F. No. 31/VVB@2047/2024-2347/EP- A /SCD

ICSSR-SPONSORED NATIONAL SEMINAR
UNDER SPECIAL CALL FOR VISION VIKSIT BHARAT@2047

"ACHIEVING CARBON NEUTRALITY AND ENHANCING FARM LIVELIHOOD THROUGH SUSTAINABLE AGRICULTURAL PRACTICES"
07TH & 08TH FEBRUARY 2025
DEPARTMENT OF GEOGRAPHY, VISVA-BHARATI, SANTINIKETAN, BIRBHUM, WEST BENGAL

SEMINAR REPORT

Title of Seminar	Achieving Carbon Neutrality and Enhancing Farm Livelihood Through Sustainable Agricultural Practices
Date	07th & 08th February 2025
Mode	Hybrid
Level	National
Sponsor	Indian Council for Social Science Research, New Delhi
Budget	Rs. 1,80,000/- (15% of the total budget allocated for the Project)
Registration fee	A nominal amount was collected from presenters and willing participants. The fee amount was mentioned in the brochure and collected online through SBCollect to the University account. A total of Rs. 32,500/- was collected.
No. of Resource Persons	13
No. of Invited Speakers	07
Abstracts received	21
Abstracts presented	19
No. of Attendees	100

Seminar Brochure

ORGANIZING COMMITTEE

Chief Patron
Prof. Bidyut Kumar Saren
Hon'ble Vice Chancellor (Offg.)
Visva-Bharati, Santiniketan

Patrons
Prof. Sirajul Islam
Principal, Vidya Bhavana,
Visva-Bharati, Santiniketan

Shri Ashok Kumar Mahato
Registrar (Acting)
Visva-Bharati, Santiniketan

Chairperson
Prof. Munjed Bhattacharya
Professor & Head
Dept. of Geography, Vidya Bhavana,
Visva-Bharati, Santiniketan

Convener-cum-Organizing Secretary
Dr. Poushali Roy
Assistant Professor
Department of Geography, Vidya Bhavana,
Visva-Bharati, Santiniketan

Co-Convener
Prof. S. Sreekesh
Professor
Centre for the Study of Regional Development, School of Social Sciences,
Jawaharlal Nehru University, New Delhi

Co-Convener
Dr. Sushil Kumar
Assistant Professor
Department of Environmental Studies,
Siksha Bhavana,
Visva-Bharati, Santiniketan

Co-Convener
Dr. Avijit Medhi
Assistant Professor
Department of Geography,
Manipur University, Imphal

Co-Convener
Dr. Wasir Alam
Assistant Professor
Department of Environmental Science,
Manipur University, Imphal

ACADEMIC ADVISORY COMMITTEE

Prof. Premangshu Chakraborty, Professor, Department of Geography, Visva-Bharati
Prof. Pratap Kumar Pathy, Professor, Department of Environmental Studies, Visva-Bharati
Dr. Amit Chatterjee, Associate Professor, Department of Geography, Visva-Bharati
Dr. Pulak Kumar Patra, Associate Professor, Department of Environmental Studies, Visva-Bharati
Dr. S. Balachandran, Associate Professor, Department of Environmental Studies, Visva-Bharati
Dr. Krishnendu Gupta, Assistant Professor, Department of Geography, Visva-Bharati
Dr. Sudipta Sarkar, Assistant Professor, Department of Geography, Visva-Bharati
Dr. Raghunath Pal, Assistant Professor, Department of Geography, Visva-Bharati
Dr. Sumit Kumar, Assistant Professor, Department of Geography, Visva-Bharati
Dr. Indrila Saha, Assistant Professor, Department of Geography, Visva-Bharati

IMPORTANT DATES

Abstract Submission opens	**05 December 2024**
Last Date for Abstract Submission	**05 January 2025**
Notification for Acceptance of Abstracts	**05 January 2025**
Registration opens	**05 January 2025**
Last Date for Submission of Full Paper	**20 January 2025**
Last Date for Registration	**20 January 2025**
Notification for Acceptance of Full Paper	**30 January 2025**
Seminar Dates	**07 – 08 February 2025**

विकसित भारत अभियान

ICSSR-SPONSORED NATIONAL SEMINAR

UNDER SPECIAL CALL FOR VISION VIKSIT BHARAT@2047

ACHIEVING CARBON NEUTRALITY AND ENHANCING FARM LIVELIHOOD THROUGH SUSTAINABLE AGRICULTURAL PRACTICES

07 – 08 February 2025

(HYBRID MODE)

Organized by

DEPARTMENT OF GEOGRAPHY, VIDYA BHAVANA
VISVA-BHARATI, SANTINIKETAN, WEST BENGAL

In Collaboration with

DEPARTMENT OF ENVIRONMENTAL STUDIES, SIKSHA BHAVANA
VISVA-BHARATI, SANTINIKETAN, WEST BENGAL

DEPARTMENT OF ENVIRONMENTAL SCIENCE, MANIPUR UNIVERSITY

DEPARTMENT OF GEOGRAPHY, MANIPUR UNIVERSITY

CENTRE FOR THE STUDY OF REGIONAL DEVELOPMENT,
SCHOOL OF SOCIAL SCIENCES, JAWAHARLAL NEHRU UNIVERSITY, NEW DELHI

Venue: Department of Geography, Padma Bhavana, Visva-Bharati, Santiniketan

Contact: vbrsgproject@gmail.com

CONCEPT NOTE

India has set a goal of reducing its carbon (C) emissions by 50% by 2030 and 100% for the entire economy by 2070, aiming to achieve C neutrality. C neutrality also requires the removal of the excess C from the atmosphere. Of the various abiotic and biotic measures of C sequestration that are being planned to be adopted in the country, carbon capture and storage (CCS) in agricultural soils is gaining priority. Some recommended agricultural land management practices for enhancing soil C include conservation agriculture, agroforestry, integrated nutrient management, and restoration of degraded soils through land use change. Although these methods are likely to have long-term positive effects on soil C, they can be time-consuming and unremunerative to farmers in the short term. Moreover, each soil, in its natural milieu, has a C saturation limit, which needs to be assessed before implementing any CCS method. Thus, an assessment of the actual and potential C stock of soils in the existing conditions of agricultural practices is necessary for the adoption of a CCS method that will be most effective not only concerning the soil's capacity but is also acceptable to the farmers and enhances their livelihood. The focal theme of the seminar is, therefore, identifying sustainable agricultural practices for C sequestration based on existing cropping systems and land management techniques that will increase soil fertility and ensure sustained crop productivity and, hence, the economic stability of farmers. Complementing the vision of the National Mission for Sustainable Agriculture (NMSA) of India to transform agriculture into a "climate-resilient production system" to ensure enhanced livelihood opportunities, the seminar will also address the issues of farmers' awareness of the C market and how they can accrue their income through C credits by adopting practices of C sequestration. Considering the vision of inclusive growth and development of Viksit Bharat@2047, focus must be laid on sustainable agricultural development and enhancing income for those engaged in the agricultural sector.

