UC SANTA BARBARA
Bren School of Environmental Science & Management

MASTER OF ENVIRONMENTAL DATA SCIENCE CAPSTONE PROJECTS:

REQUEST FOR PROPOSALS 2025-2026

OBJECTIVES

Bren School Capstone Projects help clients working in the environmental field find data-driven solutions to challenges facing their organization. Serving as the Master of Environmental Data Science (MEDS) thesis, Capstone Projects are five-month collaborations between a client and a team of highly dedicated MEDS students. Projects give businesses, government agencies, NGOs, researchers, and other organizations the opportunity to work with a small group of 3-4 talented students to help tackle their environmental problem by making meaningful and actionable data science contributions. Clients can expect the group work to be equivalent to one full-time employee engaged for five months.

Through their Capstone Projects, students develop skills in project management, team-oriented data science, solution design and implementation, and effective stakeholder communication, as well as technical skills such as data processing and analysis, creating reproducible workflows, quality assurance, interface development, data visualization, and technical writing. The projects also serve to expand both parties' professional networks by connecting future and current environmental data science leaders.

The Bren School seeks creative, interdisciplinary proposals for MEDS Capstone Projects that leverage data science and analysis coupled with understanding of environmental science and project management skills.

MEDS CAPSTONE PROJECT REQUIREMENTS

- Product-Oriented. Capstone Projects prepare students to produce meaningful data science solutions to today's environmental problems. To this end, potential project deliverables may include, but are not limited to:
    - Robust exploratory analysis using statistical methods
    - Reproducible and streamlined data processing or analysis pipelines
    - Data management tools
    - Updatable and reproducible analytical reports
    - Custom data visualizations and maps
    - Educational and outreach tools
    - And more

- Data-Driven. Projects must provide existing data for students to analyze, process, or manipulate, or clearly identify publicly-available datasets that could or should be used. The datasets required for the project must be available at the time of the proposal submission. Projects that require data collection or a non-disclosure agreement (NDA) will not be considered.
- Clearly Defined. Proposals should present a clearly defined scope and specific tasks that are attainable by the approximate equivalent of one full-time employee within a five-month period.
- Collaborative, Yet Flexible. A spirit of trust and collaboration by all parties is expected; client involvement should support students while allowing them to develop their own ideas and approaches. Successful projects have clients who can engage throughout the project, often meeting a couple times a month. Given the short timeline of the project, clients must be able to commit to at least monthly meetings during the UCSB Winter and Spring quarters (January - June 2026) and be responsive via email throughout the project duration.

PROJECT ATTRIBUTES TO AVOID

The following are examples of project ideas that do not adequately meet the needs of students:

- Automation of rote tasks (e.g. camera trap image identification)
- Dependency on proprietary software (e.g. ESRI ArcGIS)
- Research exploration with a loosely defined approach
- Development of complex interactive dashboards

WHAT SKILLS WILL MEDS STUDENTS HAVE?

At the time MEDS students begin their Capstone Project, they have competency in statistics, remote sensing, geospatial analysis, data ethics, and Python and R programming for environmental data manipulation through their coursework. Additional coursework on machine learning, data visualization, environmental modeling, and database management will take place concurrently with the Capstone Projects. Successful proposals will further the student's development of environmental data science skills and typically include several of the following activities:

- Independent development of R or Python software
- Data discovery
- Data cleaning

- Data visualization
- Model implementation
- Reproducible workflows development

Projects that cannot be completed by the end of May 2026 are not feasible and will not be considered.

SUBMITTING A PROPOSAL

The Bren School invites any agency, company, organization, or individual facing an environmental data challenge to submit a proposal for a MEDS Capstone Project. Past clients of Bren master's projects have included local, state, and federal agencies, corporations, think tanks, non-profits, and NGOs.

Proposals will be reviewed during the UCSB Fall Quarter by the Bren School Capstone Project Committee. The Committee will evaluate proposals on the criteria outlined in the Capstone Project Requirements section above. Approximately 8-9 Capstone Project proposals will be selected for 2025-2026.

All proposers must contact the Bren School at projects@bren.ucsb.edu as the first step in proposal development. Please include a brief introduction to the client and a general description of the project idea. Bren staff can assist with project scoping, offer feedback, and connect you with faculty, staff, or students for support. Because student interest is essential for selection, clients are encouraged to collaborate with current MEDS faculty and/or students.

PROPOSAL FORMAT & CONTENT

Project proposals are limited to three pages (excluding supporting materials). Proposals should be submitted as PDF documents and must include all the following information:

1. Cover page including: project title, name and contact information of the proposers, and client information.
2. Proposed project (3 pages max), including the following sections in this order:
    a. Objective
    b. Environmental Motivation
    c. Data Science Need
    d. Deliverables
    e. Broader Impacts
    f. Data Access and Availability
    g. Project Requirements

3. Supporting materials (not counted toward 3-page limit)
    a. References
    b. Client letter of support
    c. Budget and justification
    d. Additional background resources for students

More information on each section is given below.

