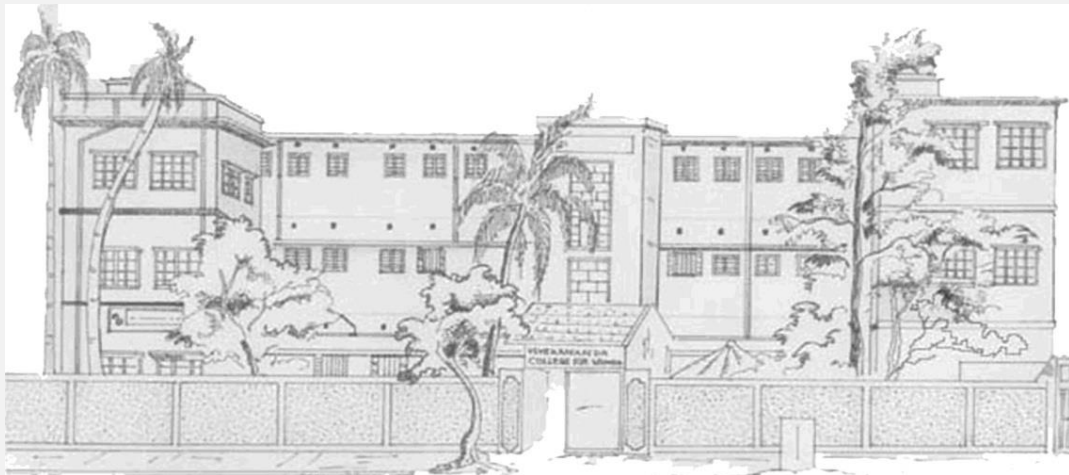


CRITERION NAME

3.2 Innovation Ecosystem

3.2.1 Institution has created an ecosystem for innovations and has initiatives for creation and transfer of knowledge



VIVEKANANDA COLLEGE FOR WOMEN

BARISHA, KOLKATA~700 008

Research and Publication

VIVEKANANDA COLLEGE FOR WOMEN
PLACE OF RESEARCH OF GEOGRAPHY
Affiliated to University of Calcutta
ESTABLISHED - 2012



**REPORT ON VISIT OF VIVEKANANDA COLLEGE FOR WOMEN, BARISHA, TO ASSESS
THE FEASIBILITY OF RECOGNISING IT AS CENTRE OF PHD-LEVEL RESEARCH IN
GEOGRAPHY BY THE UNIVERSITY OF CALCUTTA**

A team comprising of:

Prof. Uttam Bandyopadhyay, (Dean – Faculty of Science),
Prof. Ranjan Basu, (Convener – Ph.D. Committee of Geography)
Prof. Sunando Bandyopadhyay (Head – Department of Geography) and
Sri Amit Roy (Secretary – Faculty of Science)

visited the premises of the Vivekananda College for Women on 14 February 2012 to make a detail assessment of facilities available at the institution for advanced research on various aspects of Geography. The team also evaluated the space, equipment and other infrastructural facilities added by the College after another team of experts visited the college on 16 March 2009 for similar reasons and assessed whether all recommendations made by the team of experts at that time are complied with.

After careful inspection of all aspects including the fact that two teachers of the college have been recognised by the University as PhD supervisors, it is resolved that the Vivekananda College for Women, Barisha, has necessary infrastructure required for recognition ^{at} place of PhD-level research on Geography and hence, it may be granted permission to that effect by the University.

[*U. Bandyopadhyay*
22-02-2012]
Uttam Bandyopadhyay

[*Ranjan Basu*]
Ranjan Basu

[*Sunando Bandyopadhyay*]
Sunando Bandyopadhyay

[*Amit Roy*]
Amit Roy

Details of Supervisors

1. Dr. Soma Bhattacharya, Principal and Professor
2. Dr. Amitajyoti Bagchi, Associate Professor

VIVEKANANDA COLLEGE FOR WOMEN BARISHA, KOLKATA-8



Established 1961

Assessed and Accredited by NAAC in **B++ Grade**

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Ref.....

Date.....

Supervisor: Dr Soma Bhattacharya

SL	Name	JRF /SRF/ Part-time scholar	Date of Registration	Registratio n Number	Topic of Research	Status
1	Pranotosh Das Mandal	Part-time Scholar	16 th September 2016	6584/Ph.D. (Sc,)Procee d/2016	Slope Instability along Transport and Arterial Sector of Darjeeling Himalaya: A case of Kalimpong Subdivision, West Bengal	Awarde d (7.1.201 9)
2.	Balai Chandra Das	Part Time	25 th May 2007	1635/Ph.D(Arts.)proceed20 07	Changes and Deterioratio n of the Crouse of River Jalangi aand its Impact on the People Living on its Banks, Nadia, west Bengal	Awarde d (29.11.2 013)

3	Shambhunath Dinda	Part-time Scholar	15 th February 2017	1034/Ph.D(Arts.)Proceed/2017	Impact of anthropogenic activities on river channel configuration – A Case Study of Kolaghat Thermal Power Project, west Bengal, India	Awarded (7.1.2019)
4	Tanushree Dutta	Part-time Scholar	7 th June 2017	4087/Ph.D. (Sc.)Proceed/2017	Environmental Change and consequences of urban sprawl in the added areas of southern part of Kolkata	Awarded (4.6.2019)
5	Gargi Das	Part-time Scholar			Problems & Development of Reclaimed Sundarban a Case Study of Namkhana Development Block, South 24 Parganas, West Bengal	Awarded
6	Joy Rajbanshi	SRF	23 rd February 2017	1379/Ph.D. (Sc.)Proceed/2017	Assessment of Soil Erosion and Sediment Yield in the Konar Dam Catchment, Jharkhand	Submitted
7	Sudip Roy	Part-time scholar	10 th March 2017	1675/Ph.D(Sc.) Proceed/2017	Analysis of Geomorphological and Sedimentological	Submitted

					Characteristics of Matiali Geomorphic Surface to Establish Its Origin in the Dooars Region of West Bengal	
8	Ujwal Deep Saha	Part-time scholar	1st September, 2017	06077/Ph.D.(Sc.)Proceed/2017	Evolution of the Torsa River Course in West Bengal and Possible Future Changes	Submitted
9	Ramapada Sasmal	Part-time scholar	12 th April 2018	02560/Ph.D.(Sc.)Proceed/2018	A Study on Geomorphic Problems Influencing Land Cover and Land Use on Pleistocene Geomorphic Surface of Garubathan In West Bengal	Pre=Phd Submission
10	RiktaJoardar	Part-time scholar	17 th February 2015		Causes and Consequences of Waterlogging in the Southwestern part of KMC	
11	Amit Sarkar	Part-time scholar	14th January 2020	00242/Ph.D.(Sc.)Proceed/2020	An Assessment of post mining land reclamation for alternative land use practices: a study of Raniganj opencast mining area, West Bengal	
12	Nilanjana Biswas	Part-time scholar	14th January 2020	00244/Ph.D.(Sc.)Proceed/2020	Effect of Bank Line Shifting of River Ganga on Location and Relocation of Settlement in Malda District, West Bengal.	
13	Jit Biswas	Part-time scholar	15 th January 2020	00243/Ph.D.(Sc.)Proceed/2020	Evaluation of Regional Climate Models for Long Term Climate Projection of West Bengal of westbengal	

Sankharyee
Teacher-in-Charge
VIVEKANANDA COLLEGE FOR WOMEN

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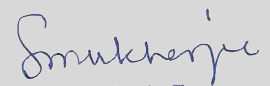
Ref.....

Date.....

Supervisor: Dr Amitajyoti Bagchi

SL	Name	JRF /SRF/ Part-time scholar	Date of Registrati on	Registratio nNumber	Topic of Research	Status
1	Madhumanjari Chakraborty	Part-time	27 th Septembe r 2017	07786/Ph. D.(Sc)Proce ed/2017	“Role of Microfinance in Empowerment of Women amongst urban poor in West Bengal.”	
2.	ChandanDatta	Part-time	23 rd Decembe r 2016	8741/Ph.D(Arts.)Proce ed/2016	“Man-Animal Conflicts Duars Region of West Bengal”	Awarded
3	Eman Banerjee	Part-time	28 th February 2020	01256/Ph. D(sc.) proceed/20 20	“Spatio- Temporal Variation of Crime Patterns in Selected Areas of West Bengal.”	
4	Piyali Kanji	Part-time	28 th February 2020	0124/Ph.D. (Sc.)Procee d/2020	“Changing Pattern of Life of Forest Fringe Population of Sundarban and Duars, West Bengal.”	

5	Deepshikha Mutsuddi	Part-time	9 th November 2020	03673/Ph. D(Sc.)Proceed/2020	“Role of Health Insurance Schemes in Health Security of South 24 Parganas District, West Bengal”	
6	Sangita Sengupta	Part-time	6 th August 2019	05685/Ph, D(Sc.)Proceed/2020	The changing pattern of indigenous healthcare practices of Rajbanshis in Koch Bihar district, West Bengal.	Awarded
7	Mitra Mondal	Part-time	2017	2022	“Problems and Prospects of Handloom Industry.”	
8	Priyanjana Guha	Part-time	1 st August 2022	06550/Ph. D.(Sc.) Proceed/2022	“Regional disparities among the selected growth centers of West Bengal.”	


 Teacher-in-Charge
 VIVEKANANDA COLLEGE FOR WOMEN

Publications of Research scholars of Geography Department

Eman Banerjee, Research Scholar

- *Spatio Variation of Different types of Crimes in West Bengal*, International Journal of Multidisciplinary Research and Development”,2020, Volume7, Issue 9, Volume7, Issue 9
- *Spatio-Temporal Analysis on Occurrence of Crimes in Districts of Jalpaiguri and Alipurduar*, West Bengal, International Journal of Research and Analytical Reviews, 2020, Volume7, Issue 2, E-ISSN: 2348-1269, P-ISSN 2349-5138
- *The Attitude of Student-Teachers on Using of Computer Assisted Instruction in Educational Programme for the D.El.Ed Course*, in the proceeding of International Conference for Teachers on “Globalizing Teacher Education-Agenda for Action”,2016, WBUTTEPA (India) Kumning University (China), ISBN: 81-89169-36-X
- *Attitude of the Teachers towards the Application of Teaching Skills in the Classroom Situation During the Elementary Teacher Education Programme through ODL System*, in the National Seminar on “Impact of Globalization on Teacher Education”, organized by Gangadharpur Sikshan Mandir and Ramakrishna Mission Sikshanamandira ,2016, ISBN: 978-81-925425-2-2
- *Attitude of Teacher educators towards Modern Instructional Strategies and Availability of Instructional Resources For Implementing Those Strategies in Secondary Teachers’ Training Institutes*, in the “Proceeding of National Seminar on Educational Research and Its Future Perspectives”, sponsored by Department of Higher Education, Govt. of West Bengal, organized by David Hare Training college,2015, (ISBN: 81-86966-88-9)

- *Comparative Study on Healthcare Facilities Produced by Government and Privately Owned Hospitals in Kolkata Municipal Corporation*, “Asian Journal of Multidisciplinary Studies”, 2013, Volume1, Issue 3, ISSN: 2321-8819
- *Nature of Vocational Training for Visually Impaired Students: A Case study on Vocational Training Centre for Women of Calcutta Blind School*, “Indian Streams Research Journal”,2013, Volume-3, Issue-9, ISSN 2230-7850
- *Variation in the Popularity of Surfing Academic and Social Networking Sites among the Higher Secondary Students in Howrah*, Golden Research Thoughts,2013, Volume-3, Issue-4, ISSN 2231-5063

Piyali Kanji, Research Scholar

- Published a joint paper with Dr. Amityojyoti Bagchi on *Joint Forest Management in West Bengal with special reference to Sunderban Tiger Reserve* ,Geographical review of India,2019 , National ISSN NO: 0375-6386,pp 294-308
- Published a joint paper with Dr. Amityojyoti Bagchi on *Disparity in health care services of Duars and Sundarbans of West Bengal: a comparative study* ,Knowledge: a multidisciplinary e-journal, vol. 2&3, 2017-18, ISSN: 2581-3471, pp 19-34
- Published a joint paper with Dr. Amityojyoti Bagchi on *Tiger Straying : An event of Man - Animal conflict in the Sunderban, West Bengal* ,Indian Journal of Landscape Systems and Ecological Studies. (ISSN No. 0971 - 4170), 2017,pp-60 – 68

Chandan Datta, Research Scholar

- Published a joint paper with Dr. Amityojyoti Bagch on *Environmental crime :Arisisng problem of Duars Region,West Bengal*, India, Journal of geography, Environment and earth science,International,2018,ISSN-255407352.

