as well as intramolecular crosslinks following a large number of reactive oxygen species. In this study, we focus on glucose mediated glycation of serum protein especially in steady state fluorescence and correlate the results with computational outcome.

Materials and methods

Chemicals

D(+) glucose, crystallised and fatty acid free bovine serum albumin (BSA), sodium dihydrogen phosphate (NaH₂PO₄), disodiumhydrogen phosphate (Na₂HPO₄), trichloroacetic acid (TCA) were purchased from SRL India. All chemicals and reagents were used in analytical grade. Double distilled water was used throughout the study.

KAZI NAZRUL ISLAM: UNLOCKING THE WORKS AND THOUGHTS OF THE REBEL POET

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Kazi Nazrul Islam: Unlocking the Works and Thoughts of the Rebel Poet
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Passcode: UB6 7HL London, UK.
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ISBN: 978-1-387-48451-5

ISBN-10: 1-387-48451-6

DOI: 10.25215/1387484516

DIP: 18.10.1387484516

£10

November- 2022 (First Edition)

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CHAPTER-3

HELD IN HIGH ESTEEM: INFLUENCE OF RABINDRANATH TAGORE ON POET KAZI NAZRUL ISLAM

DEBARATI MAITY

*Assistant Professor in English,
Netaji Nagar College for Women, Kolkata, West Bengal, India.*

❖ ABSTRACT:

Kazi Nazrul Islam's stormy arrival into Bengali literary scene with iron will determination to blow away fritters of hackneyed and decaying past, heralded a new chapter in the history of Bengali poetry. His poetry condemned human oppression, degradation, religious bigotry and politics of discrimination. He reached the pinnacle of popularity and fame with his rebellious poem, 'Bidrohi' in 1922. Nazrul's poems are highly stimulant, fiery and anti-colonial in spirit. His poetry defied language prejudice and cultural chauvinism by incorporating common people's language into poetic paradigm. Nazrul and Rabindranath Tagore shared a cordial relationship, rarest of rare within literary circles. Nazrul venerated and adored Tagore as his God and his mentor. Tagore on the other hand, was fond of his junior compatriot in whom he discovered infinite potential and seeds of great poet. He blessed the young poet and supported him through thick and thin. The relationship between the two literary icons was beyond caste, class and religious boundaries, and exemplified ideal relationship between litterateurs. The present paper will gauge into the relationship between the predecessor and the younger litterateur to make sense of its impact on society and literature.

ENVIRONMENT AND BEYOND

1st edition: -
24th Jan 2022
424 b/



Edited by :-
Pinakiranjana Chakrabarti
Sudeshna Ghoshal

ISBN: 978-81-955982-1-2

to respond differently when exposed to the same environmental stimuli. As a result, some possess a low risk of developing a disease through an environmental exposure while others are much more susceptible. Currently new studies have emerged to describe relations between genotypes and environmental exposures, in terms of their effects on disease risk. [1, 2]

The insulin-like growth factor (IGF) is a complex system of peptide hormones- [insulin-like growth factors of type 1 and 2:- IGF-I and IGF-II], cell surface receptors [insulin receptor: - InsR; insulin-like growth factor receptors of type 1 and 2:- IGF-IR and IGF-IIR] and circulating binding proteins [insulin like growth factor binding proteins: - IGF-BP (1-6)]. IGF family of peptides play an important role in the normal control of many metabolic and growth related processes. However, IGF-I-mediated paracrine/autocrine effects are essential in the modulation of cellular growth, proliferation, differentiation and survival against apoptosis. [3, 4]

Increasing epidemiological findings suggests, many identified environmental risk factors acts via insulin-like growth factor pathway and contribute to the development of disease. Hence better knowledge of the factors that influence IGF pathway genes may help in devising strategies to prevent disease risk at the population level. [5]

Interaction between environment and genes in the IGF-system

An increasing number of studies have documented variation of gene activity induced by environmental changes often known as gene expression plasticity. [6] The impact of environment on expression level of GH/IGF-I pathway genes has been studied in fishes like rainbow trout (*Oncorhynchus mykiss*), coho salmon (*O. kisutch*) and brook charr (*Salvelinus fontinalis*). [6, 7, 8, 9, 10] For

Environmental Influences on Insulin-like Growth Factor (IGF) Signalling Pathway

Subhalakshmi Ganguly

Department of Zoology, Netaji Nagar College for Women
West Bengal, India

Abstract : The insulin-like growth factor (IGF) signaling pathway functions in mediating cell proliferation, differentiation, apoptosis, survival, metabolism, migration thereby regulating different cardiovascular and developmental processes in muscle, bone, brain etc. Abnormalities and impaired IGF signaling pathways contribute to the pathogenesis of several human diseases including cancers. Several clinical and preclinical studies have evaluated the efficacy of IGF based treatment modalities for different pathological conditions. However limited information is available on the link between environmental influences on IGF system. Here we will review those investigations where researchers have examined the effect of environmental exposures on IGF pathway genes. Such information on relationship of gene-environment interactions will be important from public health perspective in future.

Introduction

In the recent years we gained much insight into the genetic influences on many human diseases. At the same time research also indicates that subtle differences in genetic factors cause people

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Metal Oxides for Biomedical and Biosensor Applications

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Metal oxide/graphene nanocomposites and their biomedical applications

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Souravi Bardhan¹, Shubham Roy¹, Mousumi Mitra² and Sukhen Das¹

¹Department of Physics, Jadavpur University, Kolkata, India, ²Department of Physics, University of Virginia, Charlottesville, VA, United States