THEMES

- **Soil Carbon Dynamics**
  - Pedologic and environmental conditioning of soil carbon distribution
  - Impact of land use and land cover change on soil carbon/organic matter
  - Soil carbon fluxes, soil carbon storage, and carbon neutrality
- **Soil Carbon Storage**
  - Potential of existing agricultural practices in enhancing soil carbon/organic matter
  - From fertilizer to fertility: Impact of fertilizers on soil carbon
  - Impact of Biochar and Biowaste
  - Agricultural soil pollution and soil carbon
  - Identification of best agricultural practices for enhancing soil carbon/organic matter
  - Predicting carbon sequestration in agricultural soils
- **Economies of Soil Carbon**
  - Soil carbon/organic matter and agricultural income
  - Livelihood diversification and soil carbon
  - Carbon market, carbon credits, and farm livelihood
- **Indian Policy Framework on Soil Carbon and Agricultural Sustainability**

TARGET AUDIENCE

The Seminar is specifically designed for faculty members, delegates, research scholars, and students, especially from the disciplines of Geography, Environmental Studies, Soil Science, Agricultural Science, Climate Studies, Economics, and Polity in various academic institutions and government undertakings, who are engaged with research on soil-agriculture-climate and farm livelihood. The attendees are likely to include policymakers such that the academic findings and proposals on climate change mitigation through soil carbon sequestration and agricultural sustainability find a pathway to their implementation at the ground level.

RESOURCE PERSONS

KEYNOTE SPEAKER

DR. TAPAS BHATTACHARYYA
Vice-Chancellor (Formerly), Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri, Maharashtra
Visiting Scientist (Formerly) ICRISAT Development Center, ICRISAT, Patancheru, Telangana
Principal Scientist & Head of Department (Formerly), ICAR-NBSSLUP, Nagpur, Maharashtra

INVITED SPEAKER

PROF. SUDESH YADAV
School of Environmental Sciences,
Jawaharlal Nehru University,
New Delhi

INVITED SPEAKER

PROF. AMITAVA RAKSHIT
Department of Soil Science
& Agricultural Chemistry,
Institute of Agricultural Science,
Banaras Hindu University, Varanasi, UP

INVITED SPEAKER

DR. ANOOP KUMAR SRIVASTAVA
Principal Scientist (Soil Science),
ICAR-Indian Agricultural Research Institute,
Dhemaji, Assam

INVITED SPEAKER

DR. SURESH KUMAR
Group Director,
Agriculture, Forestry & Ecology Group (AFEG),
IIRS, ISRO, Dehradun

INVITED SPEAKER

DR. U. SURENDRAN
Principal Scientist (Soil Science) & Head,
LWMRG, Centre for Water Resources Development & Management (CWRDM), Kerala

INVITED SPEAKER

PROF. ARUN JYOTI NATH
Professor
Department of Ecology & Environmental Science
Assam University, Silchar, Assam

INVITED SPEAKER

DR. K S ANIL KUMAR
Principal Scientist (Retd.)
ICAR-NBSS&LUP
Bangalore, Karnataka

CALL FOR ABSTRACTS

Abstracts are invited on the focal theme, but not limited to, the themes mentioned above from students, research scholars, faculty members, scientists, and professionals in Geography, Environmental Science/Studies, Soil Science, Agricultural Science, Climate Studies, Economics, and Polity. The abstracts should be submitted in MS Word file through the Google form link given below. Abstracts sent by email or post will not be accepted.

ABSTRACT SUBMISSION

- Abstracts must be submitted in English/Hindi.
- Authors should indicate their preferred theme and presentation mode (offline or online).
- Abstracts should clearly outline the objectives, methods, results, and significance of the study.
- Number of words: 300 words excluding title, authors, and affiliations. Keywords: 4-8 words.
- Font: Times New Roman; Font size: 12 points; Single line spacing
- Plain text should be used without any special characters. Graphics will not be accepted. No references should be included.

Note: *Selected abstracts will be invited for oral presentation and full paper submission. Submitted papers will be peer-reviewed and screened for plagiarism before final acceptance. Selected papers will be published in reputed journals or an edited volume by a reputed publisher.*

Abstract Submission Link: https://forms.gle/S8yoh24MkmanbgSbA

REGISTRATION FEES

Categories	Registration fees (Rs.)	
	Online mode	Offline mode
Faculty / Delegates	1000	2000
Research Scholars	750	1500
Students	500	1000
Accompanying person	—	1000

Registration Fee Link: https://forms.gle/2YrhKVoHBjwLUcScA

Note: *1. Registration Fee is* ***non-refundable.***
2. Online Registration: The presenter/participant will receive a certificate of presentation/participation. The abstract will be published in the Seminar abstract volume.
3. Offline Registration: The fee includes Seminar kit, certificate of participation/presentation, lunch & refreshment on the days of the Seminar. The abstract will be published in the Seminar abstract volume. Offline registration ***does not include accommodation.***

MODE OF PAYMENT

- Step 1: Please type https://www.onlinesbi.sbi/sbicollect/icollecthome.htm
- Select Category – "Educational Institutions"
- Select "VISVABHARATI UNIVERSITY"
- Select Payment Category "Misc Receipt"
- Fill up all details in CAPITAL and Select Purpose of Deposit "Other"
- Type at Remarks in CAPITAL "GEOGRAPHY NATIONAL SEMINAR 2025"
- Take a printout of the payment receipt and upload it to the link for registration given below.

THE HOST DEPARTMENT

The Department of Geography started its journey in the year 1968. The post-graduate course was introduced in 1978, and the Department has started conducting research offering Ph.D. degrees since the late 1980s. The CBCS course and NEP course at the undergraduate level, following UGC guidelines, were introduced in 2017 and 2023, respectively. The vision and mission of the Department is to establish industry-academic linkage for which special emphasis is given to learning geo-informatics and digital cartography. Regional planning is another field of special interest. Outreach programmes on terrain evaluation surveys, land use land cover analysis and socio-economic surveys. The aim of the Department is to contribute spatial research output to facilitate interdisciplinary research. Considering the worldwide developmental trends in Geography, the Department has emphasized subjects like land, soil and water resource management, landscape ecology, population geography, tourism and environmental geography, and urban and regional development in its revised course curriculum. The Department is presently well equipped with Remote Sensing and GIS Laboratories, a Map Interpretation laboratory, and various Ground Survey instruments, including Total Station, etc. Apart from teaching in universities, colleges, and schools, the passed-out students of the Department are also absorbed in various survey and mapping organizations as well as in planning organizations.