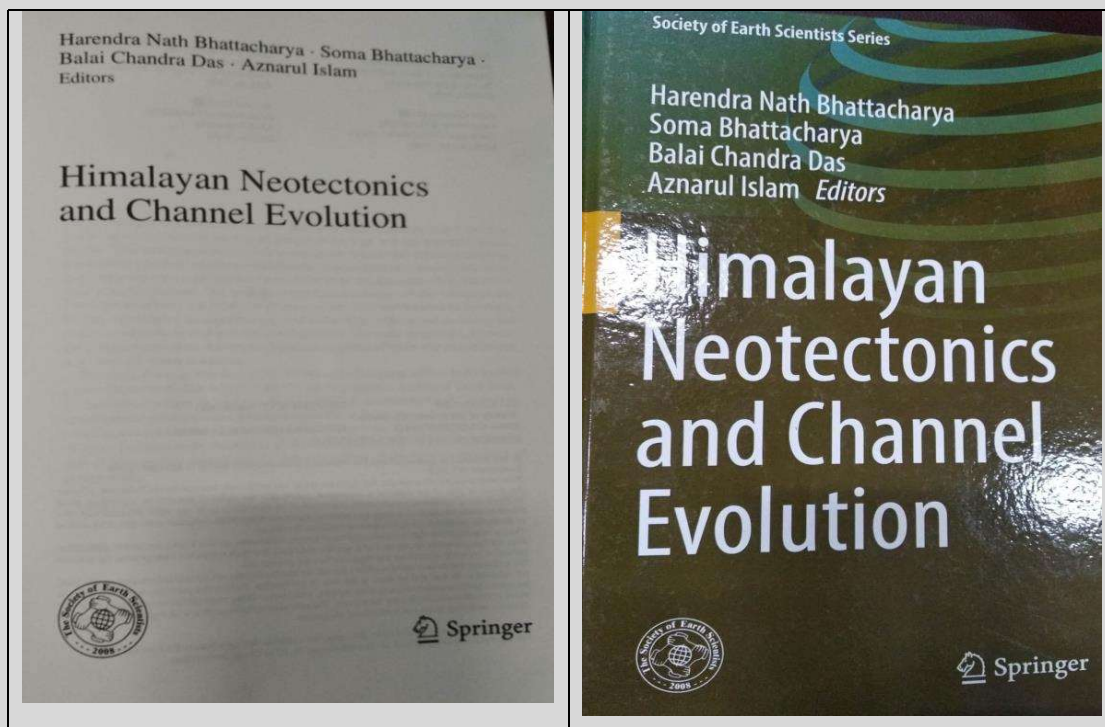
- *Human-wildlife interaction in tea tourism: The Doors in India*,Routledge Hand Book of Tea Tourism,ISSN No.2454-7352,2023
- *Wildlife Selfie Craze: A Case from India*,Social Science Research Network,2022
- *Socio-economic development indices for the forest villages in Buxa Tiger Reserve (west) in Duars, West Bengal, India*,International Journal of Research and Analytical Reviews (IJRAR),2018
- *Water Body Identification and Management in Hilly and Dense Forest Area Using Geoinformatics: A Way to Minimize the Man-Animal Conflicts in Buxa-Tiger Reserve*,Journal of the Indian National Cartographic Association (INCA),2017
- *Future Perspective of Tea-Tourism along with Existing Forest-Tourism in Duars, West Bengal, India*,Asian Review of Social Sciences,ISSN No.-2249-6319,2018
- *Assessment of riverine environment of small rivers at Jalpaiguri District, West Bengal, India*,Indian Journal of Power and River Valley Development,ISSN No.-0019-5537,2018
- *Selling of Tokay Gecko (Gecko Gecko): A money making business in forest-fringe area of Jalpaiguri District, West Bengal, India*,Research Journal of Humanities and Social science,ISSN no.0975-6795,2018
- *Quality of new born and child care: A vaccination facility assessment in rural Berhampore, Murshidabad, West Bengal, India*,International Journal of Applied Social Science,2018
- *A perspective on death of one-horned Rhinoceros (Rhinoceros unicornis) In Duars region of West Bengal, India*, International Journal of Recent Scientific Research,ISSN No-0976-3031,2018

- *Fire wood collection: a time consuming and risky work in the forest-fringe area of Garumara and Jaldapara National Park, Duars, West Bengal, India, International Journal of Innovative Knowledge Concepts, ISSN No-2454-2415, 2018*
- *School damage by elephant: an emerging problem in forest-fringe area of Duars region, West Bengal, India, Asian Journal of Multidimensional Research, ISSN No.2278-4853, 2018*
- *Rescue, rehabilitation and release of Indian rock python (python molurus) : a case study of Duars, Jalpaiguri district, West Bengal, India, ZENITH International Journal of Multidisciplinary Research, ISSN No-2231-5780, 2018*
- *Environmental Crime: A Rising Problem at Duars Region, West Bengal, India, Journal of Geography, Environment and Earth Science International, 2018*
- *Empowering the women-A way to strengthen the socio-economic condition of the tribal society: An inclusive study on Buxa Tiger Reserve, West Bengal, Violence, Violence against women in India, Vol-1, ISBN No- 9380247-76-2, 2017*
- *Analysing land use/land cover changes, prediction and fragmentation in Jaldapara-Buxa forest and its corridor, West Bengal, India, Using Geoinformatics, IJRASET, ISSN No.2321-9653, ISSN No.-0927-8392, 2017*

Nilanjana Biswas, Research Scholar

- *Facets of Anthropogenic Encroachment within the Palaeo-Fluvial Regime of Kana-Ghia-Kunti System, Damodar Fan Region, Anthropogeomorphology of Bhagirathi-Hooghly River System in India, CRC Press, ISBN 9780367557270, 2020.*
- *Urban sprawl and human intervention on environment: an indepth study on word no. 142 of Kolkata Municipal Corporation, Environmental Degradation and Disaster, Sponsored by Department of Geography, Cooch Behar College, ISBN 978-93-80736-25-9, 2016*

- *Population growth and economic emergence through household industry: a case study on Santoshpur under Maheshtala Municipality*, Socio-Economic Impact of Cottage and Small Scale Industries, Sponsored by Department of Raidighi College, ISBN: 978-93-83010-26-4, 2015
- *Assessment of the impact of anthropogenic stress on wetlands of upper Ganga Delta, India: A multi-criteria decision making approach*, Geocarto International, Taylor and Francis, Online ISSN: 1752-0762,2022
- *Published a joint paper with Dr. Soma Bhattacharya on Morphotectonic expression of the drainage basins and channel long profile forms on a selected part of Sikkim-Bhutan Himalayas, Neotectonic Movements and Channel Evolution in the Himalayas and Frontal Plains*, Springer Nature, Online ISBN 978-3-030-95435-2



Joy Rajbanshi, Research Scholar

- *Quantification of the effects of conservation practices on surface runoff and soil erosion in croplands and their trade-off: A meta-analysis*, Science of The Total Environment, Elsevier, ISSN 0048-9697, 2023
- *Surface Temperature Mapping to Assess Local Climate Zones: A Study using WUDAPT; Kolkata, The Colonial City in Transition: Reflections in Geographies of Urban India*, Routledge, India, ISBN 9781032020976, 2022
- *Planform changes and alterations of longitudinal connectivity caused by the 2019 flood event on the braided Brahmaputra River in Assam, India*, Geomorphology, Elsevier, ISSN 0169-555X, 2022
- *Responses of soil organic carbon to conservation practices including climate-smart agriculture in tropical and subtropical regions*, Responses of soil organic carbon to conservation practices including climate-smart agriculture in tropical and subtropical regions, Elsevier, ISSN 0048-9697, 2021
- *The variability and teleconnections of meteorological drought in the Indian summer monsoon season: Implications for staple crop production*, Journal of Hydrology, Elsevier, ISSN 0022-1694, 2021
- *Changes in carbon stocks and its economic valuation under a changing land use pattern—A multitemporal study in Konar catchment, India*, Land Degradation & Development, Wiley, ISSN 1085-3278, 2021, 2021
- *Monitoring land sensitivity to desertification using the ESAI approach and evaluation of the key indicators: A spatio-temporal study in India*, Land Degradation & Development, Wiley, ISSN 1085-3278, 2021

- *Published a joint paper with Dr. Soma Bhattacharya on Modelling the impact of climate change on soil erosion and sediment yield: a case study in a sub-tropical catchment, India, Modeling Earth Systems and Environment volume ,Springer,ISSN 2363-6211,2021*
- *Assessment of soil erosion, sediment yield and basin specific controlling factors using RUSLE-SDR and PLSR approach in Konar river basin, India,Journal of Civil and Environmental Engineering,Elsevier,ISSN 0022-1694,2020*
- *Estimation of Runoff Depth and Volume Using NRCS-CN Method in Konar Catchment (Jharkhand, India), IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT),Hilaris Publishers, ISSN 2165-784X,2016*
- *Rainfall Distribution and its Spatial and Temporal Variability Over Damodar Basin under Climate Change Scenario (1901-2002),IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT),International Organization of Scientific Research (IOSR),ISSN 2319-2402.2015*

Ujjal Deep Saha, Research Scholar

- *Assessment of the impact of anthropogenic stress on wetlands of upper Ganga Delta, India: A multi-criteria decision making approach, Geocarto International, Taylor and Francis, Online ISSN: 1752-0762, 2022*
- *Assessment of dam-induced changes in ecogeomorphologicalbehaviour and fluvial functionality in the Damodar River, West Bengal, India, Journal of Water Supply: Research and Technology-Aqua, The International Water Association, ISSN 2709-8028, 2022*
- *Published a joint paper with dr. Soma Bhattacharya on Morphotectonic expression of the drainage basins and channel long profile forms on a selected part of Sikkim-*

Bhutan Himalayas, Neotectonic Movements and Channel Evolution in the Himalayas and Frontal Plains, Springer Nature, Online ISBN 978-3-030-95435-2, 2022

- *Development of Dharala River course and its response to tectonic indentations-evidences from old data inventory, satellite images and sedimentary archives*, Neotectonic Movements and Channel Evolution in the Himalayas and Frontal Plains, Springer Nature, Online ISBN 978-3-030-95435-2, 2022
- *Characterizing the Trend of Channel Braiding of a Tropical Transboundary River using Spatial Growth Component Analysis and ARIMA Model*, Advances in Space Research, Elsevier, Online ISSN: 1879-1948, 2022
- *Assessing the surface and bottom river water quality for irrigation: A study of Damodar River, India*, International Journal of Energy and Water Resources, Springer Nature, 2022
- *Anthropogeomorphic Understanding of the Damodar Fan Delta, India*, Fluvial Systems in the Anthropocene; Process, Response and Modelling,, Springer Nature, eBook ISBN 978-3-031-11181-5, 2022
- *Quasi-equilibrium channel metamorphosis in planform of a subtropical river in India in post-dam period*, Catena, Elsevier, Online ISSN: 1872-6887, 2022
- *Published a joint paper with Dr. Soma Bhattacharya on Channel avulsion in the Torsa River course and its response to topographic and hydrological controls on the Himalayan Foreland Basin*, Journal of Earth System Sciences, Springer Nature, Electronic ISSN 0973-774X, 2021
- *Lithological and tectonic response on catchment characteristics of Rishi Khola, Sikkim, India*, Journal of Mountain Science, Springer Nature, Electronic ISSN 1993-0321, 2021
- *Can an annual flood induce changes in channel geomorphology?*, Natural Hazards, Springer Nature, Electronic ISSN 1573-0840, 2021

- *Facets of Anthropogenic Encroachment within the Palaeo-Fluvial Regime of Kana–Ghia–Kunti System, Damodar Fan Region, Anthropogeomorphology of Bhagirathi–Hooghly River System in India*, CRC Press, ISBN 9780367557270, 2020
- *Published a joint paper with Dr. Soma Bhattacharya on Application of multi-criteria decision making approach for ascertaining the avulsion potentiality of the Torsa River course*, Modeling Earth System and Environ, Springer Nature, Electronic ISSN 2363-6211,2020
- *Reconstructing the channel shifting pattern of the Torsa River on the Himalayan foreland basin over the last 250 years*, Bulletin of Geography Physical Geography Series,ISSN: 2080-7686, 2019
- *Comparison of Different Image Fusion Techniques for the Urban study: A Case Study on Kolkata Municipal Corporation Area (KMCA)*, Perspective of Inclusive Urbanism, Alphanumeric, 2018
- *Application of supervised enhancement techniques to identify the hypersaline tracts within the forest floor of Saptamukhi and Muriganga estuarine area, India*, West Bengal, Challenges of 21st century geography, R.K. Publication, 2017
- *Teesta Barrage Project – A Brief Review of Unattained Goals and Associated Changes*, International Journal of Science and Research, ISSN:2319-7064, 2016
- *Development of Channel Characteristics during Post-Avulsion Period - A Case Study on a Part of Torsa River*, West Bengal, Asian Journal of Research in Social Sciences and Humanities, ISSN: 2249-7315, 2016
- *A Study of river induced major hydro-geomorphic issues and associated problems in Torsa basin, West Bengal*, Geographical Review of India, ISSN : 0375-6386, 2016

Priyanjana Guha , Research scholar

- *An Assessment of the Mirik lake and the Local Neighbourhood –A dynamic Perception , Knowledge, A Multidisciplinary journal ,Vol 1, Issue 1, 2016*

Jit Biswas, Research Scholar

- *Future changes in monsoon extreme climate indices over the Sikkim Himalayas and West Bengal, Dynamics of Atmospheres and Oceans, Volume 101, Issue 101346, ISSN: 0377-0265, 2023*
- *Application of Human-biometeorological Comfort Conditions in Köppen-geiger Climate type for Different Cities of Gangetic West Bengal,Journal of Geography, Environment and Earth Science International,Volume 24, Issue 1, ISSN: 2454-7352, 2020*

Ramapada Sasmal, Research scholar

- *Controles of geotectonics on foothill alluvial geology; A case study of Gorubathan area, North Bengal, India,Bhabner Barnamala Controles of geotectonics on foothill alluvial geology; A case study of Gorubathan; pp-138-161,ISSN/ISBN No.978-93-81682-10-4,Aparna book distributers,2016, August*
- *Feminism & Feministic Geography,pp:111-124;Naribhabna: Atit-Bartaman-Bhabisyat,ISSN/ISBN No.978-93-81682-11-1,Aparna book distributers,2017, February*
- *Published a book named Bhugol Chintadharar Bikash,ISSN/ISBN No. 978-93-85150-99-9, 2017*
- *Prakritikdurjog o sundarbanernadibadherbhangan o rajniti, Samaj o Rajniti, ISSN/ISBN No. 2321-9947, 2021,Jun, p:67-73; v:1, n:8*

- Published a joint paper on *Dynamic nature of fan shape geometry of Garubathan surface under the controles of neotectonics*, Eastern Himalayan foothills, North Bengal, India, Online International Interdisciplinary Research Journal, ISSN/ISBN No. 2249-9598, 2021, August, p:37-48; v:11; n:7
- Published a book on *Chena Sundarbaner Achenabarnamala (Pratham Parba)*, ISSN/ISBN No. 978-81-950967-2-5, Tapati Publishers, 2021, January
- *Machh-kankraysundarbanerek achene jiban-jibika*, KisalaySundarban , ISSN/ISBN No. 78-93-93569-17-2 , Gang Chil , 2022, January p:72-89
- Published a joint paper with Dr. Soma Bhattacharya on *Identification of the relative active neo-tectonic variation in the chel basin based on morphometry and physical characteristics of the sedimentary facies, North Bengal, India.*, International Research Journal of Engeneering and Tectonology, ISSN/ISBN No. 3295-0072 (p)3295-0056 (e), p:2609-2629; v:9; Issue:6; 2022, June
- Accepted a joint paper for publication on *Lithofacies and Depositional Environments of the Garubathan Alluvial Fan, North Bengal, India*, Journal of the Geological Society of India, ISSN/ISBN No. 0016-7622 (p),0974-6889 (e), Springer

Amit Sarkar , Research scholar

- Published a joint paper on *GIS Based Assesment and Evaluation of the Environmental Impacts of Opencast Coal Mining in Raniganj Coalfield, West Bengal, India*, IOSR Journal of Environmental Science, Toxicology and food Technology, ISSN-2319-2399, Volume -10, Issue 12, Version II, Dec 2016 , pp:45-58

যাদবপুর বিশ্ববিদ্যালয়

FACULTY OF SCIENCE
DEPARTMENT OF MATHEMATICS



JADAVPUR UNIVERSITY
Kolkata - 700 032, India
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11th March 2023

TO WHOM IT MAY CONCERN

This is to certify that Dr. Santanu Bag of Department of Mathematics, Vivekananda College for Women, Barisha, Kolkata-700008 gave support to three candidates namely Pintu Bhunia, Kalidas Mondal and Aniket Bhanja for carrying Ph.D level research works during the period 2018-2021 in sustained manner.