22.1 Introduction

Graphene, a monolayer two-dimensional (2D) allotrope of carbon has emerged as a rising star since its discovery by Novoselov and his team (Novoselov et al., 2004). Novoselov and Geim received Noble Prize in Physics after discovery since during 2004 graphene was found to be the thinnest known material with tremendous scope for application in various fields. Graphene consists of benzene rings of sp^2 -hybridized carbon atoms arranged in honeycomb network structure (Li & Kaner, 2008), which exhibit unique physicochemical properties (Brumfiel, 2009). The structural features of graphene impart high specific surface area (Dimiev & Eigler, 2016) and magnificent strength (breaking strength is ~ 42 N/m and the tensile strength or Young modulus is 1.0 TPa) (Huang et al., 2011). Since it is stronger than various other metals and has high flexibility, it is used as a substitute for metals in various sectors (Hu, Kulkarni, Choi, & Tsukruk, 2014). The mechanical, chemical, and thermal stability of graphene and its nanocomposites make them suitable for a wide range of applications. Graphene exhibits large theoretical surface area (~ 2630 m²/g) which is nearly 260 times higher than graphite. Such high surface area provides greater efficiency for various catalytic activities (Chen, Wu, Jiang, Wang, & Chen, 2011). By virtue of the antibacterial nature, amphiphilicity, outstanding electrical conductivity, and easy surface functionalization capability (Balandin et al., 2008; Geim, 2009; Ranjbartoreh, Wang, Shen, & Wang, 2011; Wang, Zhang, Wu, & Wei, 2017), graphene is considered as a potential candidate in biological applications. Moreover biocompatible nature, surface-enhanced Raman scattering (SERS), fluorescence quenching ability, and low-energy requirement for electron movement due to $\pi-\pi^*$ transitions (Abbott's, 2007; Geim & Novoselov, 2010; Novoselov et al., 2005) are quite significant for bioimaging, biosensing, drug/gene delivery, photothermal and photo-dynamic therapies, and other biomedical studies. Based on the application purpose, several forms of graphene are used in biological applications, such as graphene oxide (GO), graphene quantum dots (GQDs), and reduced graphene oxide (rGO) (Muthurasu, Dhavadapani, & Ganesh, 2016). In certain cases, graphene nanosheets (Chong et al., 2015), graphene nanocubes (Govindasamy et al., 2019), graphene nanocrystals (Zhang, Yuan, Zhang, Wang, & Liu, 2011), graphene nanotubes (Wu, Pei, & Zeng, 2009) are also used. Extensive studies regarding surface modification of addition of other

Metal Oxides for Biomedical and Biosensor Applications, DOI: <https://doi.org/10.1016/B978-0-12-823033-6.00020-X>
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Materials Horizons: From Nature to Nanomaterials

Sreerag Gopi
Preetha Balakrishnan
Nabisab Mujawar Mubarak *Editors*

Nanotechnology for Biomedical Applications

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Chapter 5

Carbon Dots: Fundamental Concepts and Biomedical Applications



Souravi Bardhan, Shubham Roy, and Sukhen Das

1 Introduction

Development of nanoscience and nanotechnology in recent times has paved the path for emergence of various new materials and prospects for betterment of the society. Nanoparticles have attracted tremendous attention compared to their bulk counterparts due to dramatic increment of various properties, mainly by virtue of increase of surface-to-volume ratio [1–3]. Although various new nano-engineered materials for targeted applications were synthesized, most of them suffered various issues like cost-effectiveness, lacking versatility in applications, requirement of high energy consumption, and use of toxic reagents or may cause secondary pollution or toxicity in environment [4, 5]. Hence, the search for alternative suitable eco-friendly nanomaterials with multiple advantages and application triggered extensive studies worldwide and led to the discovery of various new classes of carbon. Earlier, mainly three forms of carbon were well known, namely amorphous carbon, graphite, and diamond [6], but over the last decades, various carbonaceous nanoparticles such as carbon dots (CDs), carbon nanotubes (CNTs), graphene oxide, and quantum dots (GQDs) have gained immense popularity due to their unique and exceptional optoelectronic and physicochemical properties [7]. Among them, carbon dots, also known as “carbon quantum dots” or “carbon nanodots” [8], have attracted tremendous attention since discovery in 2004, due to their nontoxic, biocompatible nature, facile synthesis procedure, excellent photoluminescence, inherent ability for electron transfer, and magnificent fluorescence emission, having 0-dimensional, quasi-spherical appearance with

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S. Gopi et al. (eds.), *Nanotechnology for Biomedical Applications*,

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গাংচিলধির

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ISBN 978-93-93569-18-9

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নিরঞ্জন জলদাস

সারসংক্ষেপ: স্বাধীনোত্তর ভারতীয় সুন্দরবনের দক্ষিণ-পশ্চিমাংশ জঙ্গল হাসিলের যুগে আবাদ বা বসতি অঞ্চল নামে পরিচিত ছিল। আনুমানিক সপ্তদশ শতকের মধ্যভাগ নাগাদ সাধারণ মানুষ জঙ্গল পরিষ্কার করে মূলত ধান চাষের মধ্যদিয়ে এই আবাদি জমির ব্যবহার শুরু করেছিল, সুন্দরবনে জঙ্গল হাসিলের এই বিশাল কর্মযজ্ঞে সমাজের উপরতলার জমিদার লাটদের, তালুকদারদের ভূমিকা বিষয়ে অনেক সমাজবিজ্ঞানী, গবেষক, আলোকপাত করেছেন। আবার এর পাশাপাশি অনেক সরকারী প্রশাসক, অধিকর্তাদের প্রতিবেদনে, রিপোর্টে সুন্দরবনে জঙ্গল হাসিলের ক্ষেত্রে সমাজের তথাকথিত নিম্নবর্গীয় সম্প্রদায়, বিভিন্ন উপজাতি শ্রেণীর উল্লেখ পাওয়া যায়।^১ আদিসুন্দরবনের নারী সমাজ নিয়ে আলোচনা সুন্দরবনেরই ভূমিপুত্র সন্তোষ কুমার বর্মণ মহাশয়ের গবেষণায় পাওয়া যায়।^২ বর্তমান প্রবন্ধে সুন্দরবনের জঙ্গল হাসিলের ক্ষেত্রে নারী সমাজের বিশেষত তথাকথিত নিম্নবর্গীয় নারীদের ভূমিকা কীরূপ ছিল সেই বিষয়ে অনুসন্ধান তথা আলোকপাত করার উপর জোর দেওয়া হয়েছে।

ভারতীয় সুন্দরবনের একেবারে দক্ষিণ-পশ্চিমভাগে অবস্থিত সমুদ্র উপকূলীয় অঞ্চলে আনুমানিক সপ্তদশ শতক নাগাদ জঙ্গল হাসিলের কাজ শুরু হয়েছিল। এখনকার কাকদ্বীপ, নামখানা, পাথরপ্রতিমা, সাগর প্রভৃতি সমুদ্র উপকূলীয় অঞ্চলসমূহ লোকমুখে 'আবাদ' বা 'বসতি' অঞ্চল নামে পরিচিতি পেয়েছিল। জঙ্গল হাসিলের গোড়াতে মূলত ধান উৎপাদন ছিল সাধারণ শ্রমজীবী মানুষের মূল লক্ষ্য। দিগুা, জানা, শাসমল প্রভৃতি পদবিধারী জমিদার, লাটদাররা

ফুট শব্দ: দক্ষিণ-পশ্চিম সুন্দরবন, জঙ্গল হাসিল, বসতি, নিম্নবর্গীয় নারী।

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Published by
Weser Books, No. 79737
Äußere Weberstr. 57
02763 Zittau, Germany
Email: weserbooks@gmail.com



