

# Subhasis Ghosh

## Office Address

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## Profile

I am a Geoscientist specializing in urban climatology research, with a strong academic foundation in Geography, Geoinformatics, and Urban Planning. My work encompasses diverse interests, including urban agglomerations, climate change, weather & climate modeling, and human-environment interactions. Leveraging advanced techniques such as remote sensing, machine learning, and cloud computing, I am committed to interdisciplinary research that uncovers innovative solutions for our evolving world, driving positive change for our future.

## Areas of Expertise

Urban Agglomeration, Climate Change, Geospatial Programming and modeling, Weather Research and Forecasting (WRF), Remote Sensing, GIS, UAV Data Collection and analysis, Human-Nature Interactions.

## Education



### Doctor of Philosophy (Ph.D.) in Earth System Science

Auburn, AL, USA

Auburn University

Expected Graduation Date: Summer 2025

Advisor: Dr. Chandana Mitra

Dissertation: Analyzing Global Urban Agglomerations and Their Impacts on Rainfall Climatologies.



### Master of Science (M.S.) in Geography

Auburn, AL, USA

Auburn University, College of Sciences and Mathematics

2023

Advisor: Dr. Chandana Mitra

Capstone Project: Revolutionizing Urban Studies: Harnessing Deep Learning to Extend Long-Term Normalized Difference Urban Index (NDUI) Data Time Series for Urban Studies



### Post-Graduate Diploma in Urban Planning and Development

New Delhi, India

Indira Gandhi National Open University

2020

Advisor: Prof. P. V. K. Sasidhar



### Post-Graduate Diploma in Geoinformatics

Kolkata, India

Maulana Abul Kalam Azad University of Technology (Formerly known as WBUT)

2019

Advisor: Dr. Asim Ratan Ghosh

Capstone Project: Identification of an Emergency Ambulance Route in Bolpur-Santiniketan, India to address mobility crisis of patients during major festival seasons- A GIS-based approach.



### Master of Arts (M.A.) in Geography

Santiniketan, India

Visva-Bharati University

2018

Advisor(s): Dr. Bhairu Lal Yadav, Prof. Vibhash Chandra Jha

Specialization: Applied Geomorphology/Terrain Evaluation

Thesis: Gully Erosion and its Impact on Regional Development- A Case Study of Bolpur-Sriniketan Lateritic Patch



### Bachelor of Arts (B.A. Hons.) in Geography

Santiniketan, India

Visva-Bharati University

2016

## Professional Certification



### Certificate in GIS and Thematic Cartography

Kolkata, India

National Atlas and Thematic Mapping Organization, Govt. of India

2018

Project: Long-term spatiotemporal change detection of a part of the Sector-V region of Salt-Lake city, Kolkata, India using satellite imagery, GPS-Surveying, and On-Ground Data Collection methods.

## Professional Experience

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### 1. Position: Graduate Research Assistant (GRA)

*Employer:* Department of Geosciences, Auburn University, USA. ([www.auburn.edu](http://www.auburn.edu))

*Project Name:* 'Earth as Earth' Interactive Global Museum

*Funding Agency:* United States Geological Survey (USGS)

*Sector:* Research (Public)

*Date Started and Finished:* 01<sup>st</sup> October 2023 to Present

- Responsible for the conversion of complex remote sensing images into simple, artistic, and relatable photographs. This involved applying image processing techniques to enhance clarity and highlight key features relevant to Earth system science.
- Collaborated with a multidisciplinary team to transform processed images into engaging virtual reality (VR) based interactive games, ensuring alignment with educational objectives and target audience engagement to promote interest in Earth science and STEM disciplines.