Summary of the research work are given herewith.

1. P Bhunia, S Bag, K Paul, Numerical radius inequalities and its applications in estimation of zeros of polynomials; Linear Algebra and its Applications 573, 166-177.
2. S Bag, P Bhunia, K Paul, Bounds of numerical radius of bounded linear operator using A -luthge transform; Mathematical Inequalities & Applications 23 (3), 991-1004.
3. D Sam, K Paul, P Bhunia, S Bag, On the numerical index of polyhedral Banach spaces; Linear Algebra and its Applications 577, 121-133.
4. P Bhunia, S Bag, K Paul, Bounds for zeros of a polynomial using numerical radius of Hilbert space operators; Annals of Functional Analysis.
5. P Bhunia, S Bag, K Paul, Numerical radius inequalities of operator matrices with applications; Linear and Multilinear Algebra 69 (9), 1635-1644.
6. P Bhunia, A Bhanja, S Bag, K Paul, Bounds for the Davis-Wielandt radius of bounded linear operators; Annals of Functional Analysis.
7. P Bhunia, S Bag, K Paul, Bounds for eigenvalues of the adjacency matrix of a graph; Journal of Interdisciplinary Mathematics 22 (4), 415-431.
8. P Bhunia, S Bag, RK Nayak, K Paul, Estimations of zeros of a polynomial using numerical radius inequalities; Kyungpook Mathematical Journal.
9. K Mandal, A Bhanja, S Bag, K Paul, On the numerical range of operators on some special Banach spaces - arXiv preprint arXiv:2005.01288, 2020.

Professor Kallol Paul
Department of Mathematics
Jadavpur University
Kolkata 700032
INDIA

Teacher-in-Charge
VIVEKANANDA COLLEGE FOR WOMEN

LIST OF DISSERTATION

LIST DISSERTATION COPY

Batch- I, 2011

Sl. No.	SUBJECT	Name of Guide
1	Role of Thermal Power Plant in Regional Planning and Fly Ash Management	D.B
2	Growth and Development of Falta SEZ and its Impact on Surrounding area	
3	Role of Public Health Care System on the Population of Selected Wards of Borough XIV	
4	A Comparison Between Upper Class Residents and Slum Dwellers Selected Wards of Borough X	
5	The Problems of Public Distribution System in Mahestala Municipality and its Role in Poverty Alleviation	B.M
6	The Problems of Solid waste Management in Kolkata Municipal Corporation, Borough XIII and XIV	
7	Challenges and Opportunities of Primary Education (I-IV) in Falta block(Could not found)	
8	Financial Inclusion in Banking Sector of rural West Bengal, Problems to Reach the Target Group	
9	A Projection on Kolkata Metro Railway: Present and Future	R.J
10	Problems and Future of Kolkata Tramways	
11	RAINWATER DISTRESS AT BEHALA: CAUSES AND REMEDIES(Could not found)	
11	Critical Analysis of Shyambazar Traffic Intersection Area , Kolkata	
12	Dalhousie Square : The Central Business District In Declination	A.B
13	Socio - Economic Scenario after AILA in Raypur mouza, Sandeshkhali -1	
14	A Probe into Degeneration of Tolly's Nullah	
15	Unplanned Growth of urban Settlement of Baranagar Municipality	
16	Influence of Telecommunication Network on Balanced Regional Development of Kolkata: Jadavpur Unit	T.D
17	Transportation Problem of Diamond Harbour Road, Taratala to Thakurpukur(Could not found)	
18	An account of Pottery Industry and Related Problems of Ghurni, Krishnanagar	
19	Socio - Economic Condition of slum Population of Kolkata: Case Study on Dhawan Colony & Nabapally Lohar Pole	

20	Growth and Development of Jaynagar Majilpur Municipality	R.G
21	A Comprehensive Study of Disparity Between Slum and Upper Class Population	
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 Teacher-in-Charge
 VIVEKANANDA COLLEGE FOR WOMEN



Review of Literature



**A Study on
Impact of Opencast Mining on
Environment:
Case Study: Sonapur Bazari,
Raniganj Coalfield**



**Postgraduate Department of Geography
VIVEKANANDA COLLEGE FOR WOMEN
Affiliated to University of Calcutta
Roll No. 543/GEO/191228
Registration No. 543-1221-0296-16**

**A Study on
Impact of Opencast
Mining on Environment:
Case Study: Sonapur
Bazari, Raniganj Coalfield**

A DISSERTATION BY: RUPIN SAMANTA

M. Sc. (Geography), 4th Semester, 2021

Environmental Geography Special Paper

Roll No. 543/GEO/191228

Registration No. 543-1221-0296-16

UNDER THE GUIDANCE OF RIKTA JOARDAR

Head of the Department of Geography

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Rikta Joardar

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IMPACT OF OPENCAST MINING ON ENVIRONMENT: CASE STUDY: SONEPUR

BAZARI, RANIGANJ COALFIELD

Chapter 1: Prologue

1.1: Backdrop of the Study

Since the beginning of human society mining activity has been of immense importance. Minerals have a worthy contribution to the development of human civilization since the Stone Age. The mining industry has a direct impact on the macro-economy by improving infrastructure, increasing employment, developing rural communities and enabling new spin-offs and downstream businesses. The prospering economy of India is supported with abundant reserves of coal. The coal mining sector in India contributed approximately 2.3 percent to the Gross Domestic Product (GDP) .

Coal being the single largest fuel source for the generation of electricity worldwide, fulfils about 63% of the electricity demand in India (Tripathi et al., 2015). Studies reveal the prospects of future improvement in Indian coal market. The country's coal production shows an increase from 431 Metric Ton in 2006- 07 to 554 Metric Ton in 2011-12 (an increase of 28.5%) (ICC, 2012).

Historically, coal mining in India started in **Raniganj** area of the then Bengal and was executed with the main target towards the mining **benefits** and with little consideration towards the **environment, local community or development** (ISID, 2012). Nevertheless, the coal extraction in the area has contributed the varying degrees of social footprints via environmental degradation, human health impacts, and social displacement, even beyond the physical boundaries of individual mining leases. Further, the mining footprint has been enhanced substantially due to in situ beneficiation and long distance transportation of the mineral over this geographically large area. This proves that no mining can be entirely free of all negative impacts and an all-round performance of coal mining sector from environmental and health perspectives is the need of the hour to be properly addressed in the country (Singh and Tripathi, 2009; ERM, 2011).

In recent years, the environmental and social impacts of coal mine operations in

India have been of great concern. The remedial and mitigation measures are the responsibility of coal mine managers and environmentalists. It is very important to consider the social impacts of coal mining activities on the surrounding socio-economic environment, and affected individuals. The present study highlights the general impacts of mining operations on **environmental and society and their scientific remedial measures**. The study also undertakes deep concerns to analyse **environmental management plans** to address the **environmental and social impacts of mining** in India. The mine of Raniganj area in the western part of the West Bengal are taken into consideration for detailed study.

The surrounding environment (both physical and socioeconomic) is influenced due to different technologies and methods of extraction of coal i.e. **Opencast and Underground**. Therefore, effects of Opencast coal mining on physical, economic, social and cultural environment of Raniganj coal belt area of Barddhaman District of West Bengal have been taken into consideration for the present study. In order to study the overall degradation, the best way is to study some **selective coal mines** as specific study, and for the present purpose samples of collieries are selected from the coal belt to study them in their totality.

Selection of Study Area:

One of the most important coalfields in India as well as in West Bengal, namely *Raniganj* coalfield, has been selected for this study. The *Raniganj* coalfield, bounded by latitudes 23°35'N to 23° 55'N and longitudes 86° 45'E to 87° 20'E, is the most important coalfield in West Bengal (Paschim Barddhaman District), and lies in the *Damodar* valley region surrounded by the *Durgapur-Asansol* Industrial belt.

2 ***Sonepur-Bazari Open Cast Project (OCP)*** is located in North-eastern part of Raniganj coal-belt in Barddhaman District of West Bengal bounded between latitudes 23°39'58.62" N and 23°42'37.25"N and longitude from 87°12'01.55"E to 87°16'31.66"E. The mining lease area of Sonepur-Bazari is 2293.98 ha. Twenty-six major coal mines of ECL viz. Jhanjhra, Tilaboni, Madhabpur, Madhaipur, Nakrakonda, Goenka-kajora, Kumardihi, Shankarpur, Bankola, Siduli, Jambad, Chora, Bansra, Kottadih, Pandaveswar, Sarpi, Toposi, Kunustoria, Belbaid-kajora, Khas-kajora, Madhusudanpur, Madujore, Khandra,

Lachhipur and Amrasota are registered and fall within its 10km. buffer zone all around the periphery of the Sonapur – Bazari area (Fig no: 1.2.1 -1.2.4).

LOCATION OF STUDY AREA

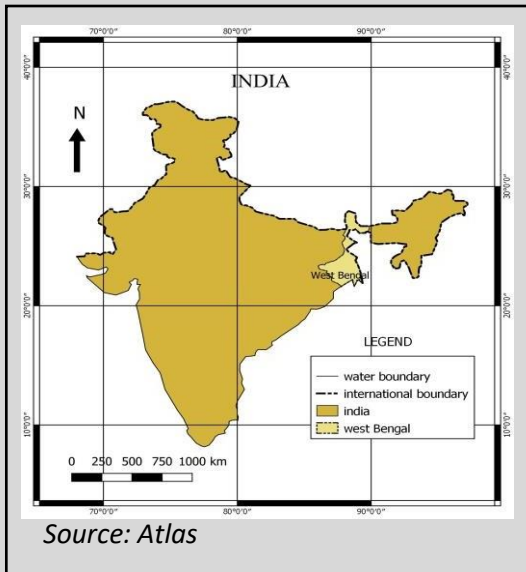


Fig 1.2.1: India

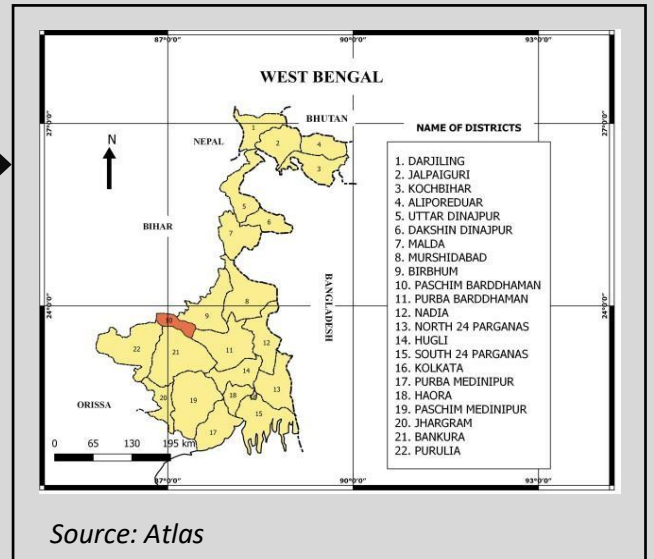
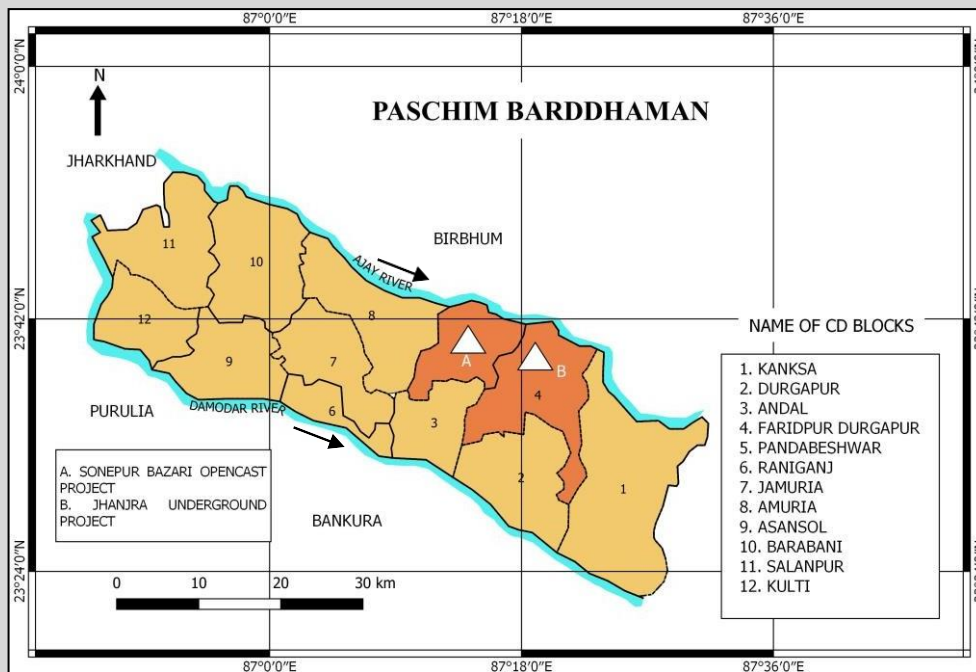


Fig 1.2.2: District map of West Bengal



Source: Google maps

Fig 1.2.3: CD blocks of Paschim Bardhaman

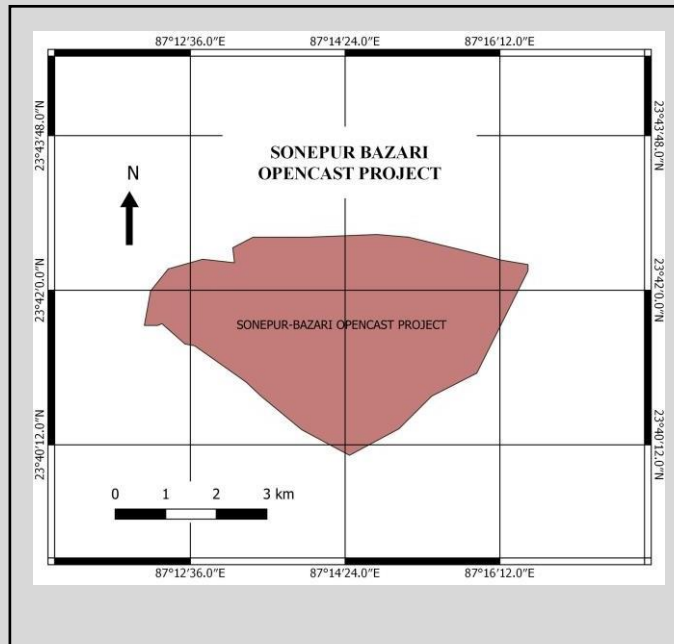


Fig 1.2.4 Sonepur Bazari Opencast Project

Objectives:

The principal objective of this research is to highlight and reveal the overall impact of coal mining on serene physical environment and their subsequent impact on economic, social and cultural aspects in the area concerned, the workers employed in mines and the peoples residing in nearby villages. In relation to the problems ascertained, the following objectives of the study can be formulated for analysis:

- To study the impacts of OCP on physical environment including land cover. (Air quality. water table and water quality, noise and vibration from mining activities.)
- To study the impact on socio-economic environment including land use of the area.
- To recommend compatible, resilient and environment friendly mitigation measures for a sustainable environment encompassing physical and socio-economic components.

