

Declaration

I, **Abhisek Sarkar**, hereby declare that the research work presented in this thesis, entitled "**IMPACT OF SOIL PROPERTIES ON AGRICULTURAL LAND USE PATTERN IN SILIGURI SUB-DIVISION, WEST BENGAL**," is my original work, and it has not been submitted, in part or in full, for the award of any other degree or diploma at any university or institution. I affirm that all sources of information, including text, figures, and data, have been duly acknowledged in the thesis. The work of others utilized in this research has been appropriately cited and referenced. I further declare that all experiments involving human subjects or animals have been conducted in accordance with ethical principles and guidelines. I take full responsibility for any copyright infringement that might arise from the reproduction or use of copyrighted material within this thesis. To the best of my knowledge, all materials used from other sources have been properly acknowledged.

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Certificate



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25.08.2023

CERTIFICATE

This is to certify that **Abhisek Sarkar**, a Research Scholar (UGC-NET SRF) of the Department of Geography & Applied Geography, University of North Bengal, Raja Rammohunpur has carried out this research work entitled "IMPACT OF SOIL PROPERTIES ON AGRICULTURAL LAND USE PATTERN IN SILIGURI SUB-DIVISION, WEST BENGAL" under my supervision which is being submitted to the University of North Bengal for the award of Doctor of Philosophy in Geography & Applied Geography under the Faculty of Science.

This Thesis is based on the original work done by the researcher. He has fulfilled all the requirements as per the regulation of the University for submission of the Ph. D Thesis.

This Thesis as a whole or any part of it has not been submitted to any other University/ Institution for any other degree.

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Anti-Plagiarism Report



Document Information

Analyzed document	Abhisek Sarkar_Geography and Applied Geography.pdf (D172989979)
Submitted	2023-08-21 10:26:00
Submitted by	University of North Bengal
Submitter email	nbuplg@nbu.ac.in
Similarity	2%
Analysis address	nbuplg.nbu@analysis.arkund.com

Sources included in the report

W	URL: https://ir.nbu.ac.in/bitstream/123456789/2784/2/Full%20thesis%20of%20Chandana%20Singha.pdf Fetched: 2022-04-20 14:02:58	37
W	URL: https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/soil-productivity Fetched: 2019-12-07 13:42:58	1
W	URL: https://efotg.sc.egov.usda.gov/references/public/WI/Soil_Quality_Test_Kit_Guide.pdf Fetched: 2020-05-12 05:50:27	1

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Dedication

I dedicate this Ph. D. journey to my dearest and respected **Prof. Deepak Kumar Mandal**, whose exceptional mentorship and guidance have been instrumental in shaping my intellectual growth. Your profound insights, tireless commitment to research, and passion for academia have ignited a fire within me to push boundaries and strive for excellence. Your unwavering support, patience, and belief in my potential have been my guiding light through the challenges of this doctoral pursuit. This accomplishment stands as a testament to your dedication to the pursuit of knowledge and your enduring impact on my scholarly path. With immense gratitude, I honor Prof. Deepak Kumar Mandal for his profound influence on my academic and personal development.

To **Susmita Mandal**, my pillar of strength and unwavering support, your encouragement and boundless love have been my constant motivation. Your belief in my abilities has driven me to overcome obstacles and reach new heights. This achievement is a reflection of the steadfast encouragement you've provided throughout. To **Debayan Mandal**, your camaraderie has been a source of respite and joy during this academic odyssey. Your presence, laughter, and shared experiences have reminded me of the importance of balance and shared moments of triumph.

With heartfelt appreciation, I dedicate this accomplishment to Prof. Deepak Kumar Mandal, Susmita Mandal, and Debayan Mandal. Your collective impact on my journey is immeasurable, and I am honored to carry your influence forward as I step into new horizons.

Abhisek Sarkar.

(Abhisek Sarkar)

Preface

The pursuit of knowledge is an exhilarating journey, one that drives us to explore the intricacies of the world around us. As a researcher in the field of agriculture, I have been captivated by the profound relationship between soil properties and agricultural land use. This Ph. D research represents the culmination of my passion for understanding the fundamental forces that shape agricultural practices in the vibrant and diverse region of Siliguri subdivision, West Bengal.

Agriculture lies at the heart of the socio-economic fabric of Siliguri subdivision, sustaining the livelihoods of countless farmers and their families. As climate change and population growth continue to exert pressures on agricultural systems, the need to optimize land utilization and enhance productivity becomes more pressing than ever. The intricate interplay between soil properties and agricultural land use serves as a linchpin for devising sustainable land management practices that not only ensure food security but also safeguard the environment for future generations. This research journey would not have been possible without the guidance and mentorship of my esteemed supervisor, whose profound expertise and unwavering support have been invaluable. Their insightful feedback and encouragement have been instrumental in shaping the direction of this study and elevating its academic rigor.