THE HOST UNIVERSITY

Visva-Bharti at Santiniketan, located in a rural setting in Birbhum district, West Bengal, was founded by Gurudev Rabindranath Tagore in 1901 as a residential school, "Brahmacharya Asrama." This Asrama Vidyalaya became "Visva-Bharati" on December 23, 1921; finally, in 1951, it was declared a Central University of National Importance by an Act of Parliament of India. On September 17, 2023, UNESCO declared Visva-Bharati as the first World Living Heritage campus. Details about Visva-Bharati are available at https://visvabharati.ac.in/. The weather in February remains moderate, and the temperature ranges between 19ºC and 32ºC.

HOW TO REACH?

Santiniketan is situated at a distance of around 160 km from Kolkata. One can reach by road, rail or air. The nearest airports are Netaji Subhash Chandra Bose International Airport (Kolkata Airport, CCU) and Kazi Nazrul Islam Airport (Durgapur Airport, RDP). From here, Santiniketan is connected by road and rail. Bolpur-Santiniketan is the railway station for Santiniketan. It is two and a half to three hours by train from Howrah, Sealdah, and Kolkata Stations and one hour from Barddhaman Station. Regular bus services are available to and from Kolkata, Durgapur and Asansol.

Programme Schedule

ICSSR-SPONSORED NATIONAL SEMINAR
UNDER SPECIAL CALL FOR VISION VIKSIT BHARAT@2047
ACHIEVING CARBON NEUTRALITY AND ENHANCING FARM LIVELIHOOD THROUGH SUSTAINABLE AGRICULTURAL PRACTICES
07– 08 February 2025
(Hybrid Mode)
Venue: Department of Geography, Padma-Bhavana, Visva-Bharati, Santiniketan

PROGRAMME SCHEDULE

Day 1: 07.02.2025 (Friday)

Breakfast **08:30 – 09:30**

Inaugural Session **09:30 – 10:15**

Venue: Seminar Hall, Annex Building, Padma-Bhavana

Google Meet Link: https://meet.google.com/rai-mmwb-gyp

Lighting of Lamp & Opening Song

Welcome Address: **Prof. Manjari Bhattacharji**
Professor & Head
Department of Geography, Vidya-Bhavana,
Visva-Bharati, Santiniketan

Concept Note: **Dr. Poushali Roy**
Assistant Professor
Department of Geography, Vidya-Bhavana,
Visva-Bharati, Santiniketan
&
Convener-cum-Organizing Secretary

Inaugural Address: **Prof. Sirajul Islam**
Principal, Vidya Bhavana,
Visva-Bharati, Santiniketan

Guest of Honour Speech: **Prof. Binoy Kumar Saren**
Hon'ble Vice Chancellor (Offg.)
Visva-Bharati, Santiniketan

Closing Remarks: **Shri Ashok Kumar Mahato**
Registrar (Acting)
Visva-Bharati, Santiniketan

Vote of Thanks: **Dr. Sushil Kumar**
Assistant Professor
Department of Environmental Studies,
Siksha-Bhavana, Visva-Bharati, Santiniketan
&
Co-Convener

1

ICSSR-SPONSORED NATIONAL SEMINAR
UNDER SPECIAL CALL FOR VISION VIKSIT BHARAT@2047
ACHIEVING CARBON NEUTRALITY AND ENHANCING FARM LIVELIHOOD THROUGH SUSTAINABLE AGRICULTURAL PRACTICES
07– 08 February 2025
(Hybrid Mode)
Venue: Department of Geography, Padma-Bhavana, Visva-Bharati, Santiniketan

Keynote Address **10:15 – 11:15**

Chairperson: **Prof. Dikshit Sinha**
Professor (Retd.)
Department of Social Work,
Palli-Samghathana Vibhaga,
Visva-Bharati, Santiniketan

Keynote Speaker: **Dr. Tapas Bhattacharyya**
Vice-Chancellor (Formerly)
Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth,
Dapoli, Ratnagiri, Maharashtra

Topic – "Soil Carbon and Soil Health: Going Back to Basics of Tagore"

TEA BREAK **11:15 – 11:30**

Plenary Session I **11:30 – 13:30**

Chairperson: **Prof. S. Sreekesh**
Professor & Chairperson
Centre for the Study of Regional Development,
School of Social Sciences,
Jawaharlal Nehru University, New Delhi

Invited Speaker: **Dr. Suresh Kumar**
Group Director
Agriculture, Forestry & Ecology Group (AFEG),
Indian Institute of Remote Sensing (IIRS), ISRO,
Dehradun, Uttarakhand

Topic – "Satellite-based Remote Sensing Approach in Soil Carbon Stock Assessment and Monitoring"

Invited Speaker: **Dr. U. Surendran**
Principal Scientist (Soil Science)
Centre for Water Resources Development and Management
(CWRDM), Kerala

Topic – "Achieving Carbon Neutrality in Agricultural Farms and Its Assessment Mechanisms"

2

ICSSR-SPONSORED NATIONAL SEMINAR
UNDER SPECIAL CALL FOR VISION VIKSIT BHARAT@2047
ACHIEVING CARBON NEUTRALITY AND ENHANCING FARM LIVELIHOOD THROUGH SUSTAINABLE AGRICULTURAL PRACTICES
07– 08 February 2025
(Hybrid Mode)
Venue: Department of Geography, Padma-Bhavana, Visva-Bharati, Santiniketan

4. Characterizing The Soil Quality for Sustainable Agricultural Practices: A Case of Jharia Coalfield Region, India - ***Kanhaiya Lal*** & *Padmini Pani*
5. Dialectics of Carbon Sequestration in the Coastal Areas of Purba Medinipur, WB: Environmentalism vs Economism - ***Tahamina Khatun*** & *Sanat Kumar Guchhait*
6. A Study on Soil Carbon, Agricultural Income and Carbon Trading with Special Reference to India - ***Debasish Sarkar***
7. Carbon Farming and Emerging Carbon Credit Market - ***Ravi Kumar***

Visit to "Magh Mela", Sriniketan

PROGRAMME SCHEDULE

Day 2: 08.02.2025 (Saturday)

Breakfast **08:30 – 09:30**

Plenary Session II **09:30 – 11:30**

Venue: Seminar Hall, Annex Building, Padma-Bhavana

Google Meet Link: https://meet.google.com/nwz-pyan-pmm

Chairperson: **Prof. Goutam Kumar Ghosh**
Professor & Head
Department of Soil Science & Agricultural Chemistry,
Palli-Siksha Bhavana,
Visva-Bharati, Santiniketan

Invited Speaker: **Dr. Anil Kumar**
Principal Scientist (Retd.)
ICAR-NBSS&LUP,
Bangalore, Karnataka

Topic – "Soil Organic Carbon Stocks and Sequestration Potential of Major Soils of India"

5

ICSSR-SPONSORED NATIONAL SEMINAR
UNDER SPECIAL CALL FOR VISION VIKSIT BHARAT@2047
ACHIEVING CARBON NEUTRALITY AND ENHANCING FARM LIVELIHOOD THROUGH SUSTAINABLE AGRICULTURAL PRACTICES
07– 08 February 2025
(Hybrid Mode)
Venue: Department of Geography, Padma-Bhavana, Visva-Bharati, Santiniketan