Data base:

Database of the study is depending entirely on secondary data source. Primary field survey is impossible due to onset of Covid-19 pandemic condition. Secondary data base has been taken from official websites of Eastern Coalfields Limited, Sonepur-

Bazari area, Central Mine Planning and Design Institute, West Bengal Pollution Control Board, Environment and Forest Department, ECL, India Meteorological Department and Census of India, 2001 and 2011. Shodhganga Repository also acts as a major source of information.

Various websites of different organizations and their publications, e-journals, research papers and articles provide important data as well as information. Also some e-newspapers helped by providing valuable information to complete the report. Satellite imagery of the corresponding area and toposheets 73M/2 and 73M/6 are also important sources of information.

Several newspaper reporting and blogs, you tube videos containing wide coverage of visual expression of the study area and interviews with the local people also act as an authentic source of information. Land use and land cover map is prepared based on the images retrieved from the Google Earth using the latitude and longitude of the study area.

Methods:

The methods applied in this study include the description of the study area, information collected from appropriate authority.

The following maps of the study area and its surroundings have been acquired from different web sources:

- Survey of India (SOI) Topographical sheet No.73 M/2 and 73 M/6
- Google Earth imagery
- Map of Raniganj coalfield,
- Map of Sonapur-Bazari Opencast Project,

The methodological approaches of the study is severely disrupted due to onset of pandemic situation. Field study has not been conducted. Therefore, the study has been basically based on secondary source of information.

In order to pursue the study, a three-stage study approach has been used. The objectives or deliverables for each stage of the study are mentioned below:

Stage	Methodology
First Stage	<ul style="list-style-type: none"> • Collection of secondary level data and information from Shodhganga repository, websites of Eastern Coalfields Limited, Sonapur-Bazari area, Central Mine Planning and Design Institute, West Bengal Pollution Control Board, Environment and Forest Department, ECL, Census, IMD records, WPCB reports and other reports, literature, maps, imageries etc. • Preparation of location maps. • Account of Study of Literature. • Account of general environ of the study area.
Second Stage	<ul style="list-style-type: none"> • Initialization of the design methodologies using <ol style="list-style-type: none"> 1. various GIS software, 2. statistical approaches and 3. cartographic techniques in MS Excel 2019. • Analysis of the information and data collected at the first stage of the study.
Third Stage	<ul style="list-style-type: none"> • Documentation of the collected information. • Final evaluation and editing as required. • Final creation of content.

Problems Faced During the Study:

In course of study on the enforcement of the theme, some obstacles are posed as serious problems:

- In recent Covid-19 pandemic situation field study is not possible; so there is a first-hand knowledge gap in course of preparation of the report.
- Primary survey has not been done due to pandemic condition; so primary data collection is not possible at the time of preparation of the report.
- In many cases, secondary data sources are not enough to prepare the report.
- There are so many secondary data sources which are not accessible without paid subscription.
- Maps and other documents regarding study area are not available in websites.

- There is a trouble in getting location specific recent data from ECL and WBPCB websites.
- Overall inferences are influenced by the works done by predecessors.



Plate no. 1.1 Office of General Manager, Sonapur Bazari Area

Chapter 2: Literature Survey

A systematic literature search has been chosen for their coverage of the issue of *Impact of Mining on Environment: Case Study: Sonepur Bazari, Raniganj Coalfield* which drew attention from experts and agencies of national and international arena.

Between April 2021 and June 2021, the surveyor executed wide web searches. Search results were imported into the hard drive of the computer as well as in the reference note books. The surveyor wrote a brief description of important articles and, where appropriate, identified any new references cited that may be relevant to this report (see Reference).

There are several literatures on general problem of ecology and environment. Evolution of ideas on Environmental issues, challenges and management are highlighted in the literatures on applied environmental studies, which mainly stress on man's role in environmental degradation through extensive use of fossil fuel.

1. The Environmental Impact of Mining in the State of São Paulo, Andréa Mechi e Djalma Luiz Sanches (2010) shows impacts can be detrimental for the equilibrium of ecosystems, such as the reduction or destruction of habitat, chasing off of animal life, death of species of animals and ground and water vegetation, eventually including putting species under risk of extinction, interruption of genetic flow, and movement of biota, among others. In relation to the anthropic environment, mining could cause not only environmental discomfort but also impact on health due to sound pollution, pollution of the air, water and from the soil.

2. Guidebook for Evaluating Mining Project EIAs Environmental Law Alliance Worldwide (ELAW), (2010) discusses environmental and social impacts of mining. Impacts on water resources, water quality and availability are the key questions. The potential for acid mine drainage will determine whether a proposed mining project is environmentally acceptable.

3. Evaluation of Environmental Hazards in the Eastern Coalfields of Raniganj, West Bengal: Mukherjee, S (2012) focuses to evaluate the

environmental hazards in the Eastern Coalfields of Raniganj with a description of major mining hazards of the study area which have caused major environmental impact - land subsidence, mine fire, spontaneous combustion of coal, mine waste dump, acid drainage, groundwater shortage, pollution from dust particles, trace metal toxicity in soils, deforestation, social-cultural problems and health problems

4. Mining and its Impact on Environment with special reference to India:

Haq, S (2013) presents the assessment of environmental impacts of overburden such as visual (aesthetics, landscape), soil erosion, ecological disruption, air and water pollution, safety, risk and health etc. Economic valuation aspects of environmental impacts of overburden are also briefly described.

5. Impact of Coal Mining on Environment A Study of Raniganj and

Jharia Coal Field in India: Goswami, S. (2015) throws light on the burning issues of coal mines and its impact on the environment. Coal mining is usually associated with the degradation of natural resources and the destruction of habitat. This causes invasive species to occupy the area, thus posing a threat to biodiversity. Huge quantities of waste material are produced by several mining activities in the coal mining region. If proper care is not taken for waste disposal, mining will degrade the surrounding environment. The method of waste disposal affects land, water and air and in turns the quality of life of the people in the adjacent areas.

6. Economic and Socio-Cultural Impact of Mining- A Case Study of The

Raniganj Coal-Belt, West Bengal: Mourya, S (2016) analyses the impact of opencast mining. It is always associated with severe environmental degradation in comparison to underground mining. The operations like drilling, blasting, crushing and other related activities are invariably damaging the natural environment, which obviously re-locate and re-orient the existing socio- economic status to an unprecedented degree. The increase in demand of coal results an accelerating rate in coal extraction and consequently, it faces significant and mounting environmental and social challenges. The problem of mining-induced displacement and resettlement poses major risks to economic and societal sustainability.

7. Environmental and Social Impacts of Mining and their Mitigation: Singh, S. Raj (2016) highlights the general impacts of mining operations on environmental and society and their scientific remedial measures. In recent years, the environmental and social impacts of mine operations in India have been of great concern.

8. Characterization of PM_{2.5} generated from opencast coal mining operations: A case study of Sonepur Bazari Opencast Project of India: Gautam, S & Others (2016) aims at health hazards due to airborne pollution resulted from opencast mining of Sonepur Bazari Opencast Project. Opencast coal mines, a major source of airborne particulate matter (PM), is widespread in the area. The health impacts are primarily associated with the concentration and composition of the PM inhaled.

9. GIS Based Assessment and Evaluation of the Environmental Impacts of Opencast Coal Mining in Raniganj Coalfield, West Bengal, India: Sarkar, A & Bhattacharya, S (2016) compares the tension between the environmental loss and the profitability of opencast

10. Socio Economic Impact Study of Mining and Mining Policies on the Livelihoods of Local Population in the Vindhyan Region of Uttar Pradesh: Dubey, K (2017) states the impacts of mining and mines upon natural ecosystems, biodiversity and tribal livelihoods. These have become a key environmental concern and source of conflict and socioeconomic tension in Uttar Pradesh. Mineral extraction, has disproportionately affected forest ecosystems and the surrounding environment and consequentially, the tribals as well as the forest dwelling populations too. However, the mining and mineral sectors are perceived to have failed to alleviate poverty for these vulnerable populations around the forest areas

11. Geotourism potential of coal mines: An appraisal of Sonepur-Bazari open cast project, India: Ghosh, P and Singh, R (2021) shows that many attributes in this mine can be projected as geotourism assets. Human-made landscapes resembling mountains and valleys, different stages of the succession of plant species on the dumping grounds, fossils, mining activities through different types of

machinery could be designed to encourage visitation. The analysis has revealed that with planned execution of the idea through protection and preservation of geotourism attractions, the establishment of basic tourism infrastructure, proper advertisement and promotion of the site, the successful development of mining geotourism is possible

Chapter 3: Environs of the Study Area

: Location The study area is a part of Raniganj Coalfield. **Sonpur** and **Bazari** are two villages that have lent their name to the **Sonpur-Bazari** open cast coal mines project in the Pandabeswar CD block in the Durgapur subdivision of the Paschim Bardhaman district in the state of West Bengal, India. National Highway 14 (old number NH 60) passes in between the Sonpur and Bazari villages and near the OCP. The closest railway station is at Pandabeswar. The mine is located in Eastern Part of Raniganj Coalfields in the district of Burdwan, West Bengal, Mine Location 14 km away from G. T. Road, 30 km away from Asansol Railway Station, 35 km away from Durgapur Railway Station. The nearest airport is Kazi Nazrul Islam Airport.

Sonepur-Bazari Open Cast Project (OCP) is located in North-eastern part of Raniganj coal-belt in Paschim Bardhaman District of West Bengal bounded between latitudes 23°39'58.62 N and 23°42'37.25N latitudes and 87°12'01.55"E to 87°16'31.66"E longitudes as shown in fig 1.2.4. The mining lease area of Sonepur-Bazari is 2293.98 ha. Twenty-six major coal mines of ECL including Jhanjra fall within its 10km. buffer zone all around the periphery of the Sonepur – Bazari area.

Physical Attributes:

Geology: The Raniganj Coalfield is the easternmost depository within the Damodar Basin, which is semi-elliptical, elongated in shape. The Damodar Basin is covered by Gondwana sediments in E-W trending linear belt (Gee 1932). The Gondwana have been sub-divided into a two-fold classification – the Upper Gondwana and the Lower Gondwana with an unconformity in between. It is the Lower Gondwana with its Barakar and Raniganj

Formations which have given India most of its coal reserves. The study area is present and coal bearing in the Raniganj Coalfield (*Fig 3.2.1*).

The following table shows the GSI framed general stratigraphic sequence of formations of Raniganj Coalfield.

Table No 3.2.1: Stratigraphic Sequence of Raniganj Coalfields (after GSI)

Age	Formation	Maximum Thickness (m)	Description of Strata
Recent, Sub- Recent to Quaternary			Alluvium & sandy soil, laterite, lateritic gravel, clays and sand
Unconformity			
Jurassic	Igneous intrusive		Dolerite dykes, mica-peridotite and Lamprophyre dykes and sills
Upper Triassic	Supra-Panchet	305	Coarse grained red, yellow and grey sandstones and quartzitic conglomerates with bands of dark grey shale
Unconformity			
Lower Triassic	Panchet	610	Coarse grained yellow & grey, soft, micaceous false-bedded sandstones with thick red clays, khaki green shales and sandstones at the base
Upper Permian	Raniganj	1035	Fine to medium grained grey & greenish sandstone, variety of siltstone, shales and coal seams
Middle Permian	Barren Measures	365	Carbonaceous shale with occasional bands of sandy, micaceous shales and numerous of clay ironstone.
Lower Permian	Barakar	640	Coarse grained white and grey arkosic to sub-arkosic sandstone, conglomerate, shale and coal.
Upper Carboniferous	Talcher	275	Coarse-grained sandstone, white or slightly variegated, green shales and fine-grained sandstone with undecomposed feldspar and a boulder bed at the base.
Unconformity			

