



Photo: Andy Patrick



The UCSB Bren School Group Project Proposal

Finding Balance in Our Urbanized Watersheds –
Policy Recommendations for Alternative
Emergency Debris Management Actions in
Santa Barbara County

Identification

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Proposal

Objective

Santa Barbara Channelkeeper (SBCK) is interested in understanding the following objectives as they apply to watershed management in Santa Barbara County.

1. A more comprehensive understanding of the natural sediment transport to Goleta Slough, Carpinteria Salt Marsh, and through the Montecito watershed, including Montecito Creek, San Ysidro Creek, and Romero Canyon Creek.
2. Analysis of the effects of debris management including routine removal of sediment from Goleta Slough and Carpinteria Salt Marsh; emergency debris removal from creeks in Montecito; and impacts on the marine environment and the community due to debris deposition at Goleta Beach and Carpinteria Beach.
3. Policy recommendations for Santa Barbara County watershed management, with the primary focus on alternatives to recent use of emergency permits to manage flood debris material.
4. Investigation of alternative flood management approaches, including investment in low-impact development strategies, green infrastructure, and other natural systems that will serve as guiding resources for the development of a long-term regional sediment management plan.

Background

The primary purpose of the Santa Barbara County Flood Control and Water Conservation District (SBCFC) is to “provide flood protection and to conserve flood and surface waters for beneficial public use” (SBCFCWD, 2001). SBCFC is responsible for channel maintenance, design, and capital improvements for active flood control zones, which includes routine debris basin management for eighteen debris basins in Santa Barbara County. Debris basins are designed to capture sediment, rocks, vegetation, and other material to better protect downstream infrastructure and property from flood risks during heavy rainfall. Accumulated debris within waterways and debris basins is excavated periodically. SBCFC’s routine maintenance of debris basins across the county is well defined, including an Environmental Impact Report (EIR) which documents the impact of maintenance activities. Historically, SBCFC disposed of this material in the upland locations of Buellton, Santa Paula, the Foothill Landfill, and other county property.

Starting in 1994, as part of the Goleta Slough Management Program, routine dredging of the Goleta Slough was deposited within the surf zone at Goleta Beach. Then in 2018, in response to the Montecito debris flows, SBCFC sought and secured emergency permits from several agencies which allowed debris basin material to be rapidly excavated and transported from the Montecito and Carpinteria area watersheds to dump at sites within the surf zone at both Goleta Beach and Carpinteria Beach. In 2023, SBCFC secured emergency permits to undertake the debris removal and placement of debris in Goleta Beach and Carpinteria Beach due to intensive rain and flood events. Updated permitting needs to be developed to account for increased extreme weather events and allow for SBCFC to conduct maintenance activities that don’t require the use of emergency permits and less stringent regulations. Further analysis of permitting requirements are necessary to address the impacts of emergency permit operations that have caused short-term beach closures due to construction activities and sediment dumping; degraded water quality as a result of increased turbidity and elevated fecal indicator bacteria (Santa Barbara Public Health Department, 2018); and long-term impacts on the ecosystems where sediment is extracted and deposited which has impaired coastal ecosystems by reducing species richness, abundance, and biodiversity of intertidal biota (Manning et al., 2014; Peterson et al., 2000; Schooler et al., 2019; Wooldridge et al., 2016). While dredging operations and debris basin clearing are necessary to reduce flood risk, more frequent and intense storm events warrant an updated permitting and environmental review of emergency activities to address the near- and long-term environmental and social impacts of regional debris management.

In natural systems, sediment and debris move gradually through the watershed before eventually being deposited within the coastal zone. This process provides needed sediment and nutrients to beaches and marine environments. Historically, flood control infrastructure has significantly modified and impacted this natural process within entire watersheds, primarily through the interruption of natural sediment transport. In the upper reaches of the watershed, for example, Southern California steelhead, an endangered indicator species, require a certain amount of sediment in creeks to maintain a viable trout reproduction environment (NMFS, 2023). Downstream, between 70% and 85% of California’s beach sand is delivered by rivers (Sherman et al., 2002) and in 1999, the California State legislature stated that “many state beaches are in an advanced state of erosion and are disappearing because of human-induced impacts produced by inland development and watershed modifications” (AB64, 1999, Sec. 1e).

Green infrastructure allows for natural areas to provide flood protection, habitat, and cleaner air and water (EPA, 2016). Successful nature-based projects in California such as the Napa River Flood Protection Project, and the Tijuana Wash and Greenway Restoration Project highlight the effectiveness of utilizing natural materials and ecosystem functions in watershed management.