EDUCATION IN THE ERA OF COVID 19

Issues, Challenges and New Directions

Editors

Dr. Santosh Kumar Behera
Dr. Lamhot Naibaho
Mr. Pranay Pandey
Mr. Mazhar Shamsi Ansary

Weser Books

Published by: Weser Books

Weser Books, No. 79737

Äussere Weberstr. 57

02763 Zittau, Germany

Email: weserbooks@gmail.com

Editors: Dr. Santosh Kumar Behera, Dr. Lamhot Naibaho, Mr. Pranay Pandey and Mr. Mazhar Shamsi Ansary

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Edition: 1st

Publication Year: January, 2022

Pages: 143

ISBN: 978-3-96492-362-2

Book DOI: <https://doi.org/10.33545/wb.book.186>

Price: € 14

CULTURAL HERITAGE OF SOUTH ASIA

CHALLENGES AND OPPORTUNITIES AMIDST COVID-19

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red'shine
Publication
LONDON

CULTURAL HERITAGE OF SOUTH ASIA: CHALLENGES AND OPPORTUNITIES AMIDST COVID-19

by: Dr. Sudip Bhui, Dr. Santosh Kumar Behera, Dr. Sujit Kumar Datta



RED'SHINE PUBLICATION

232, Bilton road, Perivale, Greenford

Passcode: UB6 7HL London, UK.

Call : +44 7842 336509

In Association with,

RED'MAC INTERNATIONAL PRESS & MEDIA. INC

India | Sweden | UK



Text © *Editors*, 2022

Cover page ©RED'SHINE Studios, Inc, 2022



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ISBN: 978-1-387-96208-2

ISBN-10: 1-387-96208-6

DIP: 18.10.1387962086

DOI: 10.25215/1387962086

Price: £ 15

First Edition: May, 2022



The views expressed by the authors in their articles, reviews etc. in this book are their own. The Editors, Publisher and owner are not responsible for them.



Website: www.redshine.uk | Email: info@redshine.uk

Printed in UK | Title ID: 1387962086

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CAN THE VIRTUAL BE THE NEW REAL? A STUDY ON THE EFFECT OF THE COVID-19 PANDEMIC ON THE INTANGIBLE CULTURAL HERITAGE OF INDIA

*Mr. Ayush Mazumdar¹, Mazhar Shamsi Ansary²,
Dr. Santosh Kumar Behera³*

Abstract

The pandemic has diversified the human way of livelihood and sustainability by pushing human society away from large gatherings and crowd into following social distancing and restricting outdoor movement as far as possible. This is due to the fact that the zoonotic disease COVID-19 spreading through SARS-COV-2 virus has a higher transmission rate from human-to-human and it is due to this fact that the relative death figure has been high. This paper seeks to highlight how the new normal created by the pandemic creates a stress upon the intangible cultural heritage of India by forcing the performing artists to remodify their way of livelihood and even making it unviable in the current context. The paper also seeks to understand how far the virtual platform can compensate or replace the real-world live performance in terms of sustainability and viability both economic as well as in terms of artistic sensibility. The paper also seeks to understand the effect of the pandemic upon different classes of the artist both rural as well as urban. The

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Contributions to Management Science

Nadia Mansour

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Finance, Law, and the Crisis of COVID-19

An Interdisciplinary Perspective

 Springer

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ISSN 1431-1941 ISSN 2197-716X (electronic)
Contributions to Management Science
ISBN 978-3-030-89415-3 ISBN 978-3-030-89416-0 (eBook)
<https://doi.org/10.1007/978-3-030-89416-0>

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This Springer imprint is published by the registered company Springer Nature Switzerland AG.
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

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Shabnam Parween, Mazhar Shamsi Ansary, and Santosh Kumar Behera

1 Introduction

After the creation of the earth, nature has organized itself with various animals, plants, objects, etc. It is true that “Homo sapiens” is considered to be the greatest animal on earth compared to other animals for its unique features of the brain. But since he is an animal, there is a tendency for humans to become vicious, just like any other animal. That is, no matter how much a person tries to be good, violence is present in him as a genetic trait and he cannot evade it no matter how hard he tries. So it can be said that Human Beings are organizational beings. They started to systematize themselves in order to survive. People began to form themselves to prove themselves stronger than the other creatures. The idea of this organizing has made men the greatest creature on earth.

Gradually society was formed, Jati, Varna, Dharma were started to demonstrate the finest of a class of society. This idea of being the best is what people have been carrying everlastingly. If we look at the earliest times of India, we will also see this castes, gender, religion, and caste disparities. The social order system was started mainly on the basis of livelihood—Brahmin, Kshatriya, Vaishya, and Shudra. The Brahmins have always been a kind of leader to the other three castes. We notice the deprivation of the three other castes in all kinds of social work. The idea of snatching

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Handbook of Research on Asian Perspectives of the Educational Impact of COVID-19

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A volume in the Advances in Educational
Marketing, Administration, and Leadership
(AEMAL) Book Series



Published in the United States of America by
IGI Global
Information Science Reference (an imprint of IGI Global)
701 E. Chocolate Avenue
Hershey PA, USA 17033
Tel: 717-533-8845
Fax: 717-533-8661
E-mail: cust@igi-global.com
Web site: <http://www.igi-global.com>

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Library of Congress Cataloging-in-Publication Data

Names: Rezaul Islam, M., editor. | Behera, Santosh Kumar, 1980- editor. | Naibaho, Lamhot, 1985- editor.
Title: Handbook of research on Asian perspectives of the educational impact of COVID-19 / M. Rezaul Islam, Santosh Kumar Behera, Lamhot Naibaho, editors.
Description: Hershey, PA : Information Science Reference, [2022] | Includes bibliographical references and index. | Summary: "This book explores the impacts and perspectives of the COVID-19 on education as well as research while schools are operating mostly via online digital platforms"-- Provided by publisher.
Identifiers: LCCN 2021031952 (print) | LCCN 2021031953 (ebook) | ISBN 9781799884026 (hardcover) | ISBN 9781799884033 (ebook)
Subjects: LCSH: Web-based instruction--China. | COVID-19 Pandemic, 2020-
Classification: LCC LB1044.87 .H3375 2022 (print) | LCC LB1044.87 (ebook) | DDC 371.33/446780951--dc23
LC record available at <https://lcn.loc.gov/2021031952>
LC ebook record available at <https://lcn.loc.gov/2021031953>

This book is published in the IGI Global book series *Advances in Educational Marketing, Administration, and Leadership (AEMAL)* (ISSN: 2326-9022; eISSN: 2326-9030)

British Cataloguing in Publication Data
A Cataloguing in Publication record for this book is available from the British Library.

All work contributed to this book is new, previously-unpublished material. The views expressed in this book are those of the authors, but not necessarily of the publisher.