Invited Speaker: **Prof. Sudesh Yadav**
Professor
School of Environmental Sciences,
Jawaharlal Nehru University, New Delhi

Topic – "Metal and Soil Health in the Realm of Industrial Development and Urbanisation"

Invited Speaker: **Prof. Amitava Rakshit**
Professor
Department of Soil Science & Agricultural Chemistry,
Institute of Agricultural Sciences,
Banaras Hindu University, Varanasi

Topic – "Sustainable Agricultural Management through Carbon Neutrality: Small Holder's Experience"

TEA BREAK **11:30 – 11:45**

Technical Session III **11:45 – 13:45**

[Policy on Soil Carbon Sequestration & Agricultural Sustainability]

Chairperson: **Prof. Sanat Kumar Guchhait**
Professor
Department of Geography,
The University of Burdwan, West Bengal

Co-Chairperson: **Dr. Sushil Kumar**
Assistant Professor
Department of Environmental Studies,
Siksha-Bhavana, Visva-Bharati, Santiniketan

1. Enhancing Farm Livelihood Through Sustainable Agriculture Practices in Santhal Pargana Division of Jharkhand - ***Babita Kumari***
2. Agricultural Practices in Santhal Community - ***Jay Prakash Rajak***
3. Enhancing Sustainable Agricultural Development through Soil Carbon Management in Purulia District - ***Shyamal Majee*** & *Santosh Kumar Singh*

6

Programme Schedule (contd./-)

ICSSR-SPONSORED NATIONAL SEMINAR
UNDER SPECIAL CALL FOR VISION VIKSIT BHARAT@2047
ACHIEVING CARBON NEUTRALITY AND ENHANCING FARM LIVELIHOOD THROUGH SUSTAINABLE AGRICULTURAL PRACTICES
07– 08 February 2025
(Hybrid Mode)
Venue: Department of Geography, Padma-Bhavana, Visva-Bharati, Santiniketan

Invited Speaker: **Prof. Arun Jyoti Nath**
Professor
Department of Ecology and Environmental Science,
Assam University, Silchar, Assam

Topic – "The Race to Net Zero Emissions: Opportunities through Agroforestry Expansion and Management in India"

LUNCH BREAK **13:30 – 14:30**

Technical Session I **14:30 – 17:00**

[Soil Carbon Dynamics & Storage]

Venue: Seminar Hall, Annex Building, Padma-Bhavana

Google Meet Link: https://meet.google.com/rai-mmwb-gyp

Chairperson: **Prof. Pratap Kumar Padhy**
Professor & Head
Department of Environmental Studies,
Siksha-Bhavana, Visva-Bharati, Santiniketan

Co-Chairperson: **Dr. Avijit Mistri**
Assistant Professor
Department of Geography,
Manipur University, Imphal, Manipur

1. Understanding Soil Geochemistry in Attaining Carbon Neutrality and Enhancing Farm Livelihood as a Part of Sustainable Agricultural Practices - ***Debdas Ray***
2. Estimating Carbon Stock and Carbon Sequestration Potential of Different Agricultural Management Practices in Palghat Gap Region, South India - ***Powshi V*** *& S Sreekesh*
3. Carbon Sequestration Potential of Agriculture System in Indira Gandhi Canal Irrigated Semi-Arid Region – ***Sandhya***
4. Does Soil Organic Carbon Vary under Different Agricultural Practices? A Case Study of Rautora Gram Panchayat of Bankura District, West Bengal - ***Nabanita***

3

ICSSR-SPONSORED NATIONAL SEMINAR
UNDER SPECIAL CALL FOR VISION VIKSIT BHARAT@2047
ACHIEVING CARBON NEUTRALITY AND ENHANCING FARM LIVELIHOOD THROUGH SUSTAINABLE AGRICULTURAL PRACTICES
07– 08 February 2025
(Hybrid Mode)
Venue: Department of Geography, Padma-Bhavana, Visva-Bharati, Santiniketan

Saren *& Abira Dutta Roy*

5. Study of Soil Properties in Paddy Based Cropping Systems in SPSR Nellore District, Andhra Pradesh - ***B Vajantha,*** *U Vineetha, M Sreevalli Devi, P Nagmani, K R Tagore and N V Sarala*
6. Role of Soil Organic Matter in Enhancing Agricultural Soil Quality in Selected C.D. Blocks of Purba Bardhaman District, West Bengal - ***Piyush Maji*** *& Biswaranjan Mistri*
7. Soil Organic Carbon as Affected by Ecological Weed Management through Crop Geometry and Live Mulching in Sweet Corn-Greengram System - ***Manisha Rout,*** *Pritam Ghosh, Mahua Banerjee, Ganesh Chandra Malik, and S N Jena*

Technical Session II **14:30 – 17:00**

[Soil Health & Economies of Soil Carbon]

Venue: GIS Lab, Annex Building, Padma-Bhavana

Google Meet Link: https://meet.google.com/udb-dcma-den

Chairperson: **Dr. Pabitra Kumar Biswas**
Associate Professor
Department of Soil Science & Agricultural Chemistry,
Palli-Siksha Bhavana,
Visva-Bharati, Santiniketan

Co-Chairperson: **Dr. Wazir Alam**
Assistant Professor
Department of Environmental Science,
Manipur University, Imphal, Manipur

1. Impact of Unsustainable Agricultural Practices on Soil Health and Farm Livelihood in Labpur C.D. Block, Birbhum, West Bengal - ***Soma Biswas*** *& Biswaranjan Mistri*
2. Assessment of Soil Organic Carbon Content in Industrially Polluted Areas of Paschim Bardhaman District of West Bengal - ***Rakhi Mondal*** *& Biswaranjan Mistri*
3. Metal Distribution and Risk Assessment in Surface Soils of Bhiwadi Industrial Area Rajasthan, India - ***Anju Verma*** *& Sudesh Yadav*

4

ICSSR-SPONSORED NATIONAL SEMINAR
UNDER SPECIAL CALL FOR VISION VIKSIT BHARAT@2047
ACHIEVING CARBON NEUTRALITY AND ENHANCING FARM LIVELIHOOD THROUGH SUSTAINABLE AGRICULTURAL PRACTICES
07– 08 February 2025
(Hybrid Mode)
Venue: Department of Geography, Padma-Bhavana, Visva-Bharati, Santiniketan

4. Effect of Ecological Weed Management in Sweet Corn-Greengram System on Sweet Corn Kernel Quality for Improving Livelihoods of Farmers - ***Manisha Rout,*** *Pritam Ghosh, Mahua Banerjee, Ganesh Chandra Malik, and S N Jena*
5. Evaluation of Trees' Capacity to Absorb Carbon Dioxide from the Air in Durgapur, West Bengal - ***Anamika Pandey*** *& Debnath Palit*
6. Environmental Benefits of Urban Vegetation on Air Quality, Dust Capture, Carbon Sequestration, and Soil Health in CIMFR Campus Dhanbad India - ***Riha Kumari,*** *Shubham Abhishek & Bhanu Pandey*

LUNCH BREAK **1β:45 – 14:30**

Valedictory Session **14:30 – 16:00**

Report

A two-day National seminar on "Achieving Carbon Neutrality and Enhancing Farm Livelihood Through Sustainable Agricultural Practices" was organized in a hybrid mode at the Department of Geography, Padma-Bhavana, Visva-Bharati. The Seminar was graced by distinguished scholars and students of Visva-Bharati and from institutes across the country. There was a Keynote Speech and six plenary lectures. Twenty-one abstracts were received, of which nineteen were presented at the Seminar in three Technical sessions – Technical Session I: Soil Carbon Dynamics and Storage, Technical Session II: Soil Health and Economies of Soil Carbon, and Technical Session III: Policy on Soil Carbon Sequestration and Agricultural Sustainability.

