UC **SANTA BARBARA**
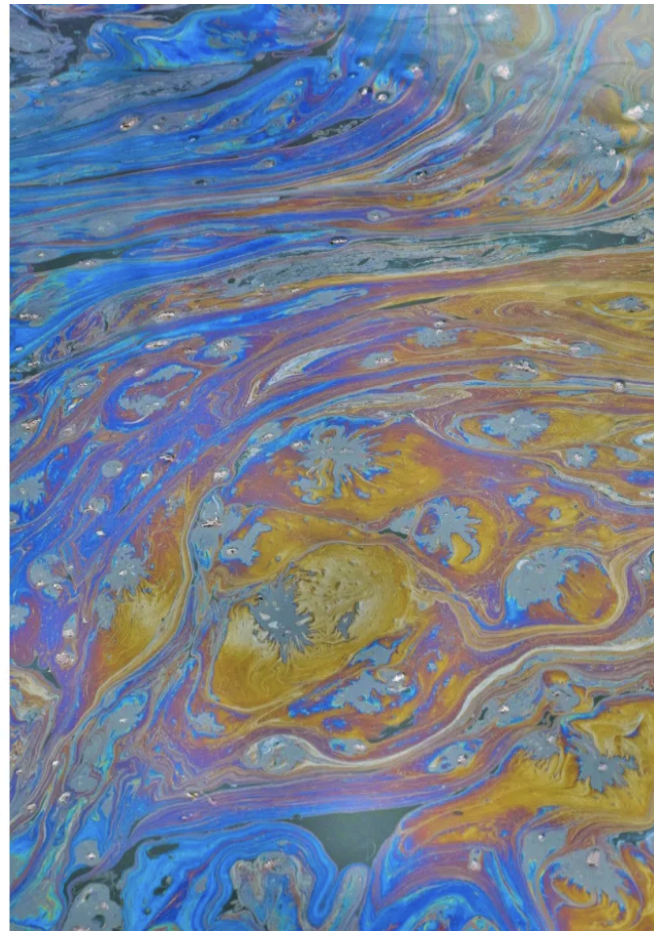**Bren School of Environmental Science & Management**

BREN SCHOOL OF ENVIRONMENTAL SCIENCE & MANAGEMENT

MESM GROUP PROJECT PROPOSAL 2025-2026

Evaluating the Equity and Efficacy of Los Angeles County's Stormwater Capture Projects

(credit: Heal the Bay)

Client: Heal the Bay
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Objectives

Anthropogenic climate change will increase extreme storm events, thus increasing urban stormwater runoff draining into the ocean and other waterways (Swain et al., 2018). In Los Angeles County (County), stormwater is not treated before the polluted runoff is dumped into the ocean. The County has started implementing stormwater capture projects to address this problem (e.g. stormwater capture facilities, rain gardens, pervious pavements, rain barrels). This group project (GP) aims to understand the efficacy of these stormwater capture initiatives on water quality and provide the County with recommendations for future project investments.

As an environmental non-profit in Santa Monica, Heal the Bay has been advocating for stormwater capture initiatives for decades. Their science and policy team has been monitoring beach water quality for 35 years, and water quality at freshwater recreational sites for 7 years. This GP will utilize their collected data to evaluate the impacts of stormwater capture projects on beach and river water quality in Los Angeles County. Specific objectives are:

1. Conduct a multi-year analysis on Los Angeles County beach and river water quality data to understand how water quality has changed within this time-frame.
2. Determine the impacts on water quality in areas where stormwater capture projects have been implemented.
3. Based on surface water quality analysis, identify areas in Los Angeles where stormwater capture projects should be implemented in the future and make recommendations to the county for project investment.