For electronic access to this publication, please contact: eresources@igi-global.com.

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INCLUSIVE EDUCATION: ENCOMPASSING REHABILITATION
Edited by Suman Kalyan Roy & Jayanta Mete

RED'SHINE PUBLICATION

62/5834 Harplingegränd 110, LGH 1103. Älvsjö, 12573
Stockholm, Sweden

Call: +46 761508180

Email: info.redshine.se@europe.com

Website: www.redshine.se

Text © *Editors*, 2021

Cover page © RED'MAC, Inc, 2021

ISBN: 978-91-987582-2-1

ISBN-10: 91-987582-2-5

DIP: 18.10.9198758225

DOI: 10.25215/9198758225

Price: kr 100

First Edition: January, 2022

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Printed in Stockholm | Title ID: 9198758225

CHAPTER 11

DEPRESSION, ANXIETY AND STRESS AMONG THE POST GRADUATE STUDENTS

Manuara Khatun¹⁵, Dr. Santosh Kumar Behera¹⁶,
Mazhar Shamsi Ansary¹⁷

ABSTRACT

In the present study the investigators made an attempt to know the level of Depression, Anxiety and Stress among the P.G level students in Purulia district of West Bengal, India. Descriptive Survey method was followed. A total of 300 PG Students (Arts-203, Science-82, Commerce-15) of Sidho-Kanho-Birsha University in Purulia district of West Bengal were taken as representative sample of the whole population. For selecting PG students Stratified random sampling technique was followed. DASS 42 scale was used for measuring the Depression, Anxiety and Stress of PG Students constructed and standardized by Lovibond and Lovibond (1995). Mean, S.D, ANOVA & t test were used to analyse the data and verify the hypotheses. The study revealed that the level of Depression and Stress among PG level students in Purulia district of West Bengal is normal and moderate. It is also found that the level of Anxiety among PG level students in Purulia district of West Bengal is normal, moderate and severe. The study also revealed that the level of Depression among PG level students with respect to their Gender (Male and Female), Location (Rural and Urban),

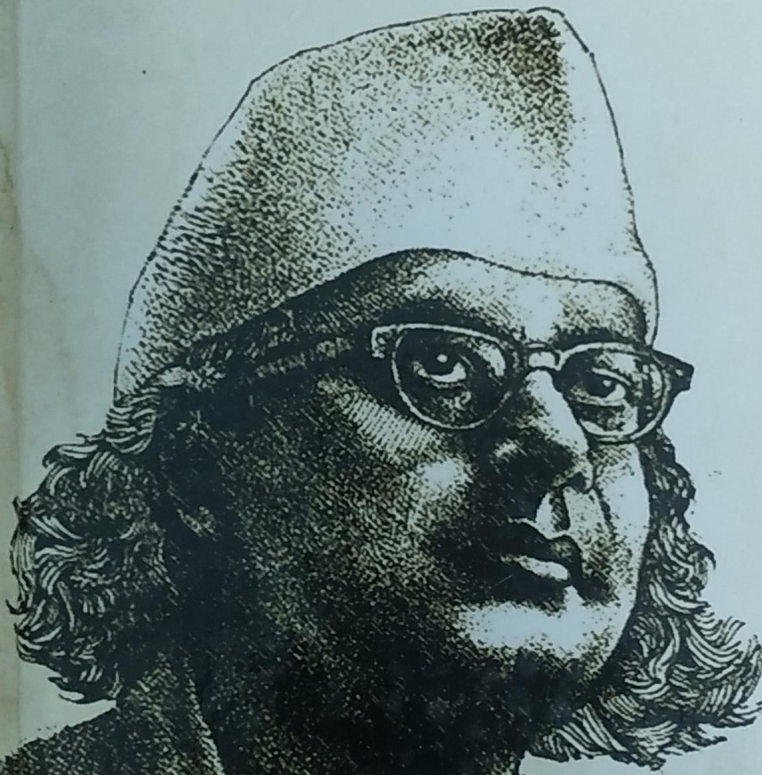
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KAZI NAZRUL ISLAM:

UNLOCKING THE WORKS AND
THOUGHTS OF THE REBEL POET



EDITED BY
DR. SANTOSH KUMAR BEHERA
PROF. GOURI SANKAR NAG

Kazi Nazrul Islam: Unlocking the Works and Thoughts of the Rebel Poet
Edited by: Dr. Santosh Kumar Behera & Prof. Gouri Sankar Nag

■
RED'SHINE PUBLICATION PVT. LTD
232, Bilton road, Perivale, Greenford
Passcode: UB6 7HL London, UK.
Website: www.redshine.uk
Call: 7842 336509
Email: info@redshine.uk
In Association with,

RED'MAC INTERNATIONAL PRESS & MEDIA. INC

India | Sweden | Canada

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Cover page ©RED'SHINE Studios, Inc, 2022

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■
ISBN: 978-1-387-48451-5

ISBN-10: 1-387-48451-6

DOI: 10.25215/1387484516

DIP: 18.10.1387484516

£10

November- 2022 (First Edition)

■
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www.redshine.co.in | info.redmac@gmail.com

Printed in India | 1794754458

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CALL FOR YOUTH IN THE LIGHT OF REBEL POET KAZI NAZRUL ISLAM

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❖ ABSTRACT:

Kazi Nazrul Islam was one of the poets, philosophers, writers and social reformers born in India as well as Bengal before independence. The initiatives which he took for the betterment of the society at that time were such as womens' liberation, people awareness, awakening of youth power etc. This article discusses in detail the place of youth in Kazi Nazrul Islam's thoughts, what messages he wanted to convey through his poems for their upliftment. From the primitive history of the world to the modern twentieth century, the role of youth society is invaluable. However, Nazrul has a touch somewhere in the role of the youth in this role. This study is based entirely on



ISBN : 978-81-950596-2-1

DPU Dr. D. Y. Patil
B-School
(Program Approved by AICTE, Ministry of Education, Govt. of India)

Contemporary Issues in Business, Management and Society

EDITORS

Dr. Neeraj Saxena | Dr. Amol Gawande |
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ISBN: 978-81-950596-2-1

Published in: June 2022

Printed at:**Success Publications**

Radha Krishna Apartment, 535, Shaniwar Peth
Opp. Prabhat Theatre, Pune – 411030
Contact: 9422025610, 8806664858, 020-24433374, 24434662
Email: marketing@sharpmultinational.com
Website: www.sharpmultinational.com

Published by:**Research and Publication Cell****Dr. D. Y. Patil B-School**

Tathawade, Mumbai Bangalore Highway
Pune 411033, Maharashtra, India
Contact No.: 8007989201
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**ATTITUDE OF POST GRADUATE STUDENTS
TOWARDS MASSIVE OPEN ONLINE COURSE
(MOOC)**