This thesis brings us into light about the potentiality of agriculture in the Siliguri Sub-Division. All the limitations of the region are discussed and a sustainable solution is given for the betterment of the farmers and the planners. As I traversed this intellectual terrain, I encountered a wealth of knowledge from the scholarly community and pioneers in the field. Their ground breaking work has laid the foundation upon which I built this research, and I am humbled to be part of an academic tradition dedicated to advancing our understanding of agricultural systems.

This Ph. D research is more than a mere academic pursuit; it is a dedication to the resilience and ingenuity of farmers and communities in Siliguri subdivision. The pages that follow recount a tale of discovery, challenges, and insights gained, with the overarching goal of contributing to the sustainable development and prosperity of this vital agricultural region. As I humbly present this thesis on the "Impact of Soil Properties on Agricultural Land Use Pattern in Siliguri Subdivision, West Bengal," I hope that the findings and conclusions resonate with readers and stakeholders, inspiring further

exploration and action in promoting sustainable agricultural practices that harmonize with the environment.

In closing, I extend my heartfelt appreciation to all those who have been part of this research journey, directly or indirectly. May this work serve as a testament to the power of knowledge, the beauty of collaboration, and the enduring spirit of those who toil the land, nurturing it for the betterment of humanity.

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Acknowledgements

I would like to express my deepest gratitude and heartfelt appreciation to all those who have contributed and supported me throughout my Ph. D research journey. Undertaking this research has been an intellectually challenging and rewarding experience, and I am sincerely indebted to those who have played pivotal roles in making it possible.

First and foremost, I extend my heartfelt thanks to my esteemed supervisor, Professor Deepak Kumar Mandal (Ph. D), for his invaluable guidance, unwavering support, and belief in my capabilities. His expertise, insightful feedback, and constant encouragement have been instrumental in shaping the direction and quality of this research. I am truly grateful for their mentorship, which has not only enriched my academic growth but also instilled in me a passion for knowledge and scientific inquiry.

I am deeply appreciative of the members of my thesis committee for dedicating their time and expertise in reviewing and providing constructive criticism on my research work. Their valuable suggestions and constructive feedback have significantly improved the rigor and depth of my study, inspiring me to push the boundaries of my research further.

My heartfelt thanks go out to the faculty members and colleagues at the Department of Geography & Applied Geography in the University of North Bengal, whose stimulating academic environment and thoughtful discussions have enriched my research journey. The camaraderie and support within the department have fostered a collaborative and nurturing space, which has been essential in overcoming challenges and achieving academic excellence.

I extend my gratitude to the support staff at the university, from the library to the administrative personnel, for their assistance and cooperation throughout my research work. Their efficiency and dedication have been pivotal in facilitating a smooth research process.

I would like to acknowledge the financial support provided by UGC, which has been instrumental in carrying out my research work. Their investment in my academic pursuit has made this research possible, and I am sincerely grateful for their belief in the importance of scientific exploration.

My deepest appreciation goes to my family and friends for their unwavering love, encouragement, and understanding during the highs and lows of this challenging

academic journey. Their belief in my abilities and constant motivation have been a driving force in persevering through the trials of research.

Lastly, I am thankful to the participants and contributors who took part in my study, as their willingness to share their insights and experiences has been the foundation of my research findings.

In conclusion, this Ph. D research would not have been possible without the support and contributions of all these individuals and organizations. Each of them has played a significant role in shaping my research and academic growth. Their encouragement, guidance, and belief in my potential have been truly humbling and inspiring. I am deeply grateful for their involvement and proud to have had them as part of my academic journey.

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List of Abbreviations

Abbreviations	Full form of the abbreviations
Al	Aluminum
ATP	Adenosine Triphosphate
Ca	Calcium
CEC	Cation Exchange Capacity
ewsc	Erosion water stoniness climate
FAO	Food and Agriculture Organization
FCC	False Colour Composite
Fe	Ferrous
GIS	Geographic Information System
GP	Gram Panchayat
Ha	Hectare
HYV	High Yielding Varieties
IARI	Indian Agricultural Research Institute
ICAR	Indian Council of Agricultural Research
IRI	Inter-Regional Initiative
IRS	Indian Remote Sensing Satellite
Kg	Kilogram
Lbs	Pounds
LCC	Land Capability Classification
LCI	Land Capability Index
LULC	Land Use Land Cover
LUP	Land use Planning
Mg	Magnesium
Mn	Manganese
NBSS	National Bureau of Soil Survey
NPK	Nitrogen Phosphorous Potassium
OC	Organic Carbon
OM	Organic Matter
pH	Potential of Hydrogen
SOC	Soil Organic Carbon
SOM	Soil Organic Matter
SPSS	Statistical Package for Social Science
USDA	United States Department of Agriculture