Curriculam Vitae

Dr. Sudip Manna

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RESEARCH INTERESTS

Remote sensing, Geostatistical and GIS applications with interdisciplinary research methods. Utility of active and passive space-borne and airborne satellite data for biophysical monitoring, assessment and modelling of different ecosystems. Impact of climate change concerning spatial ecology and carbon dynamics.

TEACHING EXPERIENCE

- **Assistant Professor – I (2025-)**: *ADAMAS University, Barasat, Kolkata*. Teaching subjects of Geoinformatics, and Basics of Remote Sensing to the students of Post graduate and Undergraduate students in Department of Geography at AU.
- **Junior, Senior and Post-Doctoral Research Fellow (2010-2017)**: *School of Oceanographic Studies, Jadavpur University*. Conducted theory and practical classes of PG Diploma and MPhil courses in RS & GIS, and Oceanography from 2010-17.

RESEARCH EXPERIENCE

- **Post Doctoral Fellowship IISER-K (2022-24)**: *Funding- IISER Kolkata, MoE, GoI*. Modelling habitat conversion, recovery, and restoration for a sustainable future: Empirical assessment of past changes and predictive analyses of future conservation and development in a large multiuse landscape in central India under Green India Mission. Landscape ecological analyses of past landcover changes in Central Indian landscape, evaluating current scenarios of socio-economic development and conservation goals. Modelling a framework (coupled equations describing changes in different sectors) to evaluate future options for development and conservation. Developing a sustainability science framework to guide socioeconomic and land-use decisions viewing the landscape as a social-ecological system. The data utilized were processed from empirical work being carried out by junior researchers, extensive secondary data, and other geospatial datasets available in public domain.

- **National Post-Doctoral Fellow (2017- 2019)**: *Funding- DST, SERB, GoI*. Modelling the dynamics of aboveground biomass and aboveground net primary productivity (NPP) of mangroves in Sundarban, India. Estimating mangrove productivity and analysis of satellite data for mangrove health and stress mapping. Seasonal inventory of biophysical attributes such as leaf area index, Chlorophyll, Biomass, slenderness coefficient of mangroves along with specific hyperspectral characteristic that could help in estimating and predicting mangrove productivity. Estimating atmospheric column CO_2 in urban and forested area to assess its variation and impacts if any, with the use of ground data and AVIRIS-NG hyperspectral data. Assisted on-going projects under the Mentor.

- **Research Associate (2017)**: *Funding- Space Application Centre, ISRO, DOS, GoI*. Geospatial assessment of mangrove's species discrimination in Indian Sundarbans, their health and its effect on environment and climate using airborne hyperspectral (AVIRIS-NG) and RISAT-1 remote sensing data. Analysed mangrove soil properties such as Nitrogen, Phosphorous, Potassium, Sand, silt, clay, salinity etc., and their relation to mangrove's biophysical attributes health and spatial distribution. Analysed Airborne Visible InfraRed Imaging Spectrometer - Next Generation (AVIRIS-NG) hyperspectral data for species level mapping. Coordinated with Space Application Centre, ISRO regarding site proposal for the AVIRIS-NG Phase-II sorties over Sundarban. Presented the project findings in user science meets and international conference. Conducted practical and theory classes (Advanced Digital Image Processing) for PG Diploma RS & GIS course.

- **Junior/ Senior Research Fellow (2012-17)**: *Funding- IIRS and NRSC,* ISRO funded project under National Carbon Project (NCP) scheme. Spatio-temporal sampling of estuarine and offshore waters for CO_2 flux estimation from mangrove vegetation, soil and water of Sundarban estuary. Conducted rigorous Quadrat samplings in mangrove forests for assessment of species diversity and distribution. *In-situ* mangrove inventory for biomass estimation and species distribution. Developed allometric models for non-destructive biomass estimation. Annual report compilation for NRSC (funding agency) and research article publication. Involved in teaching Post Graduation Diploma students (Advanced - DIP) in RSGIS and MPhil students of Oceanography and Coastal zone Management course.