Cover Page:

a. Title, descriptive of the environmental data science problem to be solved.
b. Proposers' names and contact information. Include email, title, and affiliation of each proposer. Proposers may be clients, faculty, or Bren students. If you have worked actively with a faculty member or students to write the proposal, please list them as co-authors. If more than two Bren students contribute to the proposal, the client and/or students must select two primary student authors. If the proposal is selected, the two primary student authors will have the option to be guaranteed membership in the group.
c. Client name and contact information. Include email, title, and affiliation. The client is the primary representative from the client organization and the main point of contact for students. All clients listed on the proposal will be notified at the end of the UCSB Fall Quarter (December 2025) regarding the status of the proposal. If you would prefer to limit notification of the proposal status to specific individuals, please note this in your proposal.

Proposed Project (3 pages max):

a. Objective. In 1-2 sentences, explain your project's objective.
b. Environmental Motivation. In 1-2 paragraphs, describe the problem or question you are asking students to tackle. Discuss the environmental and technical motivation for your project and why it is important from the perspective of the client. Address any equity or environmental justice implications of the project.
c. Data Science Need. In 1-2 paragraphs, detail your concrete data science need. Discuss the current hurdles, status of existing approaches, or technical gaps this project aims to fill.
d. Deliverables. MEDS Capstone Projects are product-oriented. Successful project proposals include a concrete expected deliverable students can work towards. In 1-3 paragraphs, describe the deliverable students are expected to work towards during the capstone project by responding to A, B, and C below.

A. What are the specific deliverable(s) that the client expects from the project? Please be as specific as possible.
B. Who is the audience for the deliverable(s) and how will the audience interact with it?
C. Is the deliverable a product intended to be used by the public or a community after the completion of the project (e.g. a web application or dashboard)? If this is the case, the client or their organization must demonstrate in the client letter of support their willingness and ability to provide long-term support to the deliverable post-project completion, including application troubleshooting, deployment, and maintenance. Students are not expected or obligated to maintain the deliverable post-project completion.

e. Broader Impacts At the Bren School, we hope that students' work will have impact beyond the lifetime of their capstone project. As such, the strongest proposals will demonstrate the broader impacts of the capstone project's deliverables in 1-2 paragraphs. These impacts *include, but are not limited* to:

A. Contributing to societal well-being: The results of the project improve the lives of individuals in society, including by supporting environmental justice goals.
   Example: Identifying Disadvantaged Communities Using Cumulative Environmental Burdens
B. Supporting underserved communities: The client of the project represents a community that is traditionally underserved by data science.
   Example: Improving Access to Fish Consumption Advisories and Maintaining Confidence in California's Healthy Seafood Products
C. Engaging the public: The project will provide knowledge of data science or environmental issues to the public that informs action or increases participation in decision-making..
   Example: Modeling the Impact of Decarbonization on Labor in California's Central Coast
D. Environmental education and outreach: The project increases scientific literacy of data science and/or environmental issues.
   Example: Climate Hazards Data Integration and Visualization for the Climate Adaptation Solutions Accelerator (CASA) through School-Community Hubs
E. Fostering novel partnerships: The project creates partnerships between groups that rarely collaborate.

Given the compressed timeline of capstone projects, broader impacts must be based on the core deliverables of the project and not include ancillary or outreach activities to achieve impact.

Not all projects will have clear broader impacts. In these cases, we ask that authors leave this section blank. Projects may still be selected if they are strong in other regards.

f. Data Access and Availability

In this section, describe the data the students will use in their capstone project by responding to A, B, C, and D below. Note that ***proposals without a list of direct links to initial data will not be considered.***

A. What data is needed? Describe the data that the students will use in the project. Projects that require a non-disclosure agreement (NDA) for data access will not be considered.
B. How will initial data be provided to students? Data should be *immediately* available upon project start (at the latest on January 5, 2026, start of the UCSB Winter Quarter). Briefly discuss whether your data availability falls within one of the three data availability scenarios outlined below. If data access requires specialized training, the client is expected to provide training to students within the first two weeks of the project. Any projects requiring additional data collection including, but not limited to, field work and surveys, will not be considered due to project time constraints.

    1. All data to begin the project are publicly available online (e.g. through data repositories or GitHub). Data can be downloaded directly through provided links.
    2. All data to begin the project are owned by the client and available via a cloud file storage service (e.g. Google Drive, Box).
    3. All data to begin the project are publicly available through an API (e.g. access to large-scale climate model data). Additional understanding of software, R, or Python libraries may be needed in order to access the data.