In 2014 the National Marine Fisheries Service (NMFS) delivered a jeopardy biological opinion (BO) for Southern California steelhead in several creeks in Santa Barbara County (Bissonnette, et al. 2022). In response, in 2016, Beach Erosion Authority for Clean Oceans and Nourishment (BEACON) and SBCFC submitted a grant application to the Ocean Protection Council that proposed a project to remove debris basins and provide modifications for fish passage for creeks in Montecito in response to this BO. The project incorporated habitat and watershed restoration and natural infrastructure elements as part of an adaptive management plan with long-term benefits including habitat restoration, flood management, regional sediment management, and coastal erosion management (Potter, 2016). In recent years, SBCFC has taken steps to utilize natural solutions to achieve environmentally considerate flood management, including modifying three debris basins for fish passage, with two more planned to be modified by 2024. The habitat and watershed restoration and natural infrastructure solutions that have yet to be fully adopted and implemented in these watersheds still provide promising opportunities that should continue to be considered for long-term watershed management in Santa Barbara County.

In 2021, graduate students at the UCSB Bren School conducted extensive modeling and cost-benefit analysis of various flood control strategies, focusing on feasible sediment and debris flow management solutions such as the installation of slotted outfalls, beach nourishment, and market sale of sediments. The findings documented in their paper, "Post Fire Debris Flows: Leveraging Science for Environmental Management and Community Resiliency," provide an analysis of the sediment transport in watersheds of Montecito and conclude that slotted debris basins are the most cost-effective, long-term option for SBCFC to address their sediment issues and that trucking sediment is the least cost-effective way to manage sediment of the approaches analyzed. This paper serves as a guide to address the cumulative environmental impact of emergency debris management on riparian and marine ecosystems as well as socio-economic impacts on the community. Further analysis that builds on these findings, as well as other previous research on these issues, would allow for a needed, and more comprehensive understanding of the environmental and social impacts of debris management, especially regarding alternative emergency disposal actions and new nature-based flood control technologies. In a publication on the dangers of disaster-driven responses to a changing climate, Anderson et al. state, "...it is necessary to examine the effects of human activities intended for societal recovery and resilience and ensure they do not compound the potential negative consequences of the extreme climate events they are designed to address."

Implications

As climate change increases the severity, frequency, and risks associated with extreme weather events, SBCFC is planning to address these issues. For example, SBCFC is in the process of initiating a Montecito Flood Control Master Plan, with initial conceptual modeling that incorporates eight new debris basins. In addition, the County is working on the development of a regional sediment management plan. These projects could result in new flood control infrastructure, and maintenance of these proposed debris basins will increase sediment interception and removal from the Montecito watershed. They would also likely result in continued emergency debris dumping at Goleta Beach and Carpinteria Beach as extreme storm events become a more regular occurrence. As the demand for interventional adaptations on coasts to climate change grows (Staudinger et al. 2012), a better understanding of the way sandy beach ecosystems respond to and recover from disturbance, including sediment filling, is imperative (Manning, L., et al., 2014). SBCFC master planning for new flood control infrastructure should include a comprehensive analysis of the environmental and social impacts of all debris management actions as climate change intensifies storm events in the region. SBCK is interested in contributing to SBCFC's flood control planning by identifying alternatives to emergency debris management and identifying improved long-term watershed management solutions that minimize impacts to important habitats and communities in Santa Barbara County.

Equity

Use of coastal resources and access to clean water should not be unnecessarily impacted due to management and policy decisions, nor should unequal impacts be experienced in neighboring communities of differing socio-economic status. Emergency debris dumping on Goleta Beach and Carpinteria Beach has impacted coastal users due to temporary beach closures and impacts to water quality (Li, D. et al., 2020). While there is no definitive information to confirm that current emergency debris management activities are resulting in environmental inequities, the socio-economic differences between Montecito, Goleta, and Carpinteria raise questions regarding the differing environmental and social impacts within these communities. Therefore, the proposed project aims to examine the equity and justice implications of various debris management solutions.

Available Data:

SBCK will provide the Bren GP student research team with a preliminary list of relevant papers, permits, and documents to support the literature review and research endeavors. Three fundamental resources include a cost-benefit analysis of post-fire debris flows (Bissonnette, et al. 2022), the distribution of organic material in intertidal and nearshore marine sediment due to debris deposition (Lowman, H.E. et al. 2022), and surf zone microbiological water quality follow emergency debris flow beach nourishment activities (Li, D. et al., 2020). This body of UCSB-led research provides an important foundation to build upon and guide further analysis to assess the effects of emergency debris removal and translocation. Additionally, SBCFC data will provide a foundation for impact assessment. Furthermore, a growing body of research on low-impact design and natural flood control systems will be analyzed to inform recommendations for better watershed management.

Possible Approaches:

The following is a general outline of SBCK's proposed approach for executing this research project. However, the approach will be further refined alongside student and advisor input as further investigation illuminates the best path for achieving intended outcomes.