Archean	Archaean	Granites, gneisses and schists
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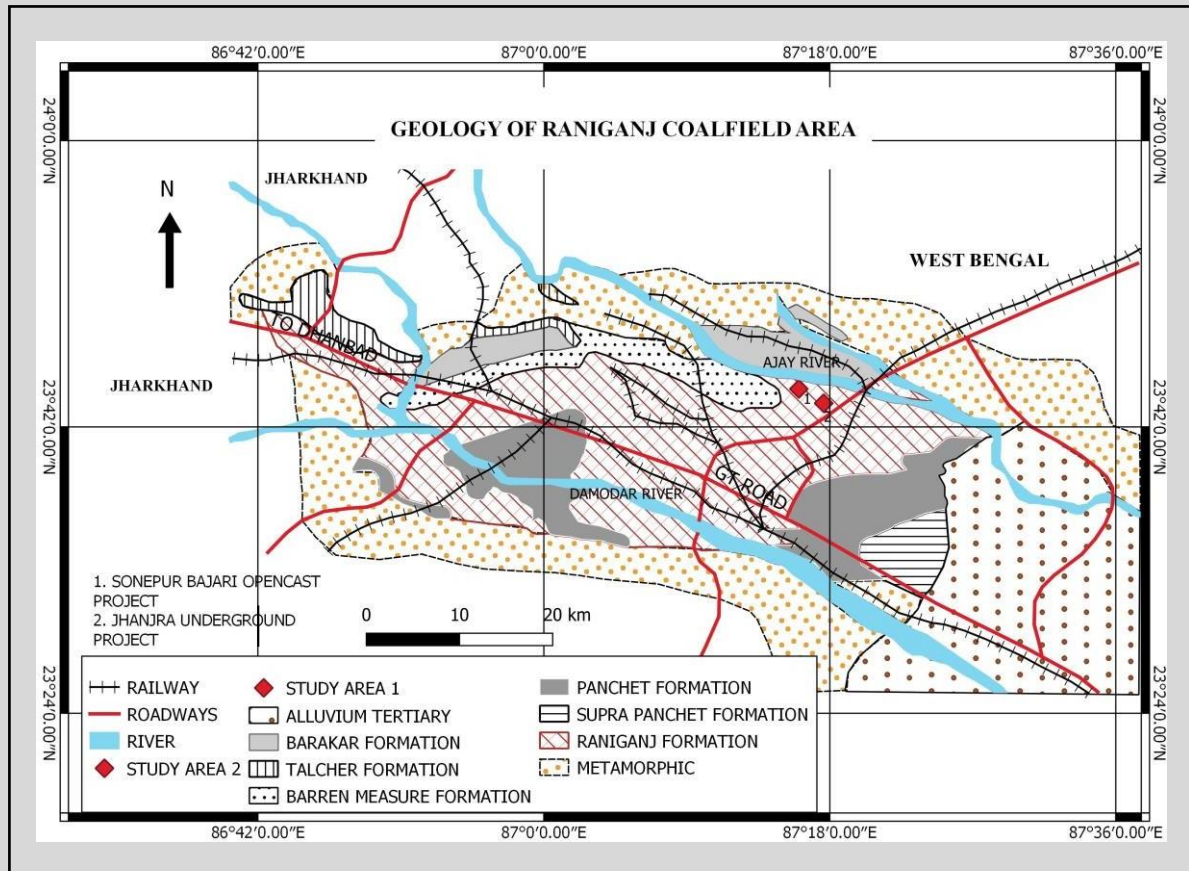


Fig 3.2.1: Geology of Raniganj Coalfield

Source: CMPDI

The micro study area (Sonepur Bazari OCP) are covered by the Raniganj measures. The coalfield is traversed by a network of faults and the NW-SE trending traverse fault system represents the major lineaments. A couple of such faults (along the northeastern part) which more or less follow the Ajay river, having their down throw towards northeast, appear to be responsible for preservation of the Trans-Ajay strip of Damuda sediments.

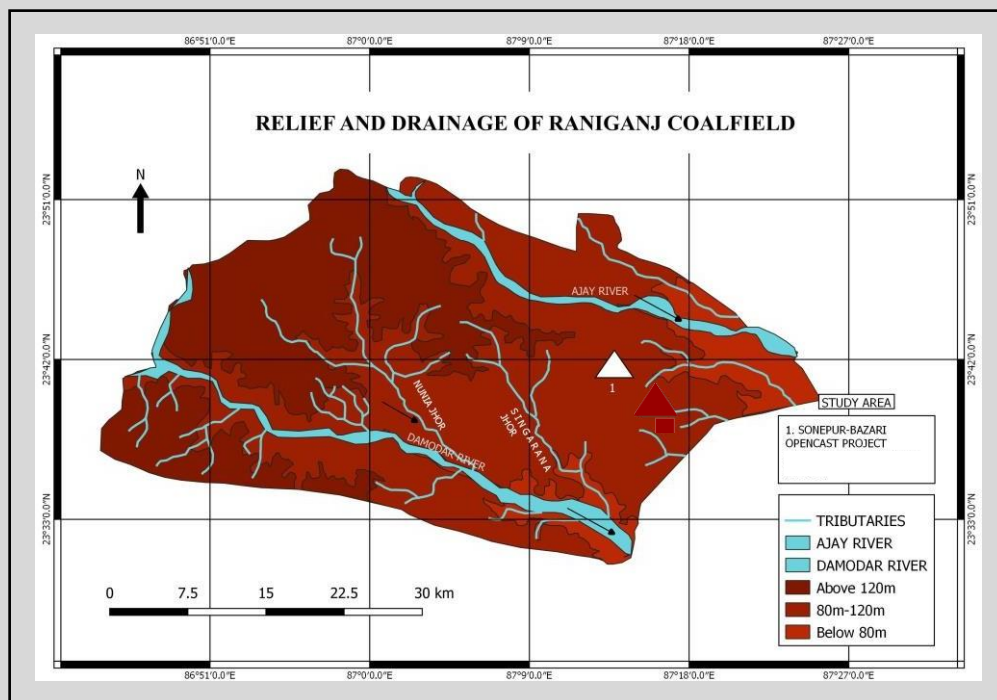
The major disturbances in the Raniganj coalfield resulted from tectonic displacement of the normal type developed due to accommodation of tensional stresses. Local folding also accompanied these disturbances.

Physiography and Drainage: The Raniganj Coalfield is a part of the eastern margin of the Chhotanagpur plateau and it resembles a outcrop

extending out from western plateau region. The main physical divisions are: (1) Western plateau and plateau fringe, (2) Central Uplands, (3) Central rolling plains, (4) Eastern low alluvial plains.

- 4 The study area is an amalgamation of barren, bare rolling plains with scattered hillocks and riverine aggregates of Ajoy and the Damodar rivers. Broadly speaking, the area forms the major part of the convex upland tract of Ajay-Damodar interfluve. The average altitude being 150 meters. The surface gradient of this part is westerly towards the west, northerly towards the Ajay and southerly towards the Damodar (Peterson, 1910).
- 5 Slope and relief variations have control over the horizontal movement of surface and ground water as well as primary slope of the district is from west to east.
- 6 The drainage in the entire Raniganj Coalfield and the adjoining areas is controlled by the parallel flowing Ajay river (running along the northern part of the coalfield) and the Damodar river (running along the southern part of the coalfield) . North-western margin of the coalfield is approximately marked by the north-south flowing river Barakar. The drainage pattern of the area is dendritic in nature. The Damodar was the carriage way of transporting coal to Kolkata before the construction of the railways. All small first order non-perennial drainage channels in the Raniganj coalfield is known as Jhor.
- 7 The *Tumni* rises from a place near Haripur and flows toward east and join the river Ajay. The Tumni is non-perennial stream and its lower reaches are very much flood prone (Peterson, 1910:35-46) (*Fig no: 3.2.2*)

8



Source: SRTM

Fig 3.2.2: Physiography and drainage of Raniganj Coalfield

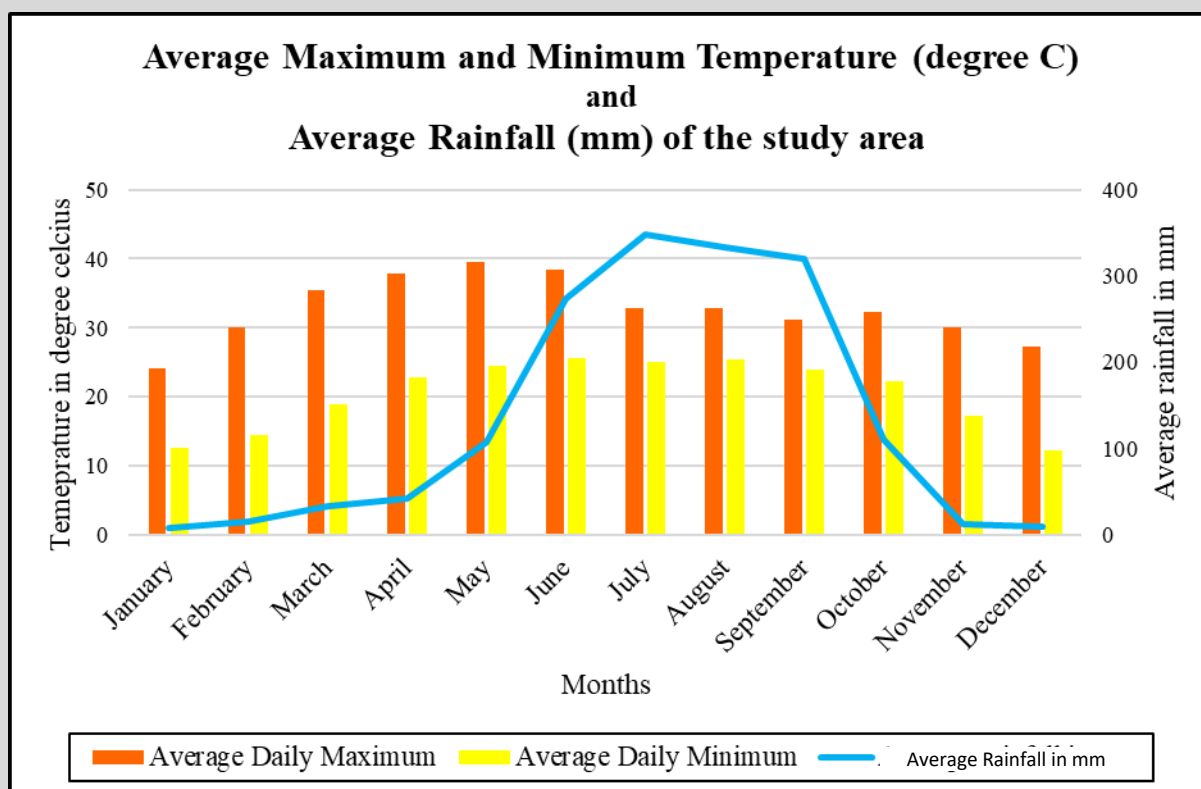
Climate: The area under study lies in the humid tropical monsoon regime. The area receives rainfall by South-West monsoon. The average annual rainfall recorded during is about 1554.5 mm. During hot summer season, the area is often subjected to norwesters. Loo is very common in mid-summer. The temperature rises rapidly from the beginning of March upto the onset of south west Monsoon in the first week of June. Maximum and Minimum temperatures are recorded in May and January respectively. The relative humidity varies from 34% (March) to 86.5% (September). Fig no: 3.2.3

Table 3.2.3: Monthly Average Rainfall (mm) and Temperature (°C) of the study area:

Month	Temperature (°C)		Average Rainfall inmm
	Average Daily Maximum	Average Daily Minimum	
January	24.17	12.67	8.33
February	30	14.44	15.33
March	35.5	18.89	33.39
April	37.78	22.78	42.67
May	39.44	24.44	107.47
June	38.33	25.56	274.29
July	32.78	25	348.31
August	32.78	25.5	333.72
September	31.11	23.89	320.39
October	32.22	22.22	111.24
November	30	17.22	12.8

December	27.22	12.22	9.83
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Source: Asansol observatory: IMD, Pune



Source: Asansol Observatory: IMD

Fig 3.2.3: Average Rainfall and Temperature

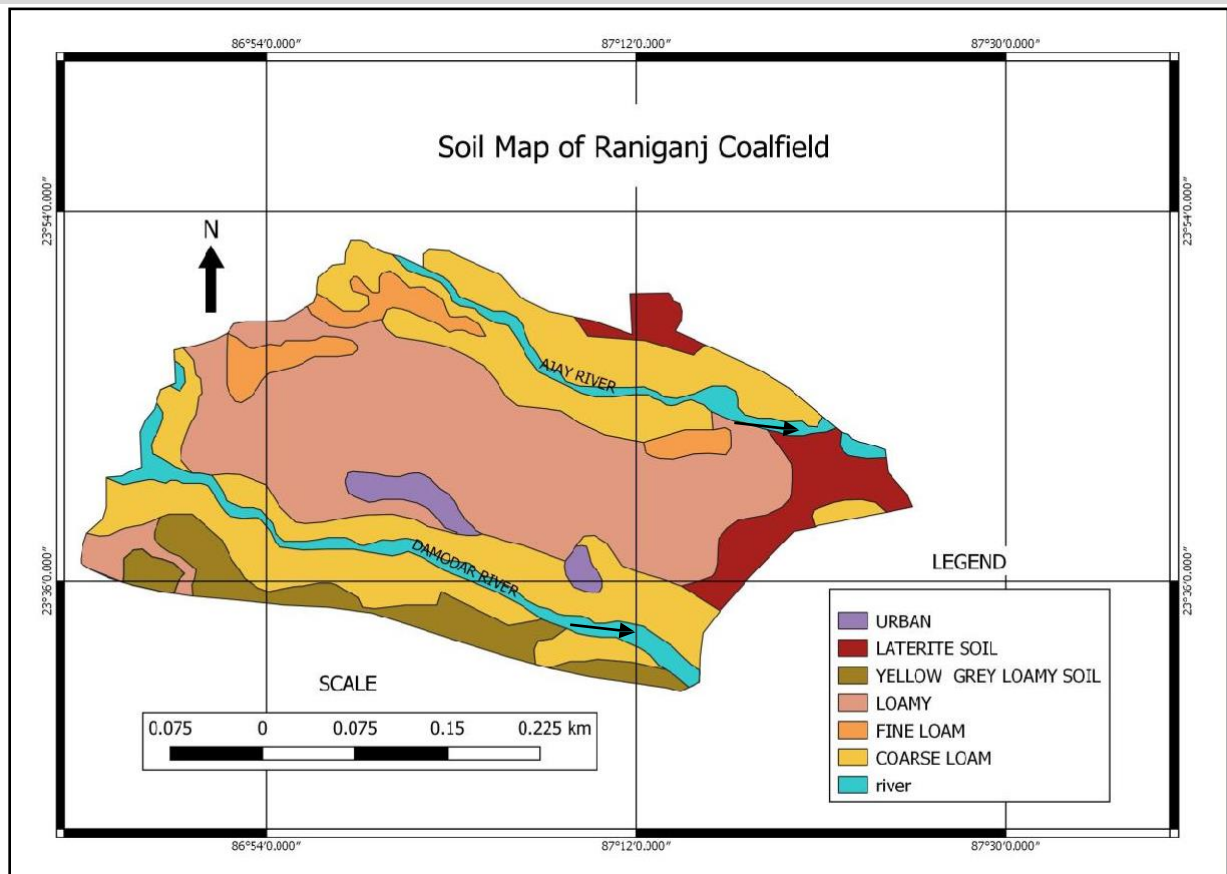
Soils: The area being the foothills of the Chhotanagpur Plateau, the soil of this region is primarily lateritic in nature. Although the soil is generally not fit for cultivation, it generally supports plantation with necessary additives and care.

Besides, riverine old and new alluvial soils are found along the river stretches. In the flood plains of the lower Damodar region newer alluvial soils are widely found. The texture is moderately coarse; as a result the water holding capacity of the soil is low (Fig no. 3.2.4)

National Bureau of Soil Survey and Land Use Planning (ICAR) classified the following major soils in the study area-

- Granite Gneiss Landscape, (Old red, yellow grey catenary soils)** consisting of fine loamy to loamy and coarse and gravelly loamy soils.