### 2. Position: Graduate Research Assistant (GRA)

*Employer:* Department of Geosciences, Auburn University, USA. ([www.auburn.edu](http://www.auburn.edu))

*Project Name:* Investigation of Global Urbanization Footprints and the Urban Rainfall Effect Climatologies &

*Funding Agency:* National Aeronautics and Space Administration (NASA)

*Sector:* Research (Public)

*Date Started and Finished:* 16<sup>th</sup> August 2021 to Present

- Developed an AI/ML-based innovative technique to extend the lifespan of DMSP nighttime data and brought the high-resolution Normalized Difference Urban Index (NDUI) dataset up to date.
- Worked extensively with various urban-climate and weather forecasting models.
- Conducted comprehensive literature reviews to identify key research gaps and contribute to the development of research hypotheses.
- Utilized cloud computing resources and high-performance computing clusters to expedite data processing, simulations, and analyses using programming languages like Python, Java, NCL (NCAR Command Language)
- Collaborated with faculty and other researchers to acquire relevant geospatial data and organize and manage datasets ensuring accuracy and accessibility for ongoing research.
- Developed and published original research manuscripts in reputable scientific journals; communicated research and science at various national and international conferences.
- Received periodical training on Responsible Conduct of Research for Physical Science.

### 3. Position: Junior Research Fellow (JRF)

*Employer:* West Bengal State Council of Science and Technology, Govt. of West Bengal, India. ([www.dstbt.bangla.gov.in](http://www.dstbt.bangla.gov.in))

*Project Name & Funding Agency:* 'Space Based Information Support for Decentralized Planning (SIS-DP)-Update', funded by National Remote Sensing Centre (NRSC), Indian Space Research Organization (ISRO), Department of Space, Government of India.

*Sector:* Research & Development (Public)

*Date Started and Finished:* 1<sup>st</sup> March 2021 to 31<sup>st</sup> July 2021 (5 Months)

- Responsible for mapping land use & land cover changes through digital image interpretation using ERDAS Imagine and ArcGIS, updating national atlas.
- Organized and attended scientific training programs and meetings.

#### 4. Position: GIS Analyst

Employer: Prayukti Systems Private Limited, India ([www.prayuktisystems.com](http://www.prayuktisystems.com))

Project Name & Funding Agency: 'Utility-Facility mapping, geo-database creation, and verification of road construction status sanctioned under Pradhan Mantri Gram Sadak Yojana (PMGSY) scheme for Purulia District, West Bengal, India'; Funded by Government of India.

Sector: Private (Geo-Spatial Technologies)

Date Started and Finished: 2<sup>nd</sup> September 2019 to 11<sup>th</sup> October 2019 (1 Month 9 days)

- Posted as the Lead GIS consultant to the client site.
- Led the team to complete all the given tasks meeting all the deadlines.

#### Peer-Reviewed Publications

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1. Das, R. D., Bandopadhyay, S., **Ghosh, S.**, Das, M., Chowdhury, M., Cotrina-Sanchez, A., Kumar, C., & Mitra, C. (2023). Have COVID lockdowns really improved global air quality? –Hierarchical observations from the perspective of urban agglomerations using atmospheric reanalysis data. *Physics and Chemistry of the Earth, Parts A/B/C*, 132, 103452. <https://doi.org/10.1016/j.pce.2023.103452>
2. Singh, M., **Ghosh, S.**, Kamath, H., Vaisakh, S. B., Mitra, C., Saxena, S., Rao, S., Shepherd, M., & Niyogi, D. (2023). Long-term normalized difference urban index (NDUI) data time series for urban studies. Manuscript under peer review. Pre-print available at arXiv: <https://doi.org/10.48550/arXiv.2306.02794>.
3. Cotrina Sánchez, A., Rojas Briceño, N. B., Bandopadhyay, S., **Ghosh, S.**, Torres Guzmán, C., Oliva, M., Guzman, B. K., & Salas López, R. (2021). Biogeographic Distribution of *Cedrela* spp. Genus in Peru Using MaxEnt Modeling: A Conservation and Restoration Approach. *Diversity*, 13(6), 261. <https://doi.org/10.3390/d13060261>
4. **Ghosh, S.**, Bandopadhyay, S., & Sánchez, D. A. Cotrina. (2021). Long-Term Sensitivity Analysis of Palmer Drought Severity Index (PDSI) through Uncertainty and Error Estimation from Plant Productivity and Biophysical Parameters. *Environ. Sci. Proc.*, 3(1), 57. <https://doi.org/10.3390/IECF2020-07956>
5. Jha, V. C., & **Ghosh, S.** (2020). Environmental Risk Assessment: A Geomorphic Investigation over the Bolpur-Santiniketan-Illambazar Lateritic Patch of Birbhum District, West Bengal, India. *National Geographical Journal of India*, 66(2), 94-110. <https://doi:10.48008/ngji.1733>
6. Bandopadhyay, S., Das, B., Sánchez, A. C., Banerjee, S. P., Banerjee, B. P., & **Ghosh, S.** (2023). Canopy Scale High-Resolution Forest Biophysical Parameter (LAI, fAPAR, and fCover) Retrieval Through Machine Learning and Cloud Computation Approach. In IEEE (Ed.), 2023 International Conference on Machine Intelligence for GeoAnalytics and Remote Sensing (MIGARS) (pp. 1-4). Hyderabad, India. doi: [10.1109/MIGARS57353.2023.10064558](https://doi.org/10.1109/MIGARS57353.2023.10064558)