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INTRODUCTION:

Despite being the world's largest democratic country and the world's second-largest population (1-25 billion people), the literacy rate is below 80%, which is not good enough to compare our education with the other developed countries across the globe. It is the homeland of various kinds of people belonging to different religions, community, culture, caste or sub-caste. Nevertheless, it is unfortunate that still India is considered a developing country, not a developed one. However, science and technology are the two spectacles of this modern age through which we now look at our future of the educational field. The students especially the postgraduate who is attached to mobile devices such as mobile phones, laptops, PDAs, etc. They use the internet for various purposes up to the Introduction of Massive Open Online Course and now they utilize their internet for educational purposes. It helps the students to study through online mode. It is very much effective and it has fine capabilities to teach students properly. If we keenly look into the full form of MOOC, we can easily understand that the learners can easily comprehend this method from anywhere at any time. It is an alternative for those students who do not understand the lectures of the teachers in the classroom. The most interesting thing about this is the flexibility and personalization in the process of learning which more or less satisfies the inner urges of the students. In this method neither there is any time limit nor particular class a degree on any interesting topic.

Apart from this, the learners who were drop out or left his education can again restart his education through this method. **Massive:** This means in one time over 20000 learners can avail the learning. **Open:** means not only regular but also drop out or poor learners can complete their education because of its free of cost facility. **Online:** means

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IN THE ERA OF

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Issues, Challenges and New Directions

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Wiser Books

Published by: Weser Books

Weser Books, No. 79737

Äussere Weberstr. 57

02763 Zittau, Germany

Email: weserbooks@gmail.com

Editors: Dr. Santosh Kumar Behera, Dr. Lamhot Naibaho, Mr. Pranay Pandey and Mr. Mazhar Shamsi Ansary

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Edition: 1st

Publication Year: January, 2022

Pages: 143

ISBN: 978-3-96492-362-2

Book DOI: <https://doi.org/10.33545/wb.book.186>

Price: € 14

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Rethinking of Education System in the Period of COVID-19: Special Reference to Higher Education

Shabnam Parween and Mazhar Shamsi Ansary

Abstract

At the end of 2019, the whole World was waiting to welcome the New Year, 2020. But nobody knows that the biggest menace of this century has been waiting for us. The COVID-19, a pestilent virus had been germinated at Wuhan State of China in the December of 2019. Gradually it's spread like a bullet towards whole world. At present whole World is affected from this pandemic. This destructive pandemic affected every aspects of our daily life. Education system is also hampered very shabbily. It is almost going to be collapsed. Due to lockdown and order of the Govt. is nobody can go to outside the room that is why especially the formal education system is stuck totally. Although this lockdown is mainly implemented for public's safety purpose. But daily teaching-learning, examination system, admission system, everything of our formal education has been immovable. In India, as we know that higher education stage is very crucial stage. Anyhow we have to take necessary step to make education system dynamic. In this regard UGC have also recommended some valuable suggestions to confront this situation. We need to think some alternative methods which will make our higher education system more fruitful and effective. We cannot leave our education system in this unwanted condition. Though we are not habituated to any other mode of teaching-learning, but to overcome from this peril we should think about better alternatives. In a simple word we have to rethink about our education system, especially the higher education level. The paper is qualitative in nature. Secondary data was collected through various research articles, writings, newspaper articles, books, etc. In this paper the authors want to focus on some problems faced by students in higher education and rethinking of education system in the period of COVID-19 in Higher Education.

Keywords: COVID-19, Pestilent Virus, Pandemic, Formal Education Higher Education.

Environment and Beyond

1st Edition : 24th January, 2022

Scholars Book Hub Paper Back

ISBN : 978-81-955982-1-2

Cover Design : Tousif Khan, Suvam Karmakar

Editor :

Pinakiranjan Chakrabarti
Sudeshna Ghoshal

Published by : On behalf of **Rajyasri Neogy**, Vijaygarh Jyotish Ray College, Santanu Banerjee Scholars Book Hub, 45, Devinibas Road, Dumdum, Kolkata - 700 074

Contact : 9231923292

Printed by : Kalachand Vidyalkar Publisher and Distributor, 24, Gaurinath Sastri Road, Kolkata - 700 055

Price : Rs.400 INR

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Contemporary context of Biodiversity : From Bioprospecting to Rights

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Abstract : The word 'biological diversity' has been defined by 1992 Convention on Biological Diversity as 'the variability among living organisms from all sources, including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part. The "usefulness" of biodiversity is expressed through the concept of different *ecosystem services*. Major threats to biodiversity include habitat alteration and loss, over-harvesting, chemical pollution, invasive species and increasing population pressure. Climate change poses a potential threat to the Earth's biodiversity. The loss of biodiversity threatens ecosystem integrity, and may ultimately threaten human existence itself. Bioprospecting describes the discovery of new and useful bioactive compounds emerging either from research or from already available existing traditional knowledge where as biopiracy is a situation where indigenous knowledge of nature is exploited for commercial gain with no compensation to the indigenous people. Bioprospecting is not inherently

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Published in the United States of America by
IGI Global
Engineering Science Reference (an imprint of IGI Global)
701 E. Chocolate Avenue
Hershey PA, USA 17033
Tel: 717-533-8845
Fax: 717-533-8661
E-mail: cust@igi-global.com
Web site: <http://www.igi-global.com>

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Library of Congress Cataloging-in-Publication Data

Names: Rathoure, Ashok K., 1983- editor.

Title: Handbook of research on monitoring and evaluating the ecological health of wetlands / Ashok K. Rathoure, editor.

Description: Hershey : Engineering Science Reference, 2021. | Includes bibliographical references and index. | Summary: "This book highlights the challenges of wetland conservation and the current scenario of existing wetlands including inland wetland and discusses Inventory, assessment and monitoring are as vital components of effective wetland management"-- Provided by publisher.

Identifiers: LCCN 2021037621 (print) | LCCN 2021037622 (ebook) | ISBN 9781799894988 (hardcover) | ISBN 9781799895008 (ebook)

Subjects: LCSH: Wetland conservation. | Wetland management.

Classification: LCC QH75 .M655 2021 (print) | LCC QH75 (ebook) | DDC 333.91/816--dc23

LC record available at <https://lcn.loc.gov/2021037621>

LC ebook record available at <https://lcn.loc.gov/2021037622>

This book is published in the IGI Global book series Practice, Progress, and Proficiency in Sustainability (PPPS) (ISSN: 2330-3271; eISSN: 2330-328X)

British Cataloguing in Publication Data

A Cataloguing in Publication record for this book is available from the British Library.