Implications

Urban runoff is cited as the number one source of pollution impacting surface water quality in Los Angeles County (MS4 Permit). The County, with diverse micro-climates, receives approximately 70% of its rain between the months of January and March (Steele et al., 2018). Since the county's creation in 1850, Los Angeles has become increasingly urbanized (Ackerman & Weisberg, 2003). Urbanization is linked to an increased percentage of impervious cover—surfaces that prevent soil from absorbing the water—which results in increased flooding and large volumes of stormwater runoff (Gallo et al., 2020; Arnold & Gibbons, 1996). This runoff is funneled into the ocean through the stormwater drainage system and the four main watersheds: the Ballona Creek, the Dominguez Channel, the San Gabriel and the LA River. Los Angeles's sewage system is separate from its stormwater drainage system; while sewage is treated before its effluent is dumped into the ocean, stormwater is not (Gallo et al., 2020). Trash, motor-oil, pet waste, pesticides, and heavy metals are among some of the pollutants that are carried by stormwater into rivers and the ocean, degrading water quality and causing harm to both humans and marine organisms (Gallo et al., 2020; Greenstein et al., 2004). As a result, approximately 3.5 million sick leaves are taken in California per year due to contaminated beach waters (Li & Zhang, 2019). The public is advised to avoid swimming near storm drains year round and for 3 to 5 days after a rain event (Ackerman & Weisberg, 2003).

In recent years, the County has begun capturing stormwater through small and large-scale projects to increase surface water quality, recharge its groundwater, and decrease its reliance on imported waters (County of Los Angeles, 2024). In the 2023-2024 rain year, the County captured more than 96.3 billion

gallons of stormwater (County of Los Angeles, 2024). As a result, less water—and less pollution—is being diverted to the ocean through storm drains and rivers. Through this analysis, this GP can be utilized to facilitate critical advocacy to improve stormwater regulation, planned for summer of 2026. All municipal stormwater runoff in Los Angeles is regulated under the Clean Water Act through a single permit called the Municipal Separate Storm Sewer System (MS4) Permit, which requires, among other things, the implementation of stormwater capture projects. This permit will be updated in summer 2026, and it will be the only opportunity this decade to improve these regulations. Currently, there is no comprehensive assessment of progress under the MS4 Permit, though initial reporting indicates that only minimal progress has been made under these regulations since 2012. This GP can be used to assess the implementation of stormwater capture projects, determine if they are resulting in significant water quality improvement, and make recommendations to the LA Regional Water Quality Control Board to improve stormwater regulation and accelerate project implementation where it is needed most.

Equity

Beach and river water quality impact all residents of the County, however, future extreme weather events will cause power outages and blackouts that will disproportionately affect disadvantaged communities (Perez et al., 2023). The beach is a refuge from hot temperatures during the summer, and as temperatures rise, beach access will become vital for those without access to air-conditioned and freshwater recreational spaces. However, contaminated waters will lead to more frequent and longer beach advisories due to poor water quality from stormwater runoff, causing disproportionate health impacts on low-income communities that lack air conditioning (Arnold & Gibbons, 1996). Thus, it is imperative to put into place infrastructure that will decrease contamination of recreational waters, and address the pollution as close to the source as possible.

Available Data

California AB411, established in 1997, requires counties within the state to sample and publish beach water quality data. The program reports on three indicator bacteria which are used to determine water quality and beach advisories: enterococcus, total coliforms (TC), and fecal coliforms (FC) (State Water Resources Control Board, 2018). Per AB411, this data is publicly available and can be used by the GP to conduct an analysis on beach water quality.

Additionally, for 35 years, Heal the Bay has analyzed this data and transformed it into letter grades which they have published weekly to inform the public on beach water quality. This data is available through their Beach Report Card. AB411 only applies to beach water data, so Heal the Bay has also been collecting and reporting river water quality data for 7 years. Furthermore, information about existing and planned stormwater capture projects is available in the MS4 Permit annual reports, which can be accessed upon request from the LA Regional Water Quality Control Board. Heal the Bay staff will assist in making a Public Information Act request for these documents.

- Heal the Bay's Beach Report Card: https://beachreportcard.org/33.960501369769304/-118.41661269693238/12
- Heal the Bay's River Report Card: https://healthebay.org/riverreportcard/
- Public water sample data required under AB411: https://www.waterboards.ca.gov/water_issues/programs/beaches/search_beach_mon.html

- MS4 Permit website:
  https://www.waterboards.ca.gov/losangeles/water_issues/programs/stormwater/municipal/index.html

Possible Approach

Database:
- Build out a cloud-based, publicly accessible database on historical beach and river water monitoring including data on sampling date, sampling location, and bacteria concentrations; and on stormwater projects including data on project location (lat/long), capacity (acre-feet), and date the project was made operational.
- Create an interactive R Shiny map of stormwater capture projects throughout the County.