- **Junior Research Fellow (2010-2012)**: Multiple projects- Provided technical and analytical inputs in the on-going research projects in the department. Worked in OCM-2 validation: assessment and validation of OceanColor algorithms to estimate the chlorophyll (planktonic) concentration in case II waters, PFZ-validation for field catch data vis-à-vis PFZ forecast generated by INCOIS, MoES, GoI. Reconstruction of Paleo-Tsunami events projects: assessment of various subsurface abraded foraminifera forms and there sedimentological and palaeontological characteristics.

- **Post Graduate Diploma in Remote Sensing and GIS (2009-10):** Dissertation- Appraisal of PFZ forecast procedure by MODIS and QuikSCAT data: a case study of Bay of Bengal, India. Use of fish catch data, satellite derived sea surface temperature, chlorophyll concentration and wind vector data to delineate potential fishing zones. The prediction capability was used to increase catch per unit effort with sustainable fisheries stock management in sync with carrying capacity of the oceanic-estuarine ecosystem.

TECHNICAL AND FIELD EXPERIENCE/SKILLS

Survey and inventory:

- Over ten years of working experience in wetland, coastal and marine ecosystems. Worked in *Sundarban*, *Bhitarkanika*, *Andaman* Island, Arabian Sea and Bay of Bengal.
- Identification of *mangrove* and *phytoplankton* species in Sundarban, Andamans and Case II waters of Bay of Bengal.
- Estuarine and off-shore water sampling, *on-board* physico-chemical data analysis and interpretation.
- Deployment of Moorings, Floats, Bouys in Arabian Sea (Three Apex bio-argo float were deployed (7122, 7123 & 7124)).
- RealTime ground truth data collection in synergy with AVIRIS-NG (NASA-ISRO) INDIA campaign flights over Indian part of Sundarbans, 2015 and 2017.

Cruises:

- **2013**-Participated in off-shore cruise with CSBOB, NRSC-ISRO, NIO-Vizag off the Vizag coast in Bay of Bengal. (Air-Water CO_2 flux estimation in Bay of Bengal).
- **2014**-Participated in off-shore cruise with INCOIS, IIT-M, CMLRE and Goa University by CMLRE, Ministry of Earth Sciences on FORV Sagar Sampada: Kochi-Pakistan-Gujrat-Goa (Bio-optical studies on harmful algal blooms (HAB's) in Arabian Sea). Collection of *in situ* optical and biological data to develop an algorithms specific to *Noctilica sci.* and discriminate *Noctiluca* and diatom dominated waters from open ocean case-I and coastal case-II waters.

Satellite data processing: Remote sensing applications using various types of satellite data including, not limited to Landsat series, LISS-III, IV, AVHRR, MODIS (aqua & terra), QuickSCAT, TRMM, LS8-OLI, Sentinel-1&2, AVIRIS-NG, Lidar and Sentinel-5P data. Processing and validation of *Ocean Color Monitor Oceansat-2 Data* (with OceanColor algorithms). Digital image processing by utilizing software, Cloud computing and Deep learning algorithms.

Instrument handling:

- **Land/Vegetation:** Optical Laser range finder (Bosch DLE-40), Handheld *Spectroradiometer* (ASD FieldSpec), *LAI* meter (CI-110), Spherical Densiometer (Model-A type), Tree increment borer (Haglöf Sweden), *SPAD* (chlorophyll index) meter, *PAR* sensor, Sun Photometer (Microtops-II), GPS & DGPS.
- **Gas/Atmosphere:** $CO_2 – H_2O$ ambient concentration *analyzer* (non-dispersive infra-red sensor) LICOR 840A, CHN Analyzer (Perkin Elmer CHNS/O, series II, 2400, USA). AWS- Weather Station (WS-2350, La Crosse Technology).

- **Water/Plankton:** D.O. meter, Salinity meter (WTW Tetracon325), LEICA microscope, Emerk Kit (Oxygen, Nitrate, Hardness, Acidity, Alkalinity, phosphate etc.), pH meter, UV-VIS Spectrophotometer, Luxmeter, Particle size analyzer (Sequoia LISST-III), Underwater Optical Radiometer (Satlantic Hyperpro-II), Underwater CTD with DO, Fluorometer and PAR (Seabird SBE 911 plus), IOP & optical profiling package (Wetlabs Seabird SBE49), Nansen sampler, SONAR, Grab sampler.