Day 1 – 07.02.2025

The **Inaugural Session** was held at the Seminar Hall, Department of Geography, Padma Bhavana – Annex Building, Visva-Bharati, Santiniketan. began with lighting the lamp and a welcome song and embracing the presence of distinguished scholars with the traditional laurel, sash, and sandalwood paste. The welcome address was delivered by Prof. Manjari Bhattacharji, Head of the Department of Geography, Visva-Bharati. The Convener-cum-Organizing Secretary, Dr. Poushali Roy, introduced the concept note of the Seminar to the respected participants. Prof. Sirajul Islam, Principal, Vidya-Bhavana, Visva-Bharati, in his inaugural speech, elaborated on the significance of agriculture in mitigating climate change. This was followed by the release of the Book of Abstracts.

The **Keynote Address** was delivered by Dr. Tapas Bhattacharyya, Vice-Chancellor (Formerly), Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri, Maharashtra. Dr. Bhattacharyya delivered his talk (online) on "*Soil Carbon and Soil Health: Going Back to Basics of Tagore*". The session was chaired by Prof. (Retd.) Dikshit Sinha, Department of Social Work, Palli-Samghathana Vibhaga, Visva-Bharati, Santiniketan. Dr. Bhattacharyya mentioned that the total carbon footprint (CF) for Indian agriculture is measured as 1.72% of total CO_2 (eq.) stored in the soil. He emphasized utilizing soil CFs to identify climate-smart soils (CSS) to save soils and to make other soils climate-smart following the appropriate farm management practices. Identification and mapping of the CSS will also lead to carbon (C) trading to incentivize the C farmers. He also referred to Gurudev Rabindranath Tagore's ecocritical perspective and the need for reverting to the traditional knowledge of soil/land for the sustenance of human life. The session ended with a vote of thanks by Dr. Sushil Kumar, one of the Co-Conveners of the Seminar.

The **Plenary Session I** was chaired by Prof. S. Sreekesh, Professor, Centre for the Study of Regional Development, Jawaharlal Nehru University, New Delhi. The panelists of this session talked about the recent advances in SOC monitoring and the sustainable measures that can be adopted to enhance SOC and farm livelihood simultaneously.

Dr. Suresh Kumar, Group Director, Agriculture, Forestry & Ecology Group, IIRS, ISRO, Dehradun, delivered the first plenary talk (online) titled "*Satellite-based Remote Sensing Approach in Soil Carbon Stock Assessment and Monitoring*". Dr. Kumar highlighted the availability of various satellite remote sensing data, such as the Resourcesat series, Landsat series, Sentinel-2, and PlanetScope, to cater to the needs at various scales ranging from reconnaissance to large-scale (field level) studies. Recent advances in cloud computing infrastructure (e.g., Google Earth Engine) offer the opportunity to process voluminous remote sensing data sets over a long period for monitoring resources and modeling soil C stock.

The next talk was delivered online by Dr. U. Surendran, Principal Scientist (Soil Science),

Centre for Water Resources Development and Management (CWRDM), Kerala, on "*Achieving Carbon Neutrality in Agricultural Farms and Its Assessment Mechanisms*". He talked about the strategies to achieve C neutrality in Indian smallholding farms through the adoption of sustainable practices such as integrated nutrient management, agroforestry, conservation agriculture, and renewable energy solutions by proper accounting methods. Sharing the research experiences from his study along with his co-workers at CWRDM and ICAR, Dr. Surendran mentioned the importance of integrating traditional knowledge with modern technologies like GIS, machine learning, and blockchain for real-time monitoring and reporting of soil C.

The last lecture of the session was delivered by Prof. Arun Jyoti Nath, Professor, Department of Ecology and Environmental Science, Assam University. The title of his talk was "*The Race to Net Zero Emissions: Opportunities through Agroforestry Expansion and Management in India*". Prof. Nath stated that organic C stocks, across altitudes, were highest in the agroforestry systems in the humid climatic zones, of which agrosilvopastoral systems recorded the highest biomass C and SOC. He recommended that expanding the area under agroforestry by just 30% could offset emissions from India's energy, agricultural, and industrial sectors by 2050. Agroforestry systems will also enhance the livelihood of the farmers. The session was highly interactive and was concluded by some observations and a vote of thanks by the Chairperson.

The Technical Sessions I and II were held in the post-lunch period. The two sessions were conducted parallelly – Technical Session in the Seminar Hall and Technical Session II in the GIS Laboratory, Department of Geography, Padma Bhavana – Annex Building, Visva-Bharati, Santiniketan.

The theme of **Technical Session I** was "*Soil Carbon Dynamics and Storage"*. The session was chaired by Prof. Pratap Kumar Padhy, Professor & Head, Department of Environmental Studies, Siksha-Bhavana, Visva-Bharati, Santiniketan, and co-chaired by Dr. Avijit Mistri, Assistant Professor, Department of Geography, Manipur University. The session in-charge was Dr. Sudipta Sarkar, Assistant Professor, Department of Geography, Visva-Bharati, Santiniketan. Six participants presented their papers (three in online mode and three offline) in this session, each presenter was given 20 minutes for presentation and interaction with the audience. Based on case studies in different parts of the country, the papers primarily talked about the SOC stock under different existing agricultural practices.

Debdas Ray, in his presentation, stressed the need for a thorough understanding of soil geochemistry for achieving C neutrality. He suggested that the soils of Birbhum, underlain by the Rajmahal Basalt, are rich in iron-magnesium silicates and C, and the farmers are likely to benefit from such soils.

Nabanita Saren and Abira Dutta Roy observed low C content (<0.5%) in the agricultural soils of Bankura, West Bengal. According to their study, soil texture is dominant in determining the SOC rather than farming practices.