1. Complete an in-depth literature review of relevant source material to gain a comprehensive knowledge of the policy, management, permitting, environmental, and social considerations impacting flood control and debris management in Santa Barbara County as well as examining relevant case studies from other regions.
2. Conduct expert and community member interviews to understand first-hand accounts of debris management and sediment deposition within Santa Barbara County.
3. Perform GIS analysis of sediment translocation, starting with SBCFC data, within Goleta, Carpinteria, and Montecito watersheds and develop a framework for assessing impact by expanding the analysis to include additional environmental and social impact parameters including, but not limited to, water quality indicators, marine ecosystem services, and coastal accessibility.
4. Design and conduct a comparative analysis of alternative emergency debris management strategies, focused on long-term solutions that minimize impact on watersheds and communities and reduce the use of emergency permits to govern future expected storm events.
5. Research the effectiveness of low-impact design and natural systems flood management solutions and cross-reference current SBCFC practices to identify the critical importance and promising opportunity in changing current debris management operations.
6. Develop policy recommendations for SBCFC on how to manage flood debris without the use of emergency permits, as well as guide SBCK and community members on how to engage in more strategic watershed management advocacy regarding flood control in Santa Barbara County.

Deliverables:

SBCK anticipates the following deliverables to be developed by the student research team to be incorporated into a final written report, executive summary, and final presentations as required by the Bren School.

1. Literature review, including an annotated bibliography.
2. GIS map of Montecito debris basins, Goleta Slough, and Carpinteria Marsh and correlating analysis of sediment delivery into these systems.
3. Document outlining suggested modifications to SBCFC regular maintenance permits to address the increasing frequency and intensity of storm events, that reduce the need to secure emergency permits.
4. Report presenting policy recommendations for county staff and SBCFC, based on comparative analysis of alternative debris management activities, emergency permitting guidelines and changes to regular maintenance activities, including the incorporation of low-impact development and natural solutions into broader watershed management and regional sediment management strategies.

Internships

SBCK looks forward to engaging with one Bren student as a summer intern to execute the work detailed in our proposal. SBCK is considering offering a paid stipend for one (1) student intern for ten weeks over the summer months from June through September; however, funding is currently undetermined.

Citations

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Budget and Justification

This project will not require any additional funding.



Greetings, Bren Group Project Review Commission –

This letter intends to affirm Santa Barbara Channelkeeper's (SBCK) commitment to engage in a Bren Group Project from Spring 2024 to Summer 2025.

SBCK is a local environmental non-profit on a mission to protect and restore the Santa Barbara Channel and its watersheds through science-based advocacy, education, field work and enforcement. SBCK's vision is for clean beaches, healthy, flowing streams, and a teeming, resilient ocean that supports a thriving economy, offer healthy habitat for fish and wildlife, and provide clean water and safe places for recreation for all people.

Since January 2018, SBCK has been actively engaged in water quality testing at Goleta Beach, advocating for long-term solutions to use emergency permits to deposit debris on our beaches. We have been called upon by the community to answer questions about water quality, the contents of debris basin material being deposited on the beach, and supplemented the sampling that has been conducted by the county. We are committed to supporting the creation of an effective long-term solution to debris basin clearing that avoids and mitigates potential harmful ecological impacts of flood control activities, particularly those undertaken through recent emergency permits.

SBCK has collaborated with the Bren School on two Group Projects in the past and SBCK appreciates the opportunity to further develop our relationship with the Bren School. Our team also looks forward to working with students to advance our interests in both environmental education and protecting our water resources through scientifically informed policy and management actions.

The goal of this project is to better understand the environmental and social impacts of Santa Barbara County's flood management strategy, focusing primarily on finding alternatives to emergency deposition of flood debris on our local beaches, and the potential for emerging low impact design and natural systems solutions to achieve improved watershed management outcomes. Our policy team looks forward to working alongside students, faculty, and external advisors to further refine the project approach as we more deeply understand the scope of the issue and investigate viable solutions that can be enacted within our communities.

SBCK looks forward to engaging with one Bren student as a summer intern to execute the work detailed in our proposal. SBCK is considering offering a paid stipend for one (1) student intern for ten weeks over the summer months from June through September; however, funding is currently undetermined. The internship will focus on furthering research and analysis in line with the project objectives. The internship will give the student the opportunity to further collaborate with experienced SBCK policy associates, as well as engage with other environmental groups and policy makers. Should more than one student express interest in the internship, the student group project team will collectively determine which individual will engage in the summer internship. The amount of funding for this internship is still being determined and will be discussed with the student intern later.

SBCK will provide a comprehensive list of initial research for starting the literature review. SBCK will work with SBCFC and other agencies to secure and provide relevant data for impact analysis. While this project includes the opportunity to conduct primary interviews, this project will not require the collection of additional data for analysis purposes. This project will not require funding in addition to the amount provided to students by the Bren School.

Nate Irwin, SBCK Policy Associate will be the main point of contact for this project and will act as the project manager and mentor for the student intern. Nate, alongside SBCK's small team of highly skilled, dedicated, and passionate staff will work to provide an educationally and professionally transformative experience for the Bren students engaged in this project. The SBCK team has enjoyed working with a collection of Bren students and faculty who have supported the development of this proposal in the past couple of weeks and we hope to continue our collaboration in the years ahead. Thank you for the opportunity to be considered as a client and collaborator for the Bren Group Project 2024/2025.

Sincerely,

Ted Morton, SBCK Executive Director