Software: Google Earth Engine (cloud), Digital Image Processing and GIS (*Erdas, ArcGIS, ENVI, SeaDAS, SARScape, PolSARPro, ESA- STEP & SNAP)*, Statistics (*SPSS, Origin pro-graphing, STATISTICA, PAST 2.5)*, Office software (MS, Visio and Adobe) and others (eCognition and TerrSet Libra GIS)

ACADEMIC BACKGROUND
- **PhD** in **Science** -**Title: Estimating aboveground biomass and forest cover dynamics of Sundarban mangroves, India: In situ and remote sensing approach**. *Supervisor*: Prof. (Dr.) Sugata Hazra. Director, School of Oceanographic Studies, Jadavpur University.
- **PG Diploma** in **Remote Sensing & GIS**: Jadavpur University, Kolkata, WB.
- **M.Sc.** in **Marine Biology** Gold Medal from Dept. of Ocean Studies and Marine Biology (DOSMB), Port Blair, Pondicherry University.
- **B.Sc.** in **Zoology (Honours)**: University of Calcutta.

AWARDS AND ACHIEVEMENTS
- Recipient of research project grant from DST-SERB. GoI as PI & NPDF, 2017.
- Successfully drafted, defended AVIRIS-NG project proposal and received research grant from SAC, ISRO, 2016.
- Recipient of Certificate of Excellence RIO+20 INDIA PROGRAM 2013.
- Recipient of DST PURSE JRF 2010, Jadavpur University.
- Awarded GOLD MEDAL in MSc. 2007, Pondicherry University.

CERTIFICATE COURSES
- EDUSAT Based two months Certificate Course on basics of **"Remote Sensing, Geographic Information System & GPS" -2010** from IIRS (ISRO) Dehradun and Jadavpur University, Kolkata.
- EDUSAT Based two months Certificate Course on basics of **"Hyperspectral Remote Sensing" -2010** from IIRS (ISRO) Dehradun and Jadavpur University, Kolkata.
- EDUSAT Based two months Certificate Course on basics of **"Advanced Remote Sensing, Geographic Information System & GPS" -2011** from IIRS (ISRO) Dehradun and Jadavpur University, Kolkata.
- EDUSAT Based two months Certificate Course on basics of **"Advances in Geoinformatics" -2011** from IIRS (ISRO) Dehradun and Jadavpur University, Kolkata.
- **Rio 20+** (United Nations Conference on Sustainable Development) **India Certification Program** 2013, Study in Sustainable development.
- **Understanding Phenology with Remote Sensing**. June-July, 2020. NASA's Applied Remote Sensing Training Program (ARSET).
- **Using Earth Observations to Monitor Water Budgets for River Basin Management II**. July-August, 2020. NASA's Applied Remote Sensing Training (ARSET) Program.
- **Remote Sensing of Coastal Ecosystems**. August-September, 2020. NASA's ARSET Program.
- **Remote Sensing for Mangroves in Support of the UN Sustainable Development Goal**s. November, 2020. NASA's ARSET Program.
- **Use of Solar Induced Fluorescence and LIDAR to Assess Vegetation Change and Vulnerability**. March, 2021. NASA's ARSET Program.
- **Satellite Observations for Analyzing Natural Hazards on Small Island Nations**. August, 2021. NASA's ARSET Program.
- **Monitoring Coastal and Estuarine Water Quality: Transitioning from MODIS to VIIRS**. September, 2021. NASA's ARSET Program.

- **Using the UN Biodiversity Lab to Monitor the Pulse of the Planet**. April-May, 2022. NASA's ARSET Program.
- **Atmospheric CO₂ and CH₄ Budgets to Support the Global Stock take**. May, 2022. NASA's ARSET Program.
- **Evaluating Ecosystem Services with Remote Sensing**. August, 2022. NASA's ARSET Program.
- **Selecting Climate Change Projection Sets for Mitigation, Adaptation and Risk Management Applications**. September, 2022. NASA's ARSET Program.