#### Conference Proceedings

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1. **Subhasis Ghosh**, Chandana Mitra (2023), 'Need for Investigating the Impacts of Urbanization on Micro-Hydroclimatology: Urban Agglomerations vs Individual Cities', Poster presented at *ICUC 11: 11th International Conference on Urban Climate*, 28<sup>th</sup> Aug – 1<sup>st</sup> Sept., 2023, UNSW, Sydney, Australia.
2. **Subhasis Ghosh**, Chandana Mitra (2023), 'Urban Climate Archipelagoes and their impacts on global climatology: An Emerging Matter of Concern', Paper presented at *AAG Annual Meeting 2023*, 23<sup>rd</sup> – 27<sup>nd</sup> March 2023, Denver, CO, USA.
3. Subhajit Bandopadhyay, Barnali Das, Alexander Cotrina Sánchez, Sankar Prasad Banerjee, Bikram P. Banerjee and **Subhasis Ghosh** (2023), 'Canopy Scale High-Resolution Forest Biophysical Parameter (LAI, fAPAR, and fCover) Retrieval Through Machine Learning and Cloud Computation Approach', Presented at IEEE MIGARS2023, 27<sup>th</sup> 29<sup>th</sup> January 2023, Hyderabad, India.
4. **Subhasis Ghosh**, Chandana Mitra, Sukanya Dasgupta (2022), 'Long Term Ozone Health Analysis of Atlanta Urban Agglomeration of United States Using Machine Learning and Cloud Computing

Techniques', Presented at *Annual Meeting of the SouthEastern Division of American Association of Geographers (SEDAAG) 2022*, 19<sup>th</sup> – 22<sup>nd</sup> November 2022, Atlanta, GA, USA.

5. **Subhasis Ghosh**, Subhajit Bandopadhyay, Dany A. Cotrina Sánchez (2020), 'Long-term Sensitivity Analysis of Palmer Drought Severity Index (PDSI) Through Uncertainty and Error Estimation from Plant Productivity and Biophysical Parameters', Presented at *The 1<sup>st</sup> International Electronic Conference on Forest*, MDPI, 15<sup>th</sup>-30<sup>th</sup> November 2020, View at: <https://sciforum.net/paper/view/7956>
6. **Subhasis Ghosh** and A.R Ghosh (2019), 'Identification of an Emergency Ambulance Route for Festival Seasons of Bolpur-Santiniketan- A GIS Based Approach', Oral Presentation at *4<sup>th</sup> West Bengal Science & Technology Congress (Southern Region) 2019*, Haringhata, West Bengal, India, 23<sup>rd</sup>-24<sup>th</sup> December 2019, Published at Abstract Volume, p- 120. View at: <https://tinyurl.com/2srf92m2>
7. **Subhasis Ghosh** and VC Jha (2018), 'Impact of Lateritic Terrain on Regional Development- A Case Study of Bolpur-Santiniketan Lateritic Patch, Birbhum District, West Bengal', Oral Presentation at *3<sup>rd</sup> West Bengal Science & Technology Congress (Southern Region) 2018*, Kolkata, West Bengal, India, 18<sup>th</sup>-19<sup>th</sup> December 2018, Published at Abstract Volume, p- 117. View at: <https://tinyurl.com/2uv782m5>

## Editorial Services

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- Reviewer – *Advances in Spece Research* journal, Elsevier
- Reviewer - The 7th International Conference on Computer Science and Application Engineering, Oct 17<sup>th</sup>-19<sup>th</sup>, 2023, Wuhan, China.
- Guest Editorial Assistant (Chief Editor's nominee) of the *Indian Cartographer* - Journal of the Indian National Cartographic Association (INCA), India, ISSN 0972-8392 (2020).
- Editorial team member (technical) of the *Indian Cartographer* - Journal of the Indian National Cartographic Association (INCA), India, ISSN 0972-8392, Vol-36, Special Issue - Cartography and Climate Change (2016).