Powshi V. and S. Sreekesh concluded that in the Chulliyar-Ikshumathi sub-watershed of Bharathapuzha basin in the Palghat Gap region of Western Ghats, the less frequent tilled crops (LFTC) of the coconut-arecanut groves, homestead farms and mango plantations had a greater potential to sequester C than the more frequent tilled crops (MFTC) like paddy and vegetables. However, they did not observe significant difference between the C stock in the LFTCs and MFTCs.

Sandhya, in her paper, reported that the C sequestration potential of agricultural soils of the semi-arid regions was higher in the areas of double cropping with adequate irrigation facilities. She used Landsat 8 data and applied geospatial techniques like the Soil Adjusted Vegetation Index for identifying cropping systems and spatial interpolation for assessing the spatial and temporal variations in the C sequestration potential of soils.

Piyush Maji and Biswaranjan Mistri assessed the role of organic matter on soil quality in the agricultural soils of Purba Bardhaman, West Bengal. They reported that the application of organic fertilizers, mainly cattle manure, leads to an increase in soil organic matter that, in turn, improves the soil quality.

Manisha Rout and others analyzed the impact of land management techniques in sweet corn-green gram systems in the *Alfisols* of Odisha. They concluded that closer spacing of crops led to an increase in SOC. Crop geometry and weed management are important but not significant parameters influencing SOC concentration.

Papers presented in **Technical Session II** focused on the theme "*Soil Health & Economies of Soil Carbon*". The session was chaired by Dr. Pabitra Kumar Biswas, Associate Professor, Department of Soil Science & Agricultural Chemistry, Palli-Siksha Bhavana, Visva-Bharati, Santiniketan, and co-chaired by Dr. Wazir Alam**,** Assistant Professor, Department of Environmental Science, Manipur University. The session in-charge was Dr. Raghunath Pal, Assistant Professor, Department of Geography, Visva-Bharati, Santiniketan. Six participants presented their papers (four in online mode and two offline) in this session, each presenter was given 20 minutes for presentation and interaction with the audience. The papers analyzed the impact of chemical fertilizers and soil pollution on SOC concentration and overall soil quality. A couple of papers investigated the effect of livelihood diversification on C sequestration and the challenges of C farming.

Soma Biswas and Biswaranjan Mistri, in their study in Birbhum, reported that farmers applied chemical fertilizers beyond recommended levels without soil testing, resulting in the deterioration of soil health, increased cultivation costs, and reduced production compared to integrated nutrient management. They applied the Cobb-Douglas Production Function model that indicated that the farmers lacked education and awareness towards sustainable agriculture and had exceeded optimal resource utilization limits. This calls for measures for enhancing farmer awareness and education on sustainable practices, training the youth in agriculture, and modernizing farming through scientific interventions to improve its economic viability.

Rakhi Mandal and Biswaranjan Mistri assessed the impact of heavy metals on SOC in the coal mining region of Paschim Bardhaman, West Bengal. They reported that the heavy metals, viz. Fe, Zn, Mn, Cu, Pb, Ni, Hg, Cr, and Cd had both positive and negative relationships with SOC. They used ArcGIS software for mapping the spatial variations in the concentration of SOC and heavy metals.

Anju Verma and Sudesh Yadav, on the other hand, reported high metal risk in the surface soils of the Bhiwadi Industrial Area of Rajasthan, and organic C restricted metal mobility by making complexes in the surface soils.

Kanhaiya Lal and Padmini Pani recorded poor soil quality in the Jharia Coalfield due to faulty management practices. They calculated the Soil Degradation Index based on the soil parameters like relative particle size, soil reaction, Electrical Conductance (EC), Total

Dissolved Salts (TDS), presence of different heavy elements, Chemical Index of Alteration (CIA), etc.

Tahamina Khatun and Sanat Kumar Guchhait concluded that "stupendous growth of economism" has resulted in the rapid transformation of paddy fields into commercial aquaculture, which might have increased the farmers' income but interestingly reduced the C sequestration potential of the soils.

Ravi Kumar reviewed that sustainable agricultural practices help farmers reduce their chemical fertilizer needs and C footprint and help them earn C credits and participate in the C market. He further underlined the major challenges in C farming as defining the baseline, which minimally takes 5 years of accurate SOC measurement, regular monitoring, and reporting of SOC, certification of sequestered soil C, and issuance of earned carbon C.

Certificates of participation and presentation were distributed at the end of each Technical Session. Certificates to the online presenters were sent via post a later date.

Day 2 – 08.02.2025

The second day of the Seminar began with **Plenary Session II,** where the panelists discussed topics that covered all the three broad objectives of the Seminar – SOC distribution, soil health, and economies and policies of C sequestration. The session was chaired by Prof. Goutam Kumar Ghosh, Professor & Head, Department of Soil Science & Agricultural Chemistry, Palli-Siksha Bhavana, Visva-Bharati, Santiniketan.

Dr. Anil Kumar, Principal Scientist (Retd.), ICAR-NBSS&LUP, Bangalore, gave an overview of *"Soil Organic Carbon Stocks and Sequestration Potential of Major Soils of India*". Dr. Kumar and his team measured the SOC stock of the *Kari, Kayal* and *Kole* ecosystems of Kerala. They reported high C sequestration potential in the *Kari* lands. They further concluded that the cumulative C sequestration potential of top 100 cm soils is high in agricultural lands.

Prof. Sudesh Yadav, Professor, School of Environmental Sciences, Jawaharlal Nehru University, New Delhi, delivered a talk on "*Metal and Soil Health in the Realm of Industrial Development and Urbanisation*". He mentioned that organic C is an extremely reactive component of soil that significantly influences the solubility, mobility, and bioavailability of metals. It favors retention, lower mobility, and bioavailability of metals in soil systems.

Prof. Amitava Rakshit, Professor, Department of Soil Science & Agricultural Chemistry, Institute of Agricultural Sciences, Banaras Hindu University gave an overview of *"Sustainable Agricultural Management through Carbon Neutrality: Small Holder's Experience"*. He emphasized the urgent need to initiate action to change the agricultural systems of India into climate-resilient systems. This can be achieved by applying C smart technologies and effective implementation of C farming through a comprehensive policy approach. According to Prof. Rakshit, the Indian Carbon Market offers a promising framework for small and marginal farmers.

Following the last talk of the Plenary Session, paper presentations of **Technical Session III** focused on "*Policy on Soil Carbon Sequestration & Agricultural Sustainability*". The session was chaired by Prof. Sanat Kumar Guchhait, Professor, Department of Geography, The University of Burdwan, West Bengal, and co-chaired by Dr. Sushil Kumar, Assistant Professor, Department of Environmental

Studies, Siksha-Bhavana, Visva-Bharati, Santiniketan. The session in-charge was Dr. Sumit Kumar, Assistant Professor, Department of Geography, Visva-Bharati, Santiniketan. Seven participants presented their papers (six in online mode and one offline) in this session, each presenter was given 20 minutes for presentation and interaction with the audience.

Debasish Sarkar emphasized the importance of accurate estimation of SOC for enhancing agricultural income and carbon trade.