All work contributed to this book is new, previously-unpublished material. The views expressed in this book are those of the authors, but not necessarily of the publisher.

For electronic access to this publication, please contact: eresources@igi-global.com.



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Business Science Reference • © 2021 • 507pp • H/C (ISBN: 9781799848172) • US \$235.00



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Arunima Nayak, Graphic Era University, Dehradun, India

Brij Bhushan, Graphic Era University, Dehradun, India

As compared to the tropical evergreen forest, wetlands are also one of the most productive ecosystems in the biosphere and make a major contribution to the ecological sustainability of a region. The wetlands maintain biologically diverse communities having both ecological and economic value. Based on the immense environmental and sustainability benefits, wetlands have been demarcated as essential for the future of human existence. The future challenges pertaining to food, clean water and energy security, well-being of humans, natural disaster risk reduction, and climate change resilience can be met by preserving the wetlands. The chapter has an aim to provide insight on the fundamentals like the classifications, major functions, as well as the various factors affecting the wetland ecosystem. Other important aspects like the major threats leading to the loss of the wetlands, consequences of the loss or degradation of wetlands, and ways to preserve the wetlands are discussed.

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Nisha Khatik, Maharshi Dayanand Saraswati University, Ajmer, India

Water-dominated landscapes include wetland areas. The term “wetland” has not been commonly used until quite recently. It is believed to be a euphemistic equivalent of “swamp.” Every year on the second day of February, World Wetlands Day marks the adoption of the convention on Wetland by Ramsar, the Iranian city that has a special place in Iranian history. Flood protection, water quality improvement, shoreline erosion control, natural products, recreation, and aesthetics are some of the many advantages of wetlands, as well as the fact that they are vital habitats for a variety of animals and plants. Several studies illustrated the importance of wetlands in reducing carbon emissions and regulating climate on a global scale. In recent years, these advantages of wetlands have been recognized by governments worldwide

and have led to legislation, regulations, and management plans creating wetlands for conservation, protection, and restoration. Unfortunately, the destruction of wetlands is a concern since they are among the planet's most productive areas.

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Vidhi Chaudhary, Daulat Ram College, India

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Pollution has become a matter of grave concern at present with all the components of the environment laden with pollutants largely from anthropogenic sources and unplanned urbanization. Inland wetlands are very delicate ecosystems and encompass a variety of water bodies, namely ponds, rivers, swamps, etc. They house some unique floristic patterns that are crucial in the primary productivity and maintaining a balance of the wetland ecosystem. In addition to it, the inland water bodies are also productive and are of immense importance to humans. The inland wetlands are also an integral part of boosting the economy of the region as they support a number of industries including fishing and recreation. Thus pollution of water bodies has impacted the human race in a deleterious manner. This chapter is an attempt to overview the inland water bodies, their biodiversity pattern, pollution, and their effect on flora at large.

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Water quality monitoring is an important tool in determining the safety and suitability of water for various desired and intended uses. The procedures involved in the evaluation of water quality are numerous and multifaceted. Therefore, taking into consideration the specific objectives of water quality monitoring, sampling design is of vital importance. Most of the physical parameters of water quality are determined via in-situ measurements using modern testing equipment/field testing kits. Although there are some good field-based sensors that are being used for evaluation of water quality, the chemical parameters traditionally are mostly analyzed through laboratory-based experiments. This chapter is aimed to offer an inclusive knowledge and insights on the importance and assessment of physico-chemical parameters that are of high priority for monitoring the water quality of wetlands.

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Antibiotic-resistant bacteria (ARB) are becoming more prevalent in the environment and are efficiently disseminating through contaminated wastewater resulting in resistome cycling. This chapter compares the bacterial profile of hospital effluents collected from rural, urban, and delta regions of West Bengal,

India. Comparative metagenomics analysis identified pathogenic bacterial genera like pseudomonas, escherichia, staphylococcus, lactobacillus, prevotella, acinetobacter across the samples. Delta sample showed highest abundance of pseudomonas whereas rural sample had lower titre of all the common bacterial genera. Urban sample reflected more diversity of different genera in terms of abundance. Pathogenic load prediction revealed significant occurrence of diarrhea, irritable bowel syndrome, liver cirrhosis, ulcerative colitis in the disease network. This chapter proposes a monitoring programme for assessing wastewater health using a combination of culture independent and culture-dependent molecular techniques in order to prevent the spread of pollutants in tropical environments.

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According to the IPCC Second Assessment Report, climate change will lead to an alteration of the hydrological cycle and could have major impacts on regional water resources. India features a diverse range of wetlands, including high-altitude alpine lakes, littoral swamps in the form of mangroves and corals, and inland wetlands of various sorts. The Upper Ganga Ramsar Site is Uttar Pradesh’s only Ramsar Site geographical distribution and may fluctuate as a result of climate change. Wetland reactions to climate change are frequently left out of global climate change models. The climate change adaptations must be incorporated into the economic development, planning, and implementation process.

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Dipanwita Sarkar (Paria), Chandernagore College, India
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Wetland-related studies documented the loss of native species diversity and promotion of the biotic homogenization due to wetland loss. Excessive withdrawals of water from wetlands for residential, agricultural, or industrial use are responsible for wetland degradation. Constructions of dams impedes water flow and replenishment of wetlands, and it also creates a hazard to aquatic living organisms. Climate change causing some wetlands to disappear under rising sea levels, while others are severely impacted by changing climatic conditions, including drought. So necessary steps such as increase wetlands and prevention of the illegal swamping of wetlands, etc. should be taken for conserving the wetland biodiversity from the threatening of unplanned urbanization, purifying the environment and mainlining the sustainable development. Though the Ramsar Convention policy exists to persevere wetlands and achieve sustainable development throughout the world, mass consciousness, greater participation of local people, use of indigenous knowledge in the management strategies are needed to protect wetlands.

Chapter 8

Ecological Succession of Wetlands: A Review of the Current Scenario..... 128

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Debolina Banerjee, Kidderpore College, India

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The change in community structure induced by environmental perturbances over time is called ecological succession and results in modification of community structure in a particular ecosystem. However, with climatic changes and pollution, wetlands are most likely to have modified their successional trails, especially as these ecosystems are exposed to various fluctuating water rhythms enhanced carbon dioxide, salinity invasion, and climatic temperatures. The chapter is an attempt to review the present condition of wetlands with respect to pollution and its impact on successional patterns.