## Research Grants

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- Climate Adaptation Scientists of Tomorrow (CAST) research mini-grant, United States Geological Survey (USGS), USA (2023) - \$2000
- Graduate Student Council (GSC) Travel Fellowship, Auburn University, USA (2023) - \$500
- Geosciences Advisory Board (GAB) Travel Grant, Auburn University, USA (2023) - \$250
- Geosciences Advisory Board (GAB) Travel Grant, Auburn University, USA (2022) - \$250
- NASA IDS (Grant No. NNH19ZDA001N-IDS, through PI-Dr. Marshall Shepherd, CO-PI- Dr. Chandana Mitra), NASA, USA (2021-2023) - \$187,993

## Geospatial Software Skills

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*GIS Image Processing and Mapping:* ArcGIS, Erdas Imagine, TNT Mips, QGIS, ENVI, Geo Server, Google Earth Engine.

*Specialized Modelling Softwares:* Weather Research & Forecasting (WRF), Community Earth System Model (CESM).

*Unmanned Aerial Vehicle (UAV) data collection and Processing:* Drone2Map, Pix4Dmapper

*Statistical Environments:* SPSS, R Studio

*Relational Database Management Systems (RDBMS):* PostGIS, PostgreSQL

## Programming Language Skills

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Python, R, Java, MATLAB, NCL

## Technical Courses / Trainings/ Workshops Attended

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- Weather Research & Forecasting (WRF) Tutorial at National Center for Atmospheric Research (NCAR), Boulder, CO, USA (17<sup>th</sup> July – 21<sup>st</sup> July 2023).
- Responsible Conduct of Research for Physical Science (Record ID 47998085), CITI Program, 3<sup>rd</sup> April 2022 (Valid till 2<sup>nd</sup> April 2027).
- Summer School (e-School) on Climate Science & Policy, Indian Institute of Technology (IIT), Bombay, India (17 Aug-28 Aug, 2020).
- Summer School (e-School) on Urban Sustainability, DLGS, Germany (7<sup>th</sup> Sept – 9<sup>th</sup> Sept, 2020).
- NASA Applied Remote Sensing Training (ARSET) Program on Understanding Phenology with Remote Sensing (2020).
- NASA Applied Remote Sensing Training (ARSET) Program on Using Earth Observations to Monitor Water Budgets for River Basin Management (2020).
- Six-month certificate course on Computer Applications, from National Institute of Computer Education, India (2010)
- Seven-month Spoken English certificate course, From Study Circle, India (May-Nov, 2011)
- 80-hours training workshop in English Communication and Basic Corporate Etiquette, jointly organized by TATA Consultancy Services & Visva-Bharati University. (2015)

## Short-Term Projects Executed

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- Landslide Susceptibility Zonation Mapping of Darjeeling, India using Weighted Overlay Analysis and Information Value Method.
- Forest Fire Risk Zonation Mapping of Kerala, India using Fire Risk Index (FRI) Method.
- Near Real Time Flood Prone Area Mapping using SCATSAT-1 Satellite Imagery data.
- Rainfall Run-Off Modeling of a part of Purulia district, West Bengal, India using Curve Number Method and Rational Method.
- Hydrological Modeling on a part of Ganges Watershed area based on DEM data.
- Preparation of Cadastral Map of Rajmela Mouza, Gangajalghati Block, Bankura District, West Bengal, India
- Solid Waste Disposal Site Selection using Remote Sensing and GIS.
- Questionnaire-interview based socio-economic status survey of *Satkahania* Village of Paschim Bardhaman district of West Bengal state, India.