PROFESSIONAL TRAINING:

- Processing of **Ocean-color Data from OCEANSAT-2**, OCM-2 sensor using SeaDAS at NRSC, ISRO. Hyderabad. 2012.
- **Microwave Remote Sensing Applications**. Various application of Microwave remote Sensing with special emphasis on RISAT data at NRSC, ISRO, Hyderabad. 2012.
- **Hyperspectral Remote Sensing**. Training and Research in Earth Ecosystem, Space Application Center, ISRO, Ahmedabad. January 2017.

OTHER EXPERIENCES:

- Organized and executed complete field inventory program for AVIRIS-NG (NASA-ISRO) India campaign -Phase I & II, over Sundarban mangrove forests in 2016 and 2018 respectively in collaboration with Space Application Centre, ISRO.
- Supervision in sessional and semester projects in PGD course (Supervised six dissertations).
- Conducted training for fishermen community of Sundarban on "Use of GPS and its application in marine navigation".

PUBLICATIONS:

- **Manna S**, Raychaudhuri B. 2019. Retrieval of Leaf area index and stress conditions for Sundarban mangroves using Sentinel-2 data. ***International Journal of Remote Sensing***. 41(3):1019-39. ⬇
- **Manna S**, Raychaudhuri B. 2019. Stress mapping of Sundarban mangroves with Sentinel-2 images using Discriminant Normalised Vegetation Index (DNVI) and Fuzzy classification technique. ***Journal of Geomatics***. 13 (1): 111-117 ⬇
- Chaube NR, Lele N, Misra A, Murthy TV, **Manna S**, et al. 2019. Mangrove species discrimination and health assessment using AVIRIS-NG hyperspectral data. ***Current Science***. 116(7):1136. ⬇
- **Manna S**, Raychaudhuri B. 2018. Mapping distribution of Sundarban mangroves using Sentinel-2 data and new spectral metric for detecting their health condition. ***Geocarto International***. 22:1-9. ⬇
- Akhand A, Chanda A, Dutta S, **Manna S**, et al. 2017. Microphytoplankton species assemblages, species-specific carbon stock and nutrient stoichiometry in the shallow continental shelf of the northern Bay of Bengal during winter. ***Indian J. of Geo-Marine Sciences***. 46(09): 1827-1835. ⬇
- Akhand A, Chanda A, **Manna S**, et al. 2016. A comparison of CO_2 dynamics and air-water fluxes in a river-dominated estuary and a mangrove-dominated marine estuary. ***Geophysical Research Letters***. 28:43(22). ⬇
- Pal S, **Manna S**, Chattopadhyay B, Mukhopadhyay SK. 2016. Carbon sequestration and its relation with some soil properties of East Kolkata Wetlands (a Ramsar Site): a spatio-temporal study using radial basis functions. ***Modeling Earth Systems and Environment***. 2(2):80. ⬇
- Giri S, **Manna S**, Chanda A, et al. 2016. Implementing a Spatial Model to Derive Potential Fishing Zones in the Northern Bay of Bengal Lying Adjacent to West Bengal Coast, India. ***J. of the Indian Society of Remote Sensing***. 44(1):59-66. ⬇
- Chanda A, Akhand A, **Manna S**, et al. 2016 Mangrove associates versus true mangroves: a comparative analysis of leaf litter decomposition in Sundarban. ***Wetlands ecology and management***. 24(3):293-315. ⬇
- Latha TP, Rao KH, Sarma VV, Seetaram P, Choudhury SB, Nagamani PV, Dutt CB, Dhadwal VK, **Manna S**. 2015. Estimation of Air-Sea CO_2 Flux in the Coastal Waters of Visakhapatnam. ***J. of the Indian Society of Remote Sensing***. 43(3):647-52. ⬇
- Pal S, **Manna S**, Aich A, Chattopadhyay B, Mukhopadhyay SK. 2014. Assessment of the spatio-temporal distribution of soil properties in East Kolkata wetland ecosystem (A Ramsar site: 1208). ***J. of Earth System Science***. 123(4):729-40. ⬇
- **Manna S**, Nandy S, Chanda A, Akhand A, Hazra S, Dadhwal VK. 2014. Estimating aboveground biomass in Avicennia marina plantation in Indian Sundarbans using high-resolution satellite data. ***J. Applied Remote Sensing***. 8(1):083638. ⬇