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Moumit Roy Goswami, Netaji Nagar College for Women, Kolkata, India

Aniruddha Mukhopadhyay, University of Calcutta, India

Wetland ecosystems support rich and unique biodiversity. Biodiversity of a given ecosystem in general and wetlands in particular provide important insights to the ecological health of an area. The Ramsar Convention 1971 identified nine criteria for identifying wetlands of international importance. Out of the nine criteria, eight are linked to biodiversity of which three are based on sites of international importance for conserving biological diversity, two are specific for water birds, two are specific for fish, and one criterion for other taxa. Hence, determination of biodiversity of wetlands is of utmost importance. In order to understand that birds, fishes, amphibians, odonates, mammals, and aquatic plants were particularly selected as indicators of wetland biodiversity, the chapter discusses the different methodologies about determination of each of these taxa under different criteria as mentioned above. These methodologies will help various stakeholders in appropriate determination of biodiversity of wetlands of a particular area.

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Solid Waste Disposal on Inland Water Wetlands: A Sustainable Restoration of Wetland

Ecosystems..... 171

Chandani Bhattacharjee, H.R. College of Commerce and Economics, India

Generation of solid waste precedes the surge of urbanization. The earliest waste dumping is recorded in Greece as early as 500 BCE, the conservancy workers in France, wastewater treatment in London, and aqueduct systems in oriental civilizations. The magnitude of waste has been compounding annually with the rise of global population, urbanization, and economic growth. Waste has been overtly and irresponsibly dumped in inland water bodies and the wetlands around it causing inherent damage to the fluvial, pond, or riverine ecosystems. The United Nations has declared this decade to be for ecosystem restoration, and hence, this chapter intends to ponder and establish the concerns of health, species modification, ecosystem endangering, pollution of the surface and subsurface water, impact on the vegetation along the water stretches, to name a few. The objective of this chapter is to evaluate the impact on the ecospheres while arriving at sustainable restoration options.

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Global Climate Change by Wetland Greenhouse Gas Fluxes: Mechanisms, Effects, and Control 182

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Wetlands (WLs) in the landscapes are important for the GHGs production, ingesting, and exchange with the atmosphere. In this chapter, the authors illustrated how the WLs influence climate change, even though it is typical for determining the climatic role of WLs in the broader perspective. The conclusions might be wary based on the radiative balance as the radiative forcing since the 1750s or climatic roles are continuously changing in the wetlands. Degradation of WLs leads to reducing their functioning, and GHG fluxes might change and alter the climatic roles of the WLs. The chapter demonstrated that WL disturbances might cause global warming for a longer duration even though the WLs are restored or managed by replacing them with the mitigation WLs. Thus, activities that cause disturbance in the WLs leading to carbon oxidation in the soils should be avoided. Regulating the climate is an ecosystem service in the WLs; during the planning of the WLs, protection, restoration, and creation, environmental management should be considered.

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Variation of the Descriptive Grain Size Distribution Along Cores From the Sebkhah of Sidi El

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Elhoucine Essefi, University of Gabes, Tunisia

Soumaya Hajji, Faculty of Sciences of Sfax, Tunisia

In this chapter, cores were the object of descriptive classifications of the grain size distribution, which were meant to describe the grain size continuous variability within cores and to correlate between them. The statistical treatment of the crude data was done on the basis of two different methods (the method of moments statistics and the method of inclusive graphic statistics) to compute statistical parameters of the grain size distribution such as mean and median. The correlations between cores were done on the basis of sand/silt/clay percentages. Even though it has given special care to test different methods of studying the grain size distribution, this study has not deviated from its primary purpose of investigating the filling of the playa; correlations between different cores were meant to infer their sedimentary dynamics.

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Sana Bedoui, Higher Institute of Water Sciences and Techniques of Gabes, University of Gabes, Tunisia

Elhoucine Essefi, University of Gabes, Tunisia

Younes Hamed, University of Gafsa, Tunisia

Saline systems are candidates to be threatened by climatic change. In terms of methodology and materials, color identification, geochemistry, and mineralogy analysis were used. The spectral analysis of data of the amount of active K and Na firstly shows the individualization of a cycle stretching along with 1000 yr. Then, a less pronounced cycle of 2500 years is marked with a lower intensity. Also, on the spectral analysis of K data, the drowned cycles of 650 and 500 years are marked by weak intensities not reaching the threshold level. These two comparable cycles may be artifacts due to analysis errors or variability in the rate of sedimentation resulting in the bifurcation of two hybrid cycles from one real cycle. This work confirmed the cycles found by color studies through real analyses such as geochemical and magnetic measurements. As a matter of fact, the majority of cycles found out by the spectral analysis of colors data are confirmed through analyses.

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Elhoucine Essefi, University of Gabes, Tunisia

Previous works proposed different age models of sedimentation in Sebkha Lagoon of Boujmel leading to the setting of controversial interpretations of eustatic and climatic phases. The aim of this work is carrying out a geological correlation and an astrochronological calibration based on the Holocene cyclostratigraphy leading to the setting of an age model satisfying dates of climatic and eustatic phases identified in southern Tunisia, including the Anthropocene and the Great Acceleration. Along a 130 cm core, four major climatic phases were upward recorded.

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Record of the Sedimentary Dynamics and Climatic Variability Within the Sedimentary Filling of Mchiguig Wetland During the Late Holocene: Central Tunisia – Astronomic, Atmospheric, and Oceanographic Forces..... 252

Elhoucine Essefi, University of Gabes, Tunisia

This work aimed to study the cyclicity of the geochemical chemical parameters and the carbonate percentages along a 59 cm core from the sebkha of Mchiguig, Central Tunisia. In fact, from the bottom upwards, six climatic phases were recorded including the Warming Present (Great Acceleration), the Late Little Ice Age (Anthropocene), the Early Little Ice Age, the Medieval Climatic Anomaly, the Dark Age, and the Roman Warm Period. In fact, the spectral analysis of the studied parameters visualized many cycles. Those cycles are related to sun activity, oceanographic, and atmospheric factors. Solar activity generated 500 yr cycles; however, the oceanographic circulation generated other cycles of 1500 yr and 700-800 yr. The 1500 yr cycle may be the result of the solar activity and NAO-like circulation.

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The Geobiology of Bacteria Within the Extreme Conditions of Sidi El Hani Wetland, Eastern Tunisia: Environmental and Astrobiological Significance..... 267

Tagorti Mohamed Ali, Univeristy of Sousse, Tunisia

Elhoucine Essefi, University of Gabes, Tunisia

Extreme conditions in wetlands may be the niche of development of colonies of bacteria. In this chapter, the authors study the gnotobiology of moderate bacteria within the saline wetland of Sidi El Hani. In terms of geology, the coring within the sedimentary filling of the wetland shows color variation from white, grey, black to red related to the variability of bacteria species. On the other hand, in terms of microbiological investigations, isolates of bacteria show a variability from Gram+ to Gram-, from oxidase+ to oxidase-, from catalase+ to catalase-. This geobiological variability is related to radical change in climatic conditions. In doing so, the wetland of Sidi El Hani may record the climatic variability during the Late Holocene. On the other hand, it may be considered as terrestrial analogue with a development of extremophiles.