C. Include a list of direct links to access the complete datasets and/or model.
D. Will the project potentially require additional datasets beyond what is provided by the client? If so, what kind of data might be additionally required? While the project must include readily available data for students to start working on it, limited data exploration of existing, publicly available datasets can be a part of the project. Briefly discuss if students may need to look for additional datasets from the ones initially provided by the client to complete the project.

g. Project Requirements: In 1-2 paragraphs, describe any requirements for the implementation or solution design of the project by responding to A and B below. Specificity is encouraged.

We also welcome projects that do not have predefined approaches and instead asks the students to design the approach.

A. Are there any specific, predefined approaches that students would need to adhere to to create the project deliverable? For example, requiring students to use specific models previously developed by the client. If there are no predefined approaches for the implementation of the project, please specify so.
B. Are there any technical requirements for the implementation of the project? This may include, but is not limited to, expected use of certain programming languages (e.g. R, Python, SQL), computational tools (e.g. cloud computing, access to servers), or software (e.g. Google Earth Engine, Microsoft Excel). If the client is able to provide specific computational resources, they should be included in the client letter of support (see below). If no technical requirements exist, please specify so.

SUPPORTING MATERIALS (not counted toward 3-page limit):

a. References. Due to the scientific and technical nature of many interdisciplinary environmental problems, authors are encouraged to include references to support their proposal.
b. Budget and justification. Each group will receive $250 from the Bren School to cover the group's basic operations and printing. This funding will be held at the school and only accessible by the students. The students will determine how to allocate the funds to cover expenses such as conference calls, file storage, etc. If the proposed project requires additional funding for completion, such as specific software, datasets, or tools, the client must provide that funding. If needed, please include a budget with a description of anticipated costs that will be covered by the client.
c. Client letter of support. Clients must submit a letter of support to clearly describe their commitment to provide data, additional funding, or any other resources for the project. The details of these commitments must be articulated clearly in the letter of support addressed to the Capstone Project Committee.
c-i. Funding: If the proposed Capstone Project requires more funding than provided to the students by the Bren School, then the client is responsible for providing those funds. Please clearly describe the client's financial commitment in the letter of support. Funds provided by the client for a specific group project ideally should be managed by the client. Grants to the University of California for specific Capstone Projects would require a Bren faculty principal investigator, preauthorization by UCSB's Office of Research, and additional indirect costs up to 55%; gifts to the Bren School for a specific group project require an additional 6% for indirect costs. (If you are interested in making a gift to the Bren School, please contact Assistant Dean

for Development Lotus Vermeer.)

c-ii. Data: For MEDS Capstone Projects, the client must provide data or facilitate data acquisition. The client should specify the type and content of the data and how it may be accessed. It is preferable for the data to be provided to the students with no restriction for publication. We cannot accept projects that require a non-disclosure agreement (NDA) for data access.

c-iii. Additional resources. Please provide additional resources that would be helpful for students to understand the environmental background or technical approaches required for your project. This may include articles, web resources, technical reports, or scientific publications.

Project proposals are due via email on Friday, October 17, 2025 by 5:00 P.M. PT to projects@bren.ucsb.edu.

TIMELINE

Summer: Bren School releases a Request for Proposals. New proposals for MEDS Capstone Projects are submitted by prospective clients.

Fall Quarter (September - December): Last day to submit proposals is Friday, October 17, 2025. Projects are selected in late November; students and faculty advisors are assigned, clients are notified by the middle of December. Clients will have their first meeting with students in mid-December.

Winter Quarter (January - March): Students refine project objectives, review datasets, and develop a design and implementation plan. Clients meet with the students and faculty advisor to review progress and reevaluate objectives, as needed. Students present their design plan in a presentation to Bren School faculty and begin working on data analysis, processing, and manipulation.

Spring Quarter (March - June): Clients meet with the students and faculty advisor to review progress and answer questions, as needed. Following the design plan, students complete the data science objective, associated project repository, and technical documentation. Students then present their findings, interface, or data visualization to the public, client, and Bren community.

THINKING ABOUT SUBMITTING A PROPOSAL?

To register your interest in submitting a proposal, please contact the Bren School Capstone Project Coordinator (projects@bren.ucsb.edu). The coordinator answers questions and provides guidance regarding proposal format. They also connect proposal authors with Bren faculty, staff, and students who can provide additional guidance and assistance in writing the proposal, as needed.

LIMITED INTELLECTUAL PROPERTY LICENSE

By participating in the Capstone Project, the client agrees that: (1) its logo and other "publicly available" intellectual property may be used by the Bren School (e.g., its students, faculty and staff) solely in connection with the specific Capstone Project in which the client participates, and (2) any Capstone Project's deliverables containing the client's logo or other intellectual property may be made publicly available via the Bren School's website and other formats. Upon written request by the client, a Capstone Project incorporating the client's intellectual property will include a disclaimer identifying the client as the owner of the intellectual property and that all rights are reserved by the client. The client may, upon written request, withhold consent to use certain intellectual property owned by the client.