Red, Lateritic and old alluvial soils consisting of very deep, poorly drained, fine soils



Source: National Bureau of Soil Survey and Land use Planning (ICAR)

Fig 3.2.4: Soil map of the Raniganj coalfield


Vegetation: Known as Jungle Mahal in the past the uplands of coalfield areas of Raniganj area are in places covered with Sal trees, Mahua, Palas, Bamboo, Arjun etc.

The very name of Asansol is derived from Asan and Sal trees which were in abundance in the area in the long past. Urbanization and spread of opencast mining have depleted the large cover of sal forest areas.

The forest lands of this area are chiefly situated in the lateritic and red soil high lands of the Damodar - Ajay interfluvium. The Forest department and the Environment wing of Eastern Coalfields Limited have made an honest effort to restore the tree cover by planting trees. A large number of species of Teak, sal and quickly growing species of Eucalyptus are planted. In Sonepur-Bazari OCP plantation has been done in 105.2 Ha till 2014-2015.

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Local Newspaper Reports and Clippings and Atlas

APPENDIX

Table 3.2.3: Monthly Average Rainfall (mm) and Temperature ($^{\circ}\text{C}$) of the study area

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July	32.78	25	348.31
August	32.78	25.5	333.72
September	31.11	23.89	320.39
October	32.22	22.22	111.24
November	30	17.22	12.8
December	27.22	12.22	9.83

Source: Asansol observatory: IMD, Pune

Table 5.1 CEPI of Asansol

Years	2009	2011	2013	2016	2018
CEPI score	70.2	70.96	56.01	55.05	55.03

Source: CPCB

Table 5.2: SPM concentration ($\mu\text{g}/\text{m}^3$) in Sonepur-Bazari Project (pre-monsoon)

Monitoring Stations	Years						
	2009	2010	2011	2012	2013	2014	2018
Training Centre	185.35	239.45	247.25	207	305.7	238.4	276
Dispensary	123.05	130.4	156.3	168.2	165.5	168.35	202
Kenda area GM office	148.55	192.3	145.4	161.3	166.15	136.1	304
CISF camp	139.6	192.3	231.4	143.9	231.45	186.15	296
SD	26.35155	44.72263	51.68121	26.6402	66.61908	42.78265	46.51523
Permissible limit	60	60	60	60	60	60	60

AVERAGE	149.14	188.61	195.09	170.10	217.20	182.25	269.50
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Source: CMPDI

Table 5.3: SPM concentration ($\mu\text{g}/\text{m}^3$) in Sonepur-Bazari Project (monsoon)

Monitoring Stations	Years						
	2009	2010	2011	2012	2013	2014	2018
Training Centre	224.75	201	251.85	323.45	266.15	235.75	204
Dispensary	95.1	123.45	159.75	179.4	163.95	161.9	120
Kenda area GM office	293.5	207.35	145	183.8	150.85	133.8	212
CISF camp	75.8	117.55	228.85	301.95	212.4	217.4	116
SD	104.4231	48.43921	52.00283	76.21902	52.3891	47.47207	52.08967
Permissible limit	60	60	60	60	60	60	60
AVERAGE	172.29	162.34	196.36	247.15	198.34	187.21	163.00

Source: CMPDI

Table 5.4: SPM concentration ($\mu\text{g}/\text{m}^3$) in Sonepur-Bazari Project (post-monsoon)

Monitoring Stations	Years						
	2009	2010	2011	2012	2013	2014	2018
Training Centre	238.7	222.4	320.6	201.6	217.1	245.25	220
Dispensary	202.1	119.7	173.55	166.25	159.8	160.2	124
Kenda area GM office	191.5	128.7	170.9	166.6	133.7	130.65	230
CISF camp	261.75	214.55	290.4	110.4	180.6	221.9	216
SD	32.53748	54.64762	77.93535	37.71588	35.21903	53.16526	49.35247
Permissible limit	60	60	60	60	60	60	60
AVERAGE	223.51	171.34	238.86	161.21	172.80	189.50	197.50

Source: CMPDI

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Review of Article



Economic Reforms and Agricultural Growth in India

Shantanu De Roy

Economic liberalisation entails a set of measures that are inimical to petty production in general, and agriculture in particular. It was meant that the initiation of reforms, liberalisation of external trade and corresponding price incentives would lead to enhanced investment, availability of crucial inputs, and increased output in agriculture.

Favourable terms of trade were expected to increase agriculture exports, growth rate, production and private investment in India (Misra 1998). But these policy pursuits resulted in a reduction of public investment in rural

infrastructure, including irrigation, agricultural research and extension services and a decline in the supply of rural credit to small cultivators.

High growth of the agricultural sector is crucial for reducing rural poverty and overall development of Indian economy as substantial section of the population depends on agriculture for employment.

The growth rate of GDP of agriculture has declined since the economic reforms. The share of agricultural output in GDP had declined by 5.6 and 7.3 percentage points in 1990s and post 2000, respectively. This shows that the agricultural sector was losing its importance as an income generating sector at a faster pace.

Due to an increase in imports as part of trade liberalisation measures, there was a sharp decline in the area under cultivation and production of oilseeds in the 1990s. Elimination of import duty on crude edible oil adversely affected domestic oilseed producers.

The growth rates of production and yield of most of the major crops declined, except cotton. Due to the adoption of Bt cotton technology, use of pesticides increased which had an adverse impact on the yield rate of cotton (Gutierrez et al 2015).

Capital formation is necessary for improving long-term growth potential in agriculture. The declining trend of the share of agriculture and allied activities in gross capital

formation since the 1990s implies that there has been lesser investment in agriculture as compared to the non-agriculture sector.

Public capital formation is mainly in the favour of public goods such as irrigation projects and road networks. Decline in public capital formation was not adequately compensated by an increase in private investment in agriculture (Balakrishnan et al 2008). Private investment was increasing at a faster rate than public investment in the 1990s. The share of public capital formation in total capital formation in agriculture had gone down from 52% in 1981-82 to 21% in 2012-13.

In India, irrigation accounts for 90% of gross capital formation in agriculture. Decline in productivity of irrigation in the 1990s was due to a loss of momentum in the development of yield-increasing technologies. There was decline in the share of outlays on irrigation in GDP over time from the already low levels of the 1980s. Lesser proportion of the income generated was ploughed back to enhance facilities of the inputs crucial for the agricultural growth.

Financial liberalisation reduced the availability of credit to small and marginal cultivators and made cultivation more expensive. Credit, particularly from the formal sector, is useful for farmers whose income is tied to the harvest and to smoothen consumption. Reduction in bank branches in rural areas from 57.2% in 1994 to 38.6% in 2014 and declining credit-deposit ratios in 1990s led to increased dependence

of smaller cultivators on private moneylenders at exploitative conditions. These had made agriculture a loss-making activity and reduced the ability of farmers to reinvest surplus, thereby adversely affecting capital formation in agriculture (Dev 2009).

Mohan (1974), in a study on the productivity of Indian agriculture showed highest productivity gain had higher research intensity as compared to others. Evenson et al (1999) observed that the share of public spending on agricultural research and extension services in GDP of agriculture in India has been lower than that observed in the 1990s in developed nations (2% to 4%), and the average share in developing nations (0.75%). In other words, public spending on agricultural research and extension services did not increase after reforms

Agricultural trade liberalisation expected India to emerge as a major exporter of agricultural commodities which will increase scarce foreign exchange reserves in the economy. There were fluctuations but no marked improvement was observed in the terms of trade for agriculture.

International prices of most of the commodities, except for cotton and sugar, never remained stable. Exposure to such fluctuations in international prices in trade of agricultural commodities would endanger livelihood security of substantial sections of the population in rural areas.

CONCLUSIONS


This paper focuses on the economic reforms initiated in 1991-92 to remove biased behaviour against agriculture in India. These reforms were in the favour of shift in terms of trade in agriculture which would enable the producers to earn more and reinvest surplus in different agriculture techniques and equipment, therefore, increasing productivity of land. Thus, the share of agriculture sector in GDP would increase. But there was no noticeable improvement in agriculture post-reforms.

Increasing divergence between growth rates of GDP of agriculture and economy indicated the declining importance of agriculture in the growth trajectory of India. Decline in area for cultivation of coarse cereals, imports duties on oilseeds and usage of excessive pesticides had an adverse effect on the cultivators. Thus, agriculture was losing its importance as an income generating activity. Public capital formation which ensures long-term growth potential in agriculture, lacked during 1990s. Large amount of private capital investment did not reassured agriculture advancement. Same with the irrigation system, share of outlays in GDP and productivity have declined in the post-reform period. Decline in rural bank branches and credit-deposit ratio lead to decline in supply of credit to small farmers. Exploitation of these poor farmers by the moneylenders, made agriculture a difficult job option for them, which in return affected the share of agriculture in GDP. The government didn't take any initiative in promoting

research and extension services. Fluctuations in international prices and terms of trade in agriculture turned it into an unviable occupation.

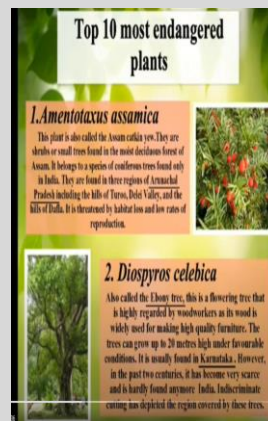
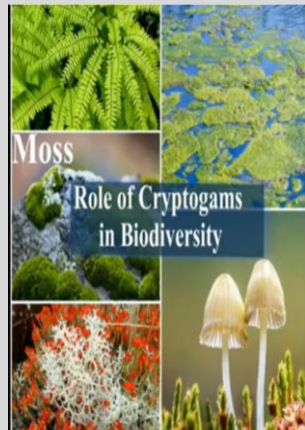
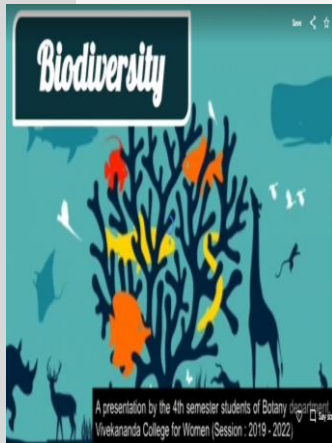
In my opinion, this paper would have been more effective if it highlighted role of technology and decline in employment in agriculture due to introduction to new agriculture technology after the initiation of reforms, like the other papers.

In all, this paper made it clear that economic reforms didn't have a powerful impact on agricultural growth of India.