Visual analysis of data:
- Conduct a temporal analysis of beach and river water quality to determine if water quality is improving, declining, or remaining stagnant over time at individual sampling locations.
- Conduct a spatial analysis of the most recent data to determine if water quality changes throughout the coastal watersheds, and to determine who faces higher water pollution burdens today.
- Identify when and where existing stormwater capture projects were implemented, and use the temporal analyses of local monitoring locations to determine if water quality improved when the project was made operational.

Recommendations:
- Identify which existing projects resulted in the biggest improvement in local water quality, and identify where current water pollution exists that must be addressed.
- Within the final report, provide recommendations to the County for future stormwater project investments which Heal the Bay can utilize in their advocacy.
- Write and submit a public comment to the County and the LA Regional Water Quality Control Board regarding findings and recommendations derived from the project.

Deliverables

In addition to the required group project deliverables, this project will produce one or more of the following:

1. Interactive map of stormwater capture projects in Los Angeles County.
2. Publicly-accessible database for beach and river water quality data and current stormwater capture projects.
3. Recommendations for where new stormwater capture projects should be implemented, possibly through a public comment report.

Internships

Heal the Bay will provide one paid summer internship position for a project team member during summer of 2025. The selected intern will join the Heal the Bay Stream Team and gain hands-on experience in river water quality monitoring, sample collection, and/or data analysis. They will also contribute to our weekly grade reports and annual River Report Card. Stream Team members must be available for

approximately 10 hours per week for approximately 16 weeks between June and September, and will be compensated at $17.50/hour. Other group members are welcome to apply to the Stream Team, and may be selected, but one spot will be guaranteed. Furthermore, we are offering up to two unpaid internship opportunities for additional students on the team, providing exposure to key areas of our work, including policy advocacy, community engagement, and scientific research.

Budget and Justification

It is not anticipated that the project will require additional funding outside of the $1000 from the Bren School.

Citations

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Steele, J. A., Blackwood, A. D., Griffith, J. F., Noble, R. T., & Schiff, K. C. (2018). Quantification of pathogens and markers of fecal contamination during storm events along popular surfing beaches in San Diego, California. *Water research*, *136*, 137-149.
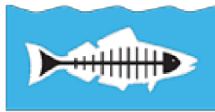
Heal the Bay

January 10, 2025

Master of Environmental Science (MESM) Group Project Committee
Bren School of Environmental Science & Management
University of California, Santa Barbara
2400 Bren Hall, Santa Barbara, CA 93106

Subject: Letter of Support for Group Project Proposal - Evaluating the Equity and Efficacy of Los Angeles County's Stormwater Capture Projects.

Dear Group Project Committee,

Heal the Bay is pleased to express our strong support for the proposed Group Project titled *"Evaluating the Equity and Efficacy of Los Angeles County's Stormwater Capture Projects"* and to commit to serving as the client for this project if selected by the Committee. This research will addresses the number one source of surface water pollution (urban runoff) and identify where investments are need for new multi-benefit stormwater capture projects. As such, this research aligns with Heal the Bay's mission to ensure clean, healthy, and safe waterways for all.

Heal the Bay is committed to provide the student team with comprehensive access to our extensive water quality database, including historical data from our Beach Report Card and River Report Card programs. This includes bacterial concentration metrics, water quality grades, and sampling site information. Additionally, we will assist in accessing publicly available data, such as MS4 Permit annual reports, which document stormwater capture project implementation and outcomes. Annelisa Moe, Heal the Bay's Associate Director of Science & Policy, will serve as the primary client contact for this project, and will provide ongoing mentorship and technical expertise.

Heal the Bay is pleased to offer one paid summer internship position for a project team member during summer of 2025. The selected intern will join our Stream Team and gain hands-on experience in river water quality monitoring, sample collection, and data analysis. They will also contribute to our weekly and annual River Report Card publications. Furthermore, we are offering up to two unpaid internship opportunities for additional students on the team, providing exposure to key areas of our work, including policy advocacy, community engagement, and scientific research.

We believe this collaborative research has the potential to make a significant impact by informing our ongoing advocacy efforts and advancing policy discussions around stormwater management and the MS4 Permit renewal process. We are enthusiastic about the opportunity to work with the talented students of the Bren School on this critical issue. Thank you for considering our support for this proposal. Please do not hesitate to contact me at amoe@healthebay.org for further information or to discuss the details of this collaboration.

Sincerely,

Annelisa Ehret Moe
Associate Director, Science & Policy
Heal the Bay