## Leadership Roles

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- Senator - Auburn University Graduate Student Council (2023-2024)
- Vice President of Special Projects, Indian Students Association, Auburn University, USA (2022-2023)
- Student Representative - Regional Development and Planning specialty group of the American Association of Geographers (AAG). (2023 to present)
- Secretary of Geography Student Organization at Auburn University, AL (2022-2023)
- Media and Publicity Officer of Indian Student Association, Auburn University, USA (2021-2022)

## Awards and Honors

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- AU Involvement Award for 'Excellence in Communications and Marketing in recognition of the innovative publicity and communication efforts for the Indian Students Association (ISA) in Auburn University, AL, USA (2023)



- Awarded Swami Vivekananda Merit-Cum-Means Scholarship worth INR 48000 from the Government of West Bengal, India (2016-2018)
- Awarded full tuition fee waiver by Visva-Bharati University, India (2013-2015)
- All India Rank-2 in Visva-Bharati Common Admission Test (VBCAT) to study B.A.(Honours) in Geography (2013)
- All India Rank-4 in the entrance examination of PGD (Geoinformatics) program organized by the Dept. of Higher Education, Science & Technology and Biotechnology, Govt. of West Bengal, India (2018)
- Certificate of Appreciation received for outstanding contribution in welfare project of environmental protection and awareness for the people of Bolpur, India, from 50 Bengal Bn., India (2018)
- Delegation team member of the Department of Science & Technology and Biotechnology, Government of West Bengal, India to attend esri India User Conference (2019)

## Community Services, Extra-Curriculars, and Outreach Activities

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### Service to School and Academia

- Events Committee Member of Auburn University Graduate School (2023)
- Paper session organizer on 'Urban, Climate, and Sustainability' at AAG (American Association of Geographers) Annual Meeting, Denver, CO, USA. (2023)
- Judge: Auburn Research Student Symposium, Auburn University, AL, USA (2022)
- Student volunteer in organizing INCA (Indian National Cartographic Association) International Conference (2016)
- Sportsman-
  - Volleyball: Played for Visva-Bharati University, India in Zonal Inter-University Volleyball Championship (2013-2014)
  - Basketball: Runners-up in Intra-University Basketball Tournament (2010-2011)
  - Discus Throw and Javelin Throw: Won medals (gold-1, silver-2, Bronze- 1) in high school level athletic meets (2010, 2012)

### Service to Community

- Served as a voluntary academic tutor to provide free tuition to the unprivileged school kids of my locality coming from economically humble families. (2016-2018)

### Outreach Activities

- Judge: Greater East Alabama Regional Science and Engineering Fair (GEARSEF)- 2022, USA
- Judge: 'Special Awards' and 'Marketing Presentation' categories of South's Best Championship – 2021 (Demo Daze Best Robotics) organized by Auburn University, USA (2021)
- Member of state representatives to attend special national integration and leadership camp at Lakshadweep Islands, India from West Bengal State (2014)
- Student volunteer at National Service Scheme ([nss.gov.in](http://nss.gov.in)) (2011-2013)
- Participated in Snorkeling Experience program (Discover the Underwater World) organized by PADI (Professional Association of Diving Instructors) (2014)

## Professional Memberships

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- American Association of Geographers (AAG) ([www.aag.org](http://www.aag.org)) (Since 2021)
- Regional Development and Planning specialty group of the American Association of Geographers (AAG)(RDPSG, AAG)(Since 2023)
- South Eastern Division of the American Association of Geographers ([sedaag.org](http://sedaag.org)) (Since 2022)
- Geography Student Organization, Auburn University ([auburn.campuslabs.com/engage/organization/gso](http://auburn.campuslabs.com/engage/organization/gso)) (Since 2021)

- The International Society for Photogrammetry and Remote Sensing Student Consortium (ISPRS SC), (<https://sc.isprs.org>) (Since 2020)
- International Water Resources Association (<https://www.iwra.org>) (Since 2020)
- Visva-Bharati Alumni Association, India (<http://www.vb-alumni.org>) (Since 2018)

## Languages

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- English: Proficient User (Reading, Writing and Speaking)
- Bangla / Bengali: Native User (Reading, Writing and Speaking)
- Hindi: Proficient User (Reading, Writing and Speaking)