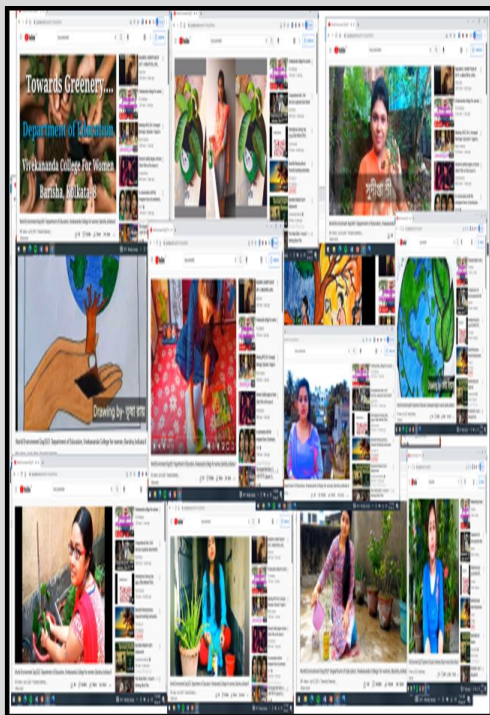

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Poster

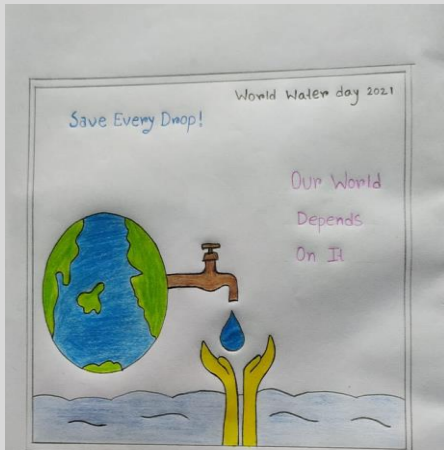
World Bio-diversity Day Celebration



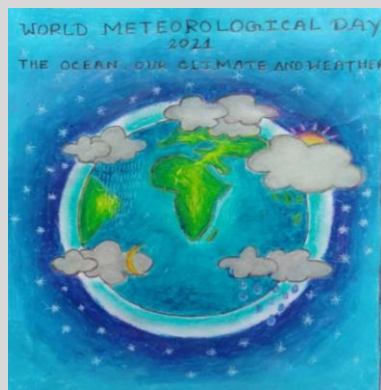
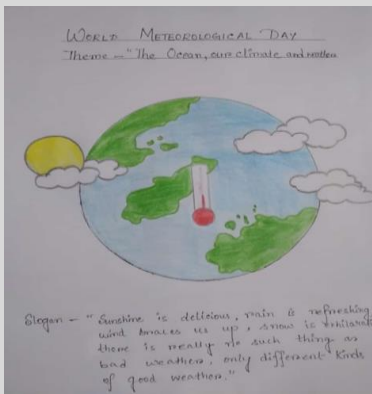
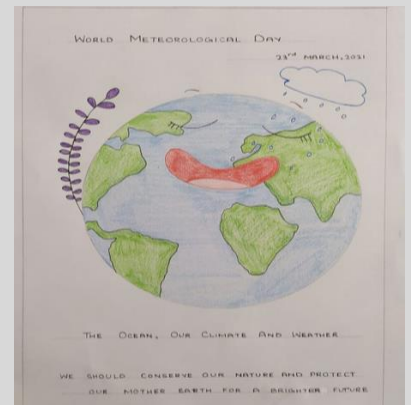
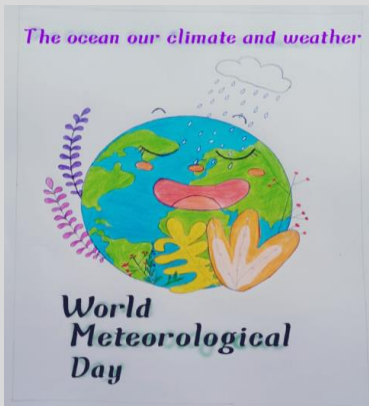
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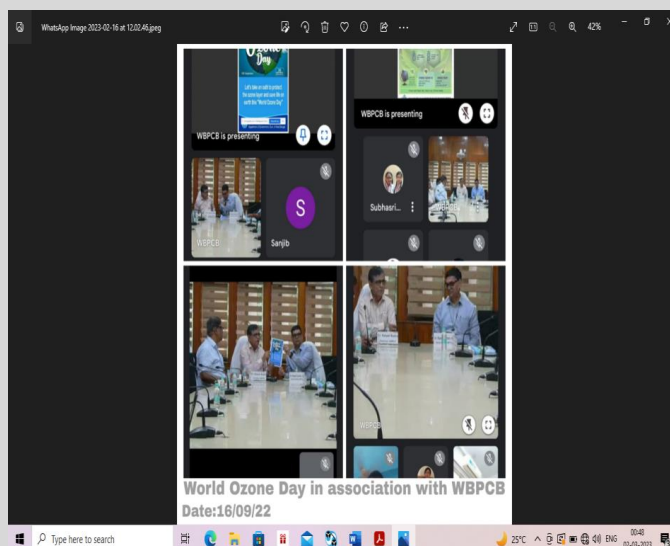
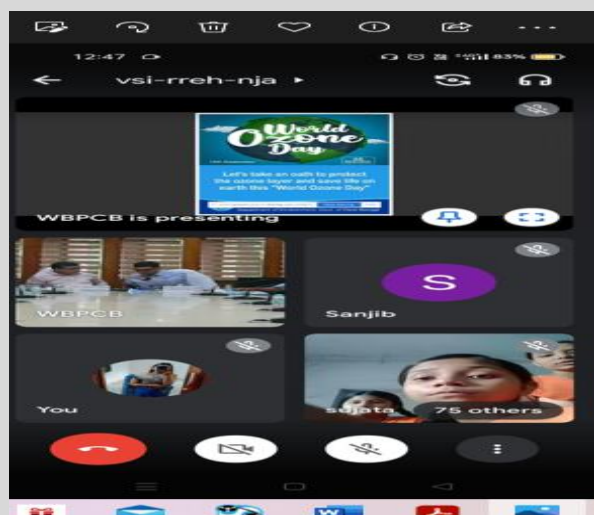
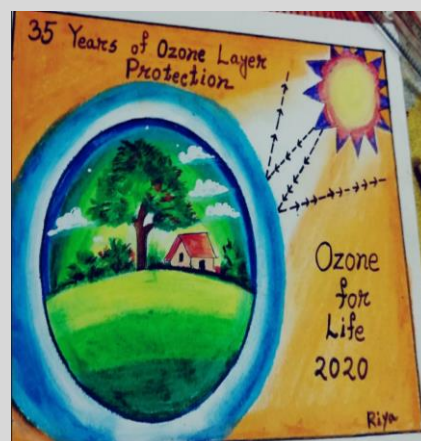
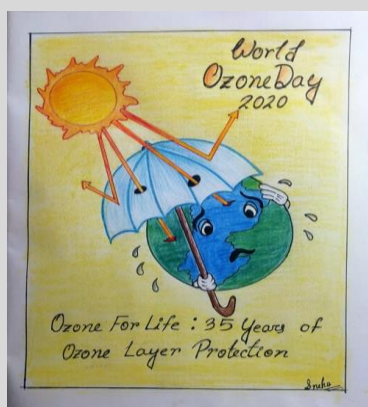
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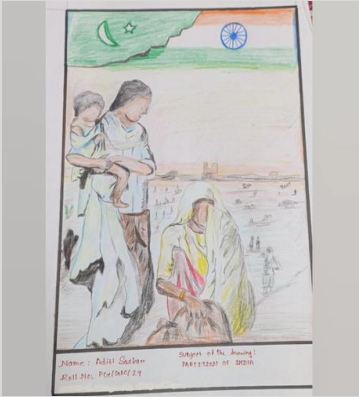
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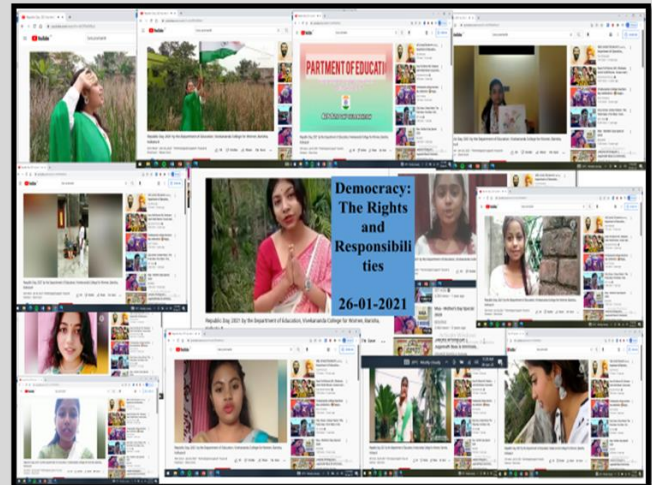
World Ozone Day Celebration



Partition Horror Remembrance Day Celebration



Republic Day Celebration



SWACHHA BHARAT ABHIYAN



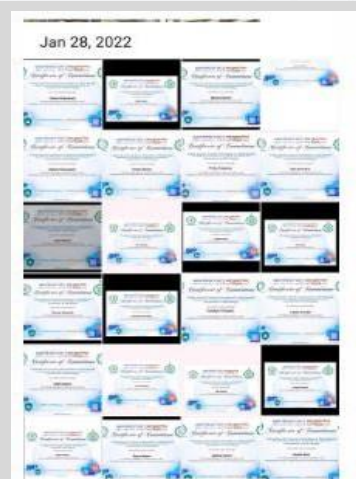
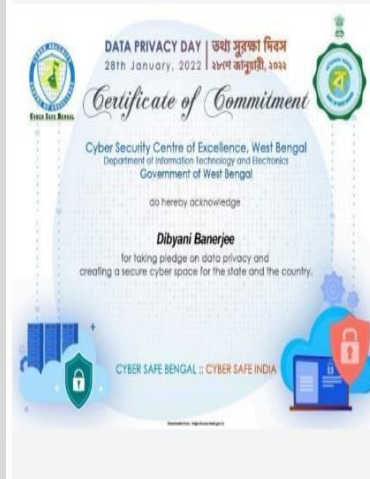
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EXTENSION ACTIVITIES

EXTENSION ACTIVITIES SENSITIZING STUDENTS TO VARIOUS SOCIAL ISSUES FOR THEIR HOLISTIC DEVELOPMENT FOR THE ACADEMIC YEAR 2021-2022

1. Cyber Security Awareness Drive Against Cyber Crime

During the last two years there has been a thousand fold increase in the use of internet and ICT related technologies and android phones both for educational and non- educational activities. With this there has been a lightning increase in cybercrimes. As a result the students of the Department took a cyber-security awareness drive by participating in the Data Privacy Day Pledge on 28th January 2022 conducted by the Department of Information Technologies, Government of West Bengal. The aim of this awareness drive was to develop a knowledge about cyber security which is the application of technologies, processes, and controls to protect systems, networks, programs, devices and data from cyber-attacks. The students of Semester II/ IV and VI participated in this activity (Jan-June) 2022



Vivekananda College for Women, Barisha

Report On Community Outreach Program

SURVEY ON ELECTORAL BEHAVIOUR INBEHALA CHOWRASTA, KOLKATA

Conducted on 17.08.2022



Community Outreach Program

The Community Outreach Program 2022 was conducted by the students of the Department Of Political Science to create awareness among the voters and to understand the voting behaviour of the electorate in the nearby community, surrounding our Institution, Vivekananda College for Women.

The Community Outreach Program is a method for circles of people to identify existing problems or challenges in small communities and provide the means and resources to solve them.

These opportunities help the students to build a sense of responsibility and sensitivity towards the society. More importantly, students can deepen their understanding of individual leadership, systematic change and social responsibility in the context of a local, national and global multi-cultural society.

To carry out this program forward, our Guide Teacher Dr. Minu Sinha Ratna Ma'am provided us with a set of questionnaire to understand the awareness regarding the right to the act of voting by the citizens of India and to determine the prevalent electorate behavior around us.

There were 5 students who were selected for this activity. Each student had to survey atleast 4 sets of questionnaires and take their respective details. The students who were allotted for this activity were Xclara Kar, Sahiba Yasmin, Fahima Sirin, Rehana Khatun and Sanghamitra Paul, all students of Semester III

When we conducted this survey, we faced a mixture of opinions regarding political awareness. Our team surveyed an estimate of 25 male population and 15 female population. The bucket of political awareness is a mixture of positive and negative reponse. The male population showed a different view regarding this particular survey. Even if the males were aware of their rights, they didn't exercise them or were unable to channelize their electorate behavior properly. As per the responses it was quite evident that women were not very politically aware, they were still dependent on their male counterparts be it their partners, husbands or their brothers whose help they would take to reply the questions.

Women should become more politically aware and visit political meetings or mass awareness campaigns. The

blatant truth of patriarchy has always ruled the nation building and politics of our country but it is a high time now that women speak and become more confident in using their freedom and right to speech without any fear. Women must be educated not only through schools and colleges but also all round development is vital especially every citizen must be well informed about their rights and duties.

The survey showed the students a different view altogether regarding the voting behaviour of the citizens. The team understood that still many sections of the society is not conscious about the proper exercise of their political rights and they are still afraid to come forward and share their opinions regarding this kind of political awareness programme.

It was a mixture of both good as well as bad experience regarding this survey. But the students enjoyed a lot during this program. It was a great opportunity for the students to reach out to the community, understand

their level of consciousness and create awareness among the electorate about their right to generate aggregate views regarding socio-political issues of the country.



GPS Map Camera



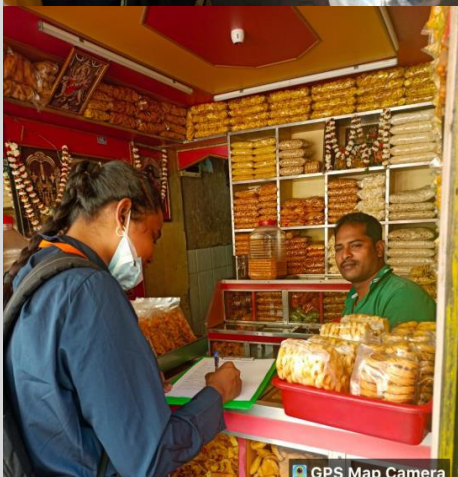
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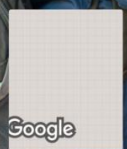
GPS Map Camera



Kolkata, West Bengal, India
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GPS Map Camera



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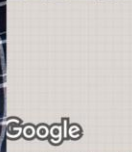
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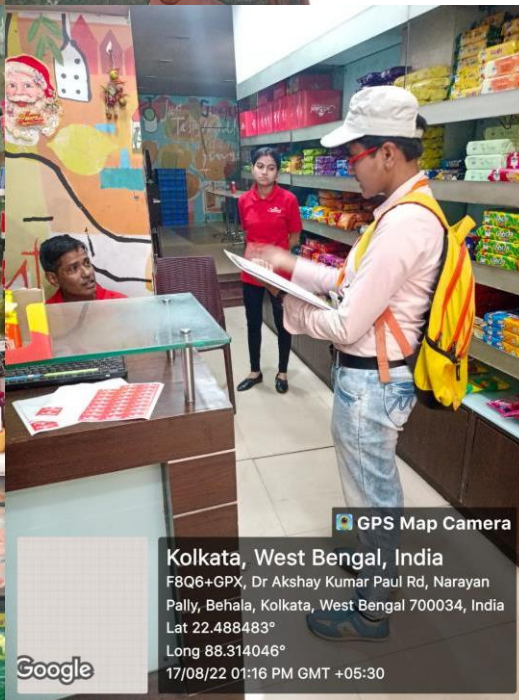
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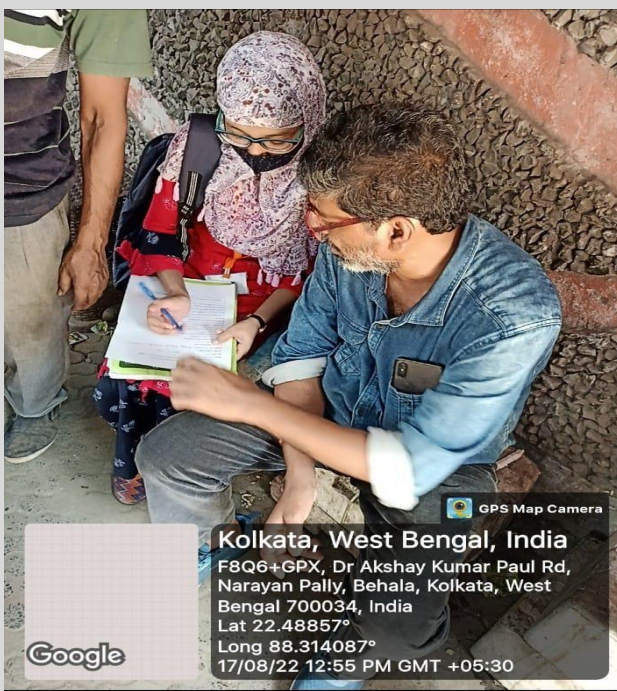
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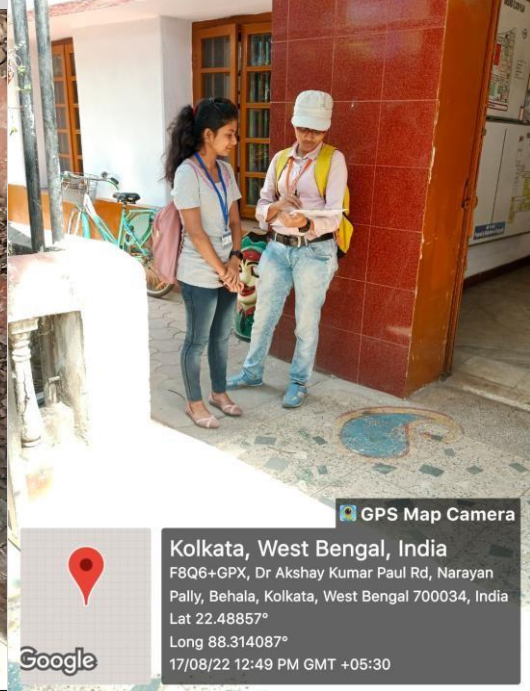
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GPS Map Camera



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Narayan Pally, Behala, Kolkata, West
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GPS Map Camera



Kolkata, West Bengal, India
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VIVEKANANDA COLLEGE

N BARISHA, KOLKATA-8

Assessed and A

AC in B++ Grade

[24455044/24457575/vcwbehalachowras](https://www.vivekanandacollegeforwomen.org)

www.vivekanandacollegeforwomen.org



Ref.....