Babita Kumari talked about the challenges faced in enhancing farm livelihoods in the Santhal Pargana division in Jharkhand. She mentioned that by integrating traditional knowledge with modern scientific techniques and ensuring active community participation, farm livelihood can be improved, and food security ensured in the region.

Jay Prakash Rajak, in his study on the Santals of Odisha, underscored that though agricultural modernization has enhanced the livelihood of the Santals, it has adversely affected the Santal people's village occupational structure, family, marriage, Kinship, indigenous knowledge, and land distribution pattern.

Shyamal Majee and Santosh Kumar Singh underscored the importance of soil C as a cornerstone for sustainable agricultural practices and rural development in resource-constrained regions like Purulia. They highlighted that strategic soil C management can transform the marginal lands of Purulia into more productive systems, addressing food security and improving the livelihoods of local farming communities.

Based on their two years of research, Manisha Rout and her team recommended that live mulch with cowpea up to 1st plucking in sweet corn for quality harvest while enabling implementations of ecological weed management practices for agricultural sustainability in the *Alfisols* of Odisha.

Anamika Pandey and Debnath Palit suggested that tree species *Ficusbenghalensis L.* and *Shorearobusta Gaertn.* should be used for afforestation projects, especially in the urban areas, not only to reduce air pollution levels but also as they have the highest capacity for sequestering C.

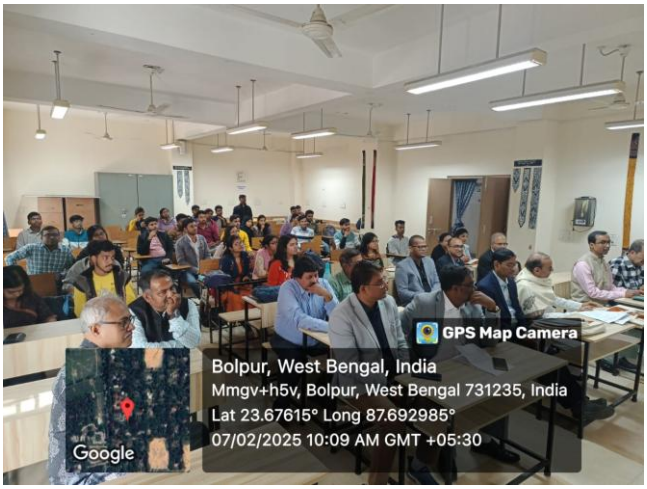
Riha Kumari, Shubham Abhishek, and Bhanu Pandey calculated the C sequestration potential of 75 tree species, of which *Eucalyptus tereticornis* resulted in a total carbon stock of 2011.42 t.

Certificates of participation and presentation were distributed at the end of each Technical Session. Certificates to the online presenters were sent via post a later date.

The **Valedictory Session** was chaired by Prof. Sanat Kumar Guchhait, Professor, Department of Geography, The University of Burdwan, West Bengal. The panelists of this session were Prof. Goutam Kumar Ghosh, Professor & Head, Department of Soil Science & Agricultural Chemistry, Palli-Siksha Bhavana, Visva-Bharati, Santiniketan, and Prof. S. Sreekesh, Professor, Centre for the Study of Regional Development, Jawaharlal Nehru University, New Delhi. Prof. Ghosh lucidly summarized the proceedings of the two-day Seminar. Prof. Sreekesh briefly shared a word of concern that needs to be addressed while adopting policies on agricultural sustainability, i.e. to ensure food security to an ever-growing population.

The Seminar ended with a vote of thanks delivered by the Convener-cum-Organizing Secretary.

Plate 1: Glimpses of Inaugural Session



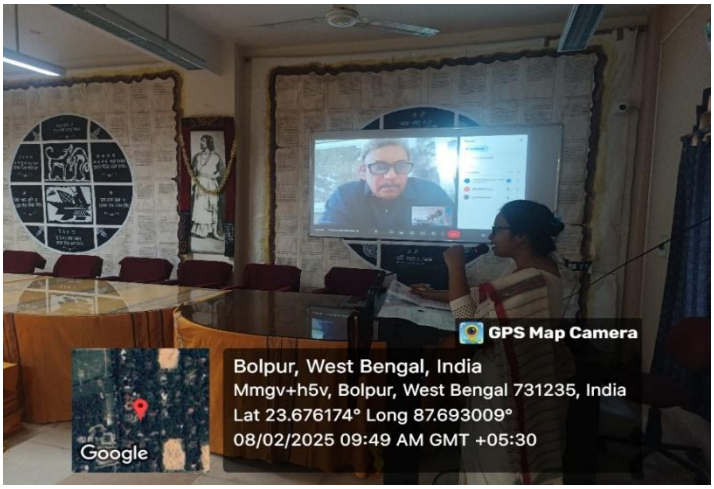
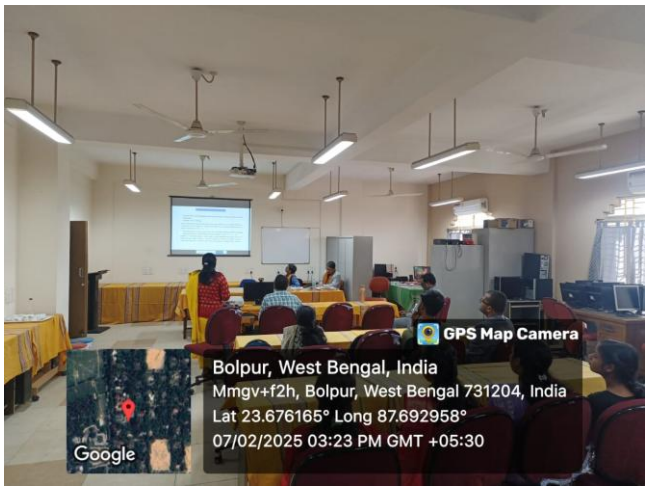
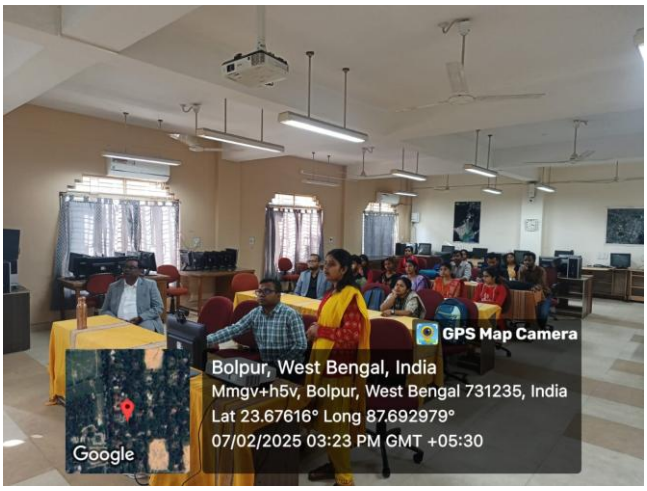