- Chanda A, Akhand A, **Manna S**, et al. 2014. Measuring daytime CO_2 fluxes from the inter-tidal mangrove soils of Indian Sundarbans. ***Environmental Earth Sciences***. 72(2):417-27. ⬇
- Akhand A, Chanda A, Dutta S, **Manna S**, et al. 2013. Characterizing air–sea CO_2 exchange dynamics during winter in the coastal water off the Hugli-Matla estuarine system in the northern Bay of Bengal, India. ***Journal of oceanography***. 69(6):687-97. ⬇
- **Manna S**, Mondal PP, et al. 2013. Vegetation cover change analysis from multi-temporal satellite data in Jharkhali Island, Sundarbans, India. ***Indian J. of Geo-Marine Sciences***. 42(3):331-342. ⬇
- Chanda A, Akhand A, **Manna S**, et al. 2013. Characterizing spatial and seasonal variability of carbon dioxide and water vapour fluxes above a tropical mixed mangrove forest canopy, India. ***J. of Earth System Science***. 122(2):503-13. ⬇
- Chanda A, Akhand A, **Manna S**, et al. 2013. Spatial variability of atmosphere-biosphere CO2 and H2O exchange in selected sites of Indian Sundarbans during summer. ***Tropical Ecology***. 54(2):167-78. ⬇
- Akhand A, Chanda A, Dutta S, **Manna S**, et al. 2013. Dual character of Sundarban estuary as a source and sink of CO_2 during summer: an investigation of spatial dynamics. ***Environmental Monitoring and Assessment***. 185(8):6505-15. ⬇

BOOK CHAPTER/REPORTS:

- Manna S, Pal S, Chaube N, Mishra A, Hazra S. 2017 Mangrove assemblage in Sundarban. Spectrum of INDIA. ⬇
- Akhand A, **Manna S**, Mondal PP, et al. 2017. Estimation of Air-Sea CO_2 Exchange and Decadal Change of Surface Water fCO_2 in a shallow Continental Shelf Using in-situ and Remote Sensing Data During Winter. ***Environment and Earth Observation***. ISBN: 978-3-319-46008-6. Springer International Publishing. ⬇
- **Manna S**. 2010. (Report), Planning for safe nation. National conference on corporate intervention in disaster management. Proceedings, 18.11. pp.4-7.

CONFERENCE / SYMPOSIUM/ SEMINAR (abstract & papers):

- **Manna S**, Raychaudhuri B. 2018. (**Oral**). Stress mapping of Sundarban mangroves with Sentinel-2 images using Discriminant Normalised Vegetation Index (DNVI) and Fuzzy classification technique. National Symposium on **ADVANCEMENTS IN GEOSPATIAL TECHNOLOGY FOR SOCIETAL BENEFITS (ISG-NS, 2018).** December 5-7, Space Applications Centre, Ahmedabad, India.
- **Manna S**, Pal S, Chaube N, Mishra A, Hazra S. 2017 (**Oral & Paper**). Analysis of mangroves assemblage using AVIRIS-NG data and their correlation with in-situ edaphic and topographic attributes in Sundarbans, India. **Asian Conference on Remote Sensing (ACRS-2017)**. 1:1812. ISBN: 978-1-5108-5684-4 Curran Associates, Inc. NY, USA. ⬇
- Akhand A, Chanda A, **Manna S**, Hazra S, Kuwae T. 2016 (**Abstract**). Temporal Variability (Diurnal, Seasonal and Decadal Scale) of CO2 Dynamics and Air-Water CO2 Flux in a Tropical Macro-Tidal Estuary, East Coast of India. American Geophysical Union **2016 AGU Fall Meeting Program**. San Francisco. ⬇
- **Manna S** and Samanta K. (**Poster**) 2011. Climate change and Sundarban mangroves. Abstract publication and poster presentation in state state-level seminar sponsored by DST- Govt. of WB. 23-24 March, 2011.pp 25-26.

Declaration

I, Sudip Manna, hereby declare that the above-mentioned information is correct up to my knowledge and I bear the responsibility for the correctness of the above-mentioned particulars.

Dated: 17. 02. 2026
Place: Barasat   **SUDIP MANNA**