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Priya Banerjee, Centre for Distance and Online Education, Rabindra Bharati University, India

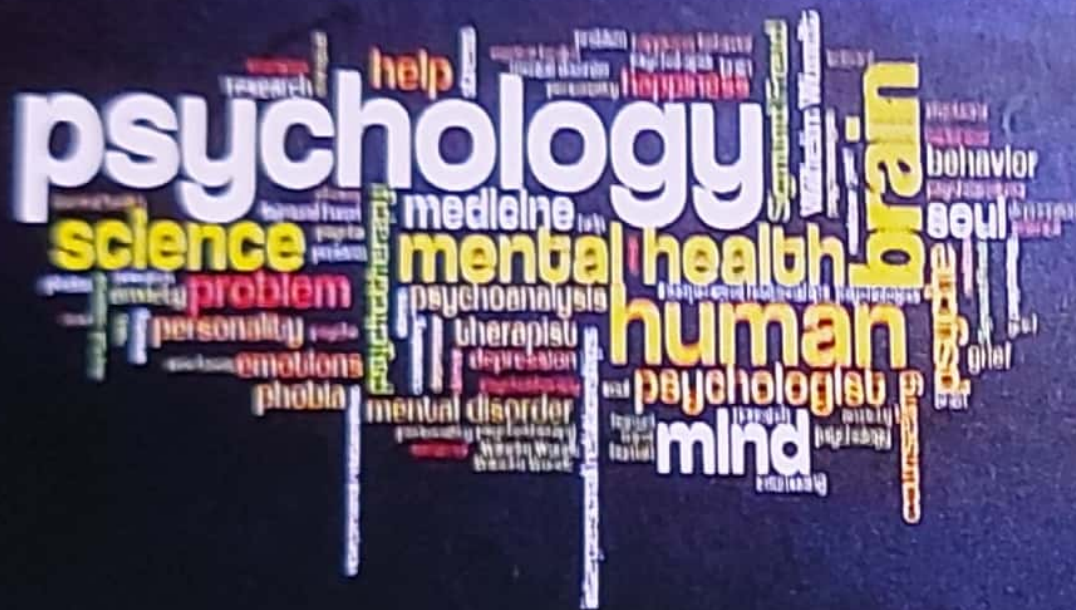
Ecosystem services include conditions and processes that make up natural ecosystems and the species present therein. According to recent studies, wetland ecosystems provide the maximum service value per area by playing a significant role in regulating and purifying water supplies, controlling flood, acting as carbon-sinks, and sustaining human lives and livelihoods. Challenges like wetland loss and degradation, declining freshwater resources, and probable consequences of climate change have attracted significant scientific and public attention towards wetland conservation and restoration. Despite diligent conservation efforts, the global status of wetland security is still alarming. Long-term sustainable management and use of wetlands necessitate active public participation from all sectors. This study reviews the current status of different wetlands in India. It also provides a detailed discussion of different aspects of economic evaluation of ecosystem services, wetland restoration, and public participation for improving wetland policies and governance.

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Psychological Foundation of Education



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Prof. Mita Banerjee, First Vice Chancellor of Kanyashree University was also the former and first Vice Chancellor of The West Bengal University of Teachers' Training Education Planning and former Professor of Department of Education, University of Calcutta has more than 36 years of teaching experience. Eminent Teacher Awardee from the University of Calcutta and Parul Prakashani and also awarded Lifetime Achievement Certificates from different institutions, recipient of Leading Educationist of India Award, and Bharat Excellence Award, New Delhi, is a student friendly Teacher Educator with extensive research experience. She has about 36 scholars awarded Ph.D. degrees under her supervision. She effectively and efficiently took up the responsibility of teaching and administration simultaneously for many years. Prof. Banerjee was the Chairman of two Curriculum Committees set up by the Department of Higher Education, Government of West Bengal to formulate the curriculum for two year B.Ed. and Four year Integrated Teacher Education programmes for the State of West Bengal. She was a member of a High Powered Committee of National Council for Teacher Education. (NCTE), New Delhi. She has several publications to her credit. She was the Chairperson, Coordinator, Resource Person, Keynote speaker at the University, State, National and International levels and even delivered a Convocation Address. She served as member of various Research Boards and other Committees of various Universities. She was Pro-Vice Chancellor, Professor Emeritus and Dean of School of Education of Adamas University. Presently she is the First Vice Chancellor of Kanyashree University, Krishnanagar, Nadia.



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INCLUSIVE EDUCATION

Dr. Shabana Haydar
Prof. (Dr.) Mita Banerjee



ABOUT THE BOOK

The book is divided into four units. Unit 1 provides an understanding of the concept of Inclusion, meaning and objectives of Inclusive Education, and importance of Inclusive society. Unit 2 deals with the concept of Impairment, Disability and Handicap, the types of Impairment such as Orthopedic Impairment Visual Impairment Hearing Impairment, Cerebral Palsy, and Autism. It gives a brief description about the causes and the impact of disability and the role of society in creating a barrier free environment for the disabled.

The Unit 3 of the book deals with social exclusion and the importance of providing equal educational opportunity for different sections of the society; the scheduled castes and scheduled tribes and other backward classes and women as a social category. It also gives a brief description about the concept of Gender and Sexuality, Patriarchy, Masculinity and Feminism. The Unit 4 of the book deals with inclusive society and inclusive school, teaching learning materials TLM and Lesson plans to provide teachers with some basic skills and aptitude to act as catalyst in the process of helping individuals to fully participate as responsible members of the society. It involves application of the principles and the techniques of psychological principles of individual differences to solution of the problems confronting teachers in an Inclusive classroom. It also gives a brief description about Multicultural Society, Multicultural Education and Peace Education.

Inclusive Education employs scientific approaches and methods in understanding children's behaviour and equips teachers with specific knowledge about effective teaching methodologies. Inclusion has positive effect on children with disabilities in improving communication and social skills, increasing positive peer interactions, and learning skills. An inclusive setup helps in learning social skills, developing of positive attitude, and encouraging better social interaction among children with or without disabilities.

The book will be useful to students, particularly undergraduates and post graduates in education, psychology and allied fields. It will be useful to teacher educators. Teachers and educators have an important role to play in nurturing individuals, in helping them acquire knowledge, values and proficiency. Knowledge of Inclusive Education will equip teachers to bring about desirable changes in attitudes, behaviour and skills in students in the classrooms, and help them to modify their approach towards teaching learning process.

ABOUT THE AUTHORS



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