Plate 2: Glimpses of Plenary Sessions





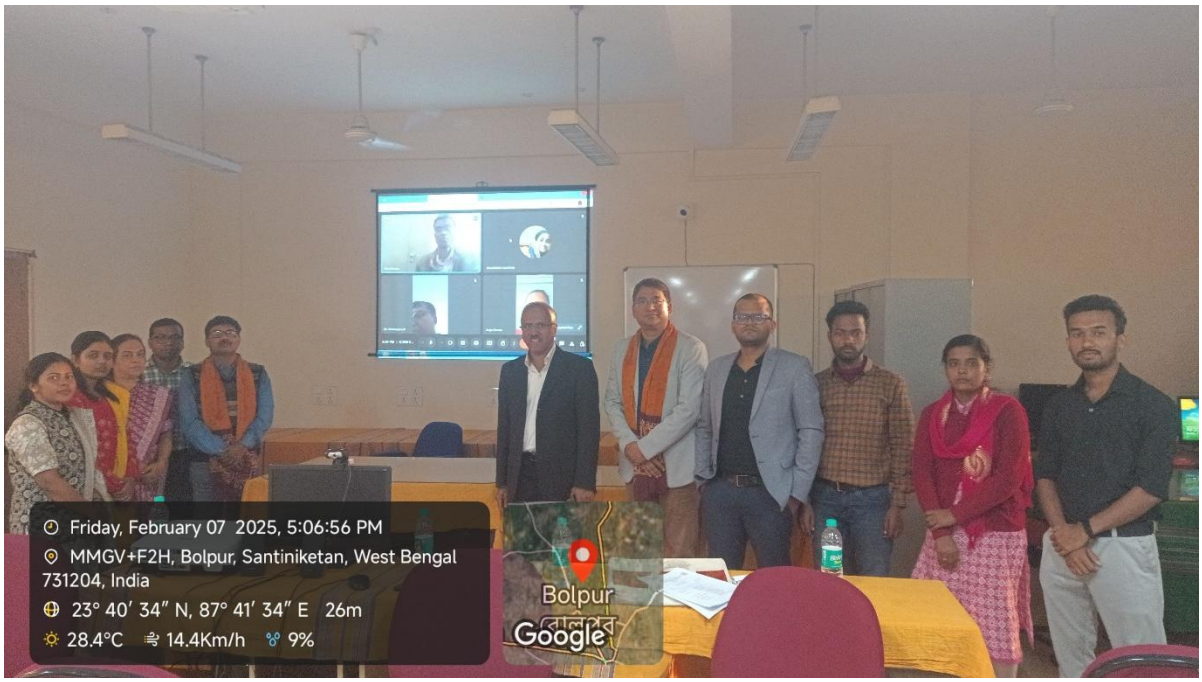
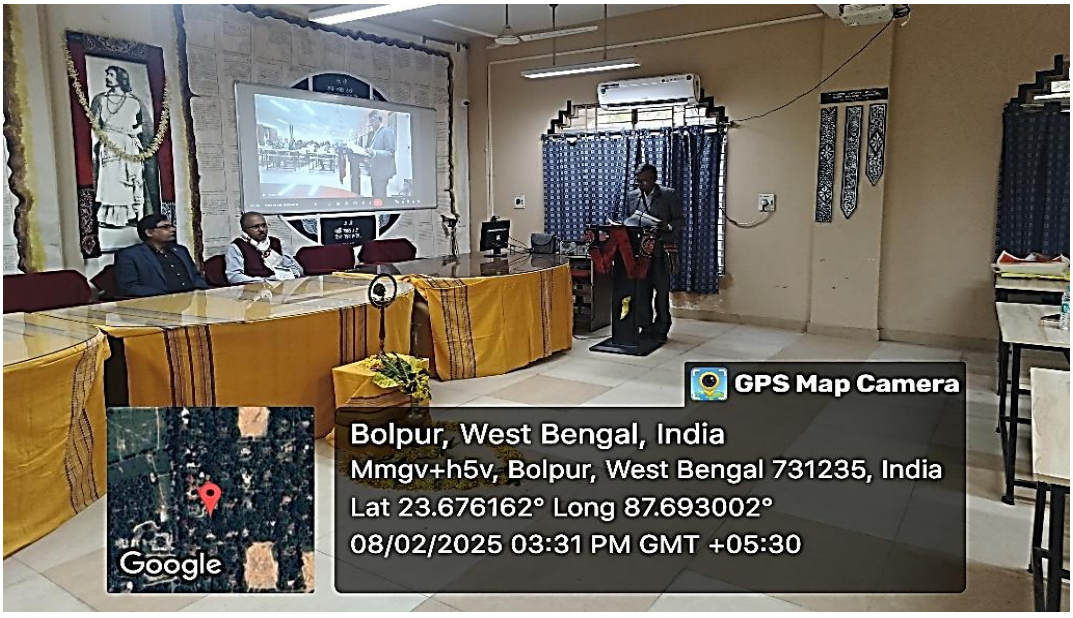


Plate 3: Glimpses of Technical Sessions



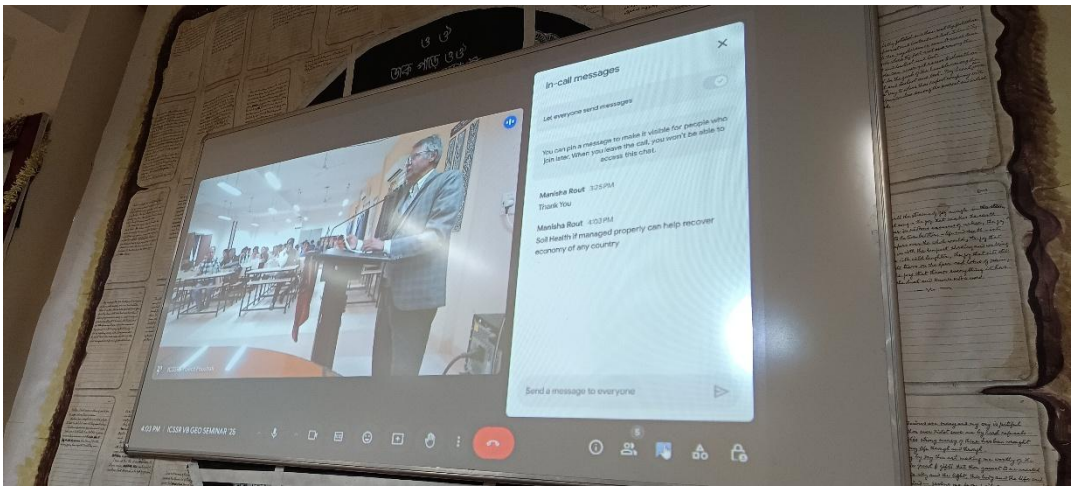


Plate 4: Glimpses of Valedictory Session

Plate 5: Miscellaneous