Date: ...10.08.2022.....

TO WHOM IT MAY CONCERN

QUESTIONNAIRE SURVEY ON VOTING BEHAVIOUR

This questionnaire survey on voting behavior is being conducted by the students of the Department of Political Science to create awareness among the voters and to understand the voting behavior of the electorate in the nearby community surrounding our institution, Vivekananda College for Women, Kolkata-700008 under the Community Outreach Programme Project 2022. This survey is conducted solely to fulfill academic requirements.

Principal

Sample of QUESTIONNAIRE SURVEY ON VOTING BEHAVIOUR

(Conducted by Students of Vivekananda College for Women Kolkata 700008)

NAME:

AGE:

MALE-----FEMALE-----

ASSEMBLY CONSTITUENCY:

ADDRESS:

----- many times

Q3. When was the last

time you voted in a

national/local polls

Mention the year -----

Q4. Do you share the same political

views as your parents/spouse/family

members?Yes----- No-----

-- Don't know-----

Q5. Attended a political rally, speech, or event?

Yes----- No----- Don't know-----

Q6. Where do you get your political news?

Newspaper----- TV----- Mobile news----- Political Rally-----

Q7. How likely are you to go vote in the coming election?

Certain to vote-----Probably won't vote-----Don't know-----

Q8. In your opinion, what is the most important problem facing us today?

Economy /Unemployment /Healthcare /

Corruption/ Education /Environment / don't


knowQ9. Do you think there should be stricter

laws and regulations to eradicate corruption?

Yes----- No ----- Don't know

Q10. Do you think the politician who represent us must be at least Graduate/ literate

Yes----- No ----- Don't know


Teacher-in-Charge
VIVEKANANDA COLLEGE FOR WOMEN

Report on West Bengal Youth Parliament Competition

**Department of Political Science, Vivekananda College for Women,
Kolkata**

The Department of Parliamentary Affairs Government of West Bengal is the nodal Ministry for implementation of the West Bengal Youth Parliament Competition Scheme in Educational Institutions across West Bengal. It is conducted annually by Youth Parliament Affairs Department, Govt. of West Bengal to promote the Youth Parliament programme in educational institutes.

The objective of the Youth Parliament programme is to strengthen the roots of democracy, inculcate healthy habits of discipline, tolerance of the view of others and to enable the student community to know about practices and procedures of the Parliament. This is to afford young people the opportunity to learn the procedure of decision making at all levels of our governance structure.

Youth Parliament offers young people the opportunity to debate in Mock Parliament, create Youth Bills on issues for change, and have their voices and recommendations heard by Members of Mock Parliament. The Youth Parliament program provides an important platform to ensure young people are heard and prepare the youth of India as conscious citizens. The Scheme is now having the following components: A. Youth Parliament Competition Programme. B. Youth Parliament Quiz contest Programme. D. Youth Parliament Extempore Speech Competition Programme. E. Essay Competition Programme

Annually the students of the Department of Political Science also visit West Bengal State Legislative Assembly (Vidhan Sabha) for Youth Parliament workshop so that later they can participate in the Youth Parliament competition at the district level as well as state and national level. The students of the Department under Programme Coordinator: Dr. Minu Sinha Ratna, faculty guide teachers and members of Youth Parliament Committee of our college enthusiastically participate in the mock

parliament project. The students have won prizes many a times for their participation in Youth Parliament competition

Youth Parliament Competition 2017

On 01st Sep 2017 Students of 1st Year Honours, 2nd Year Honours and 3rd Year Honours participated in the Youth Parliament competition District level South 24 Parganas. The Youth Parliament Competition was held at Vivekananda College Thakurpukur, South 24 Parganas. The Youth Parliament competition team attained 2nd Position at the District Level Competition at College level.



Youth Parliament Competition 2017

On 12-13 Dec 2017 Students of 1st Year Honours,, 2nd Year Honours, and 3rd Year Honours, participated University Level Youth Parliament Competition held at Ramakrishna Mission Nimpith South 24 Parganas after winning the 2nd Position at the District level competition which was held at Vivekananda College Thakurpukur, South 24 Parganas.



Youth Parliament Competition 2018

On 6th February 2018 Youth Parliament workshop was conducted by the Department of Political Science by arranging a visit to West. Bengal State Legislative Assembly (Vidhan Sabha). It was participated by students of Ist Year Hons and II Year Hons. The programme Coordinator was Dr. Minu Sinha Ratna faculty guide teachers and members of Youth Parliament Committee of the college also represented the team to Vidhan Sabha



Youth Parliament Competition 2019

On 25th Sep 2019 Students of 3RD YEAR, SEMESTER 1 & SEMESTER III participated in the District level Youth South 24 Parganas Parliament competition held at Fakir Chand College South 24 Parganas College Level and Ranked 3rd in the District level Youth Parliament competition.



Youth Parliament Competition 2022

On 21st September 2022 the Department of Political Science participated in District Level Youth Parliament Competition 2022 organized at Narendrapur Ramakrishna, Mission Residential (Autonomous) College S 24 Parganas by West Bengal Legislative Assembly.



DIBYANI BANERJEE, a student of Fifth Semester of Department of Political Science won the



Best Lady Parliamentarian Award and brought glory to the department. All the other students' received participation certificates and gained humongous knowledge from this exposure. The students practiced rigorously and gave extremely good performance in the mock parliament competition, the participants were mostly students of the department of political science, however for the wholesome development and greater exposure the students of other departments were also included.



**Trophies of the Departmet of Political Science on Display Won In
YouthPartiament Competition during the Academic Year
2017-2022**

Smukherjee
Teacher-in-Charge
VIVEKANANDA COLLEGE FOR WOMEN

QUIZ



Vivekananda College for Women

(Affiliated to University of Calcutta)

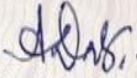
Barisha, Kolkata-700008, WB, India


Certificate of Participation

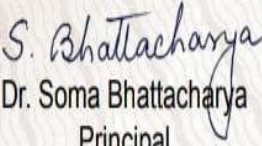
JIP39G-CE000111


This is to certify that Soma Bhattacharya, Principal
of Vivekananda College for Women
has actively participated in "*National Level Online Quiz Programme on Information and
Communication Technology (ICT)*" organised by Central Library & Department of
Physics on 02/07/2020, and obtained 84% of marks.

Date:
02/07/2020


Dr. Atanu Das
Librarian


Dr. Biplab Ghosh
HOD, Dept. of Physics


Dr. Soma Bhattacharya
Principal


Teacher-in-Charge
VIVEKANANDA COLLEGE FOR WOMEN

Vivek Mela

2017-2018

Students participated in “Biki Kini” Food Stall in Vivek Mela January 018:



2018-2019

1st day, 11/01/2019—Food and hand craft stall given by departmental students (2nd year Hons and 3rd year Hons)

2nd day, 12/01/2019--- Food and hand craft stall given by departmental students (Students of 2nd Semester)



2019-2020

Departmental students gave “Biki Kini” Food Stall at Vivek mela 6th and 7th December, 2019




2020-2021

(Due to Corona Pandemic there was no picture of Vivek
Mela)

2021-2022

(Due to Corona Pandemic there was no picture of Vivek
Mela)


Teacher-in-Charge
VIVEKANANDA COLLEGE FOR WOMEN

Entrepreneurship Programme

Report on Career Talk ‘Development of Entrepreneurship Programme’ organised by Vivekananda College for Women in Collaboration with District Employment Exchange, Budge Budge and RSETI, Rajpur, West Bengal held on 30th August and 31st August, 2022

Vivekananda College for Women in Collaboration with District Employment Exchange, Budge Budge and RSETI, Rajpur, West Bengal organised two days Career Talk ‘Development of Entrepreneurship Programme’ (30th August and 31st August, 2022 at 11am to 3:30pm) held at DEE Budge Budge, Behala Industrial Estate, 620, Diamond Harbour Road, Behala Chowrasta.

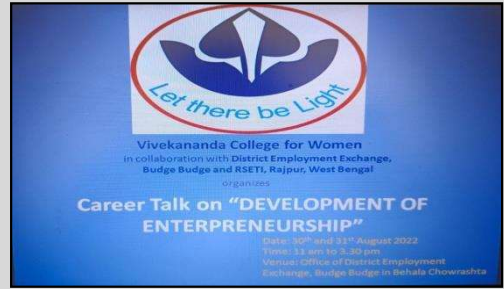
This two days career talks were successfully supervised by Career Counselling Cell, Vivekananda College for Women and DEE Budge Budge, Behala Industrial Estate, 620, Diamond Harbour Road, Behala Chowrasta. Sincere efforts were delivered by Dr. Soma Bhattacharya, Principal, Vivekananda College for Women and Ms. Saswati Mukhopadhyay, Joint Director of Employment, West Bengal towards the smooth conduction of this two days event. Before the programme a WhatsApp group was created with all the participants, members of Career Counselling Cell, Vivekananda College for Women and the Joint Director of Employment, West Bengal where various important instructions were given. The students’ participation was nearly 50 in this programme. The students’ records and feedback were maintained by Career Counselling Cell, Vivekananda College for Women District Employment Exchange, Budge Budge and RSETI, Rajpur, West Bengal.

The important subjects covered in this two days career talk is as follows:

Entrepreneurship Development Programme				
Venue : DEE Budge Budge, Behala Industrial Estate, 620, Diamond Harbour Road, Behala Chowrasta.				
Date	Session	Time	Subject/ Topics	Faculty
30-08-2022	I	11:00 - 12:00 Hrs	Inauguration	NA
	II	12:00 - 13:00 Hrs	Achievement Motivation, Self Employment & Entrepreneurship Development, Attitude	B. Ganguly
	III	13:30 - 14:30 Hrs	Entrepreneurial Competencies, Leadership Qualities	B. Ganguly
	IV	14:30 - 15:30 Hrs	Problem Solving, Creativity, Effective Communication, SWOT analysis	B. Ganguly
31-08-2022	I	11:00 - 12:00 Hrs	Market survey, Time management, Marketing management - Branding etc.	K C Dey
	II	12:00 - 13:00 Hrs	Banking, Costing & Pricing	K C Dey
	III	13:30 - 14:30 Hrs	Business Laws, Human Relations	K C Dey
	IV	14:30 - 15:30 Hrs	Launching Formalities- Growth, Diversification & Expansion	K C Dey

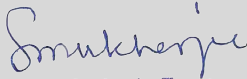
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Sample Photographs



IMPORTANT LINKS

1. <https://photos.google.com/share/AF1QipM6J1MnzYBwUGiQraEXbuhV6VMexlLk6TcntZeYa4TLLteUR70Yvblax3ZvzpdlagA?key=a1NDcjV2TDVIRXZUVF9MbWtaOWUtTWM4YlowZnZ3>
2. https://drive.google.com/drive/folders/17_knSGvYZlx7MP_16431FuqaR3AAcfUT?usp=share_link


Teacher-in-Charge
VIVEKANANDA COLLEGE FOR WOMEN

Project Work/Field Work

Name of Students undertaking project work/field work (2021-2022)

Programme name	Program Code	List of students undertaking project work/field work/internship	Title of the project or Fieldwork
B.Sc. General in Physics	PHS-G- SEC B - 1 (Technical Skill): Arduino (Project type)	1. Priti Patra	LED BLINKING AND FADING USING ARDUINO

The link of the project details is as follows :

https://drive.google.com/drive/folders/1aAglomKiuNpzmf1th9ltg4G1ZWzB8xLw?usp=share_link

DEPARTMENT OF Physics
VIVEKANANDA COLLEGE FOR WOMEN BARISHA, KOLKATA-8
24457575 / vcwbehalachowrasta@gmail.com

To whom it may concern

This is to certify that Priti Patra having Registration No. 543-1211-0495-19, a student of VI Semester of Department of Physics, Vivekananda College for Women, Barisha, Kolkata, has completed her project work on LED BLINKING AND FADING USING ARDUINO as a part fulfillment of her B.A./B.Sc.

Semester syllabi, pertaining to Module PHS-G- SEC B -1 (Technical Skill):
Arduino (Project type) under my supervision.

Dr. Biplab Ghosh (12.07.2022)
Signature of teacher with date


Teacher-in-Charge
VIVEKANANDA COLLEGE FOR WOMEN

DEPARTMENT OF Physics
VIVEKANANDA COLLEGE FOR WOMEN BARISHA, KOLKATA-8
24457575 / vcwbehalachowrasta@gmail.com

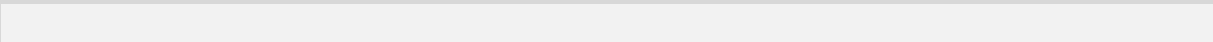
To whom it may concern

This is to certify that the following students of VI Semester of Department of Physics, Vivekananda College for Women, Barisha, Kolkata, has completed their project work on LED BLINKING AND FADING USING ARDUINO as a part fulfillment of their VI Semester syllabi, pertaining to Module PHS-G- SEC B -1 (Technical Skill): Arduino (Project type) under my supervision.

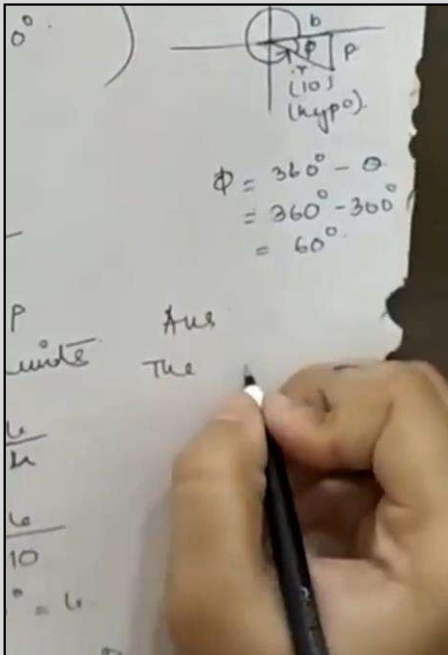
Name of Students	University Registration Number
Priti Patra	543-1211-0495-19

Dr. Biplab Ghosh (12.07.2022)

Signature of teacher with date



Senior As Mentor



Youtube link:

<https://youtu.be/B8x4gkzlis>

Career Motivation



Smukherjee
 Teacher-in-Charge
 VIVEKANANDA COLLEGE FOR WOMEN