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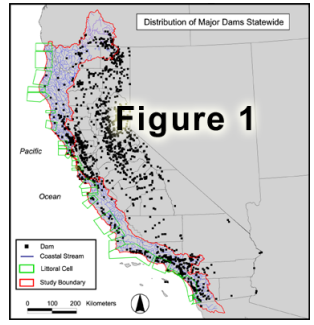
Engineer Research and Development Center

Los Angeles District, State of California

ISSUE

The Regional Sediment Management (RSM) demonstration initiative in California encompasses approximately 1,100 miles of shoreline along the Pacific Ocean. California's shoreline is comprised of sandy beaches, rocky headlands, scenic coastal bluffs, estuaries, and coastal wetlands (Figure 1). Flood control, navigation, and water supply projects can adversely impact the coastal zone by impeding the continuation of natural sediment movement through streams, rivers, and watersheds.



In the past, the dominant mechanisms to transport sediments to the coast were rivers and streams, conveyor belts that moved sediment from the mountains and uplands to the lowland basins and nearshore systems. However, during the last 30 to 40 years, most of the rivers were tamed through construction of more than 1,200 large dams, trapping all but the finest sediments. Damming rivers has decreased the sand supply by more than 50 percent. As a result, most California beaches have undergone substantial erosion. Only Northern California

has a constant supply of sediment to the nearshore since streams and rivers were never dammed and are now protected under the Wild and Scenic Rivers Act of 1972.

RSM DEMONSTRATION PROJECT GOALS

The goal of the RSM demonstration program for the state of California is to develop a comprehensive master plan that uses a regional, systematic approach to resolving coastal sediment management issues. Several initiatives are being implemented toward achieving this goal.

SUMMARY

California is involved in many RSM initiatives, including those listed below:

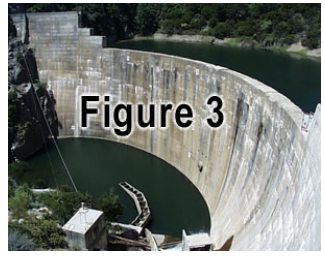
Dam Removal Studies

Extensive alteration of the fluvial systems by constructing dams and debris basins led to the impoundment of much of the natural sediment load, thereby reducing the amount of sand reaching the coast. The potential loss of beach sand through reservoir impoundment exceeds the estimates obtained by river discharge models. Part of the difference can be attributed to sediment storage within the drainage system and on the alluvial plain. Nevertheless, the net impact is substantial. The magnitude of human impact warrants intervention to restore sediment supply to beaches. The nature of the intervention depends on the characteristics of individual dams – purpose, condition, quantity and quality of impounded sand, distance from the coast, and magnitude of local beach erosion.

Alternatives to mitigate sediment trapping by dams include dam removal, dam bypassing, sand hauling, and the provision of sand credits. Two problem dams investigated were the Rindge Dam and Matilija Dam.

- The construction of Rindge Dam (Figure 2) obstructed the natural flow of Malibu Creek. Heavy silt loads in the creek resulted in sediment deposition in the reservoir, completely filling it with sediment by the late 1950s, resulting in the reservoir becoming useless for water storage. The amount of sediment stored behind the dam is estimated to be between 800,000 and 1,600,000 cu yd.

- Matilija Dam (Figure 3) is located on Matilija Creek, a tributary of the Ventura River, approximately 16 miles upstream from the Pacific Ocean coastline. Silty material carried by Matilija Creek filled the reservoir with sediment, deeming the structure useless as a water storage facility. It is estimated that 2 to 4 million cu yd of sediment lie trapped behind the dam.



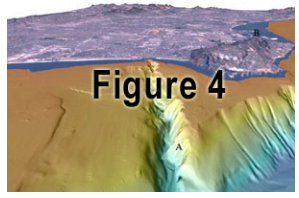
Geographical Information Systems (GIS) Database

The California Coastal Sediment Management Master Plan will call for evaluation and prioritization of statewide coastal sediment management needs through development of a GIS database with focus on the ecological functions of California's coastal watersheds, wetlands, and beaches. In addition, the Master Plan will identify the means to restore and manage high

priority coastal wetlands and beaches, with the goal of enhancing and preserving these valuable assets. The Master Plan will identify, evaluate, and prioritize sediment management approaches in a framework that addresses natural and man-made influences on sediment sources, transport, and deposition.

Submarine Canyons

This California RSM initiative will evaluate the feasibility of capturing alongshore drift sediments prior to them reaching submarine canyons, such as Newport Beach Canyon, Redondo Beach Canyon (Figure 4), or La Jolla Canyon.



Incremental Cost Analysis

The purpose of this RSM project is to maximize net benefits from regional sediment management, as well as determine incremental cost versus benefits. Interactive management will be accomplished through real-time GIS applications. Items to be considered include dredge platforms, placement platforms, physical sediment quality, nourishment requirements, environmental constraints, distance to be moved, erosion hot spot benefits, available volume, and hot spot shoreline contours.

Coupling RSM and Section 227

RSM will assess littoral cell needs in areas of maintenance, compute cost differential from operations and maintenance placement sites and hot spots, compute benefits for beach placement at hot spots, and demonstrate projects to fund the

incremental cost. The Section 227 Program (National Shoreline Erosion Control Development and Demonstration Program) has four potential sites in northern San Diego and Ventura counties. A workshop in conjunction with the University of Southern California Sea Grant Program to advertise a request for proposals will be held in October 2003.

STATUS

Current status of the RSM initiative in California is to:

- Continue evaluation of impacts of dams on sediment transport to the coast.
- Develop a GIS and Internet map server component based on necessary technical studies.
- Initiate study on a conceptual plan to capture and reuse coastal sediments generally lost into submarine canyons.
- Initiate a study to optimize the use of sediments dredged at coastal harbors for beach nourishment purposes, for example, the Ventura Harbor Back-Passing Study.
- Continue partnership with the state to gain congressional support and cost sharing.

LESSONS LEARNED

The following items have been found essential to the success of the RSM demonstration project in California:

- Partnering with the state to gain congressional support and cost-sharing.
- Leveraging funds with other agencies for RSM initiatives.
- Coupling of national programs for regional benefit.

- Continued collaboration with regional stakeholders.

KEY WORDS

RSM, California, erosion hot spot, estuary, watershed, dam removal

POINTS OF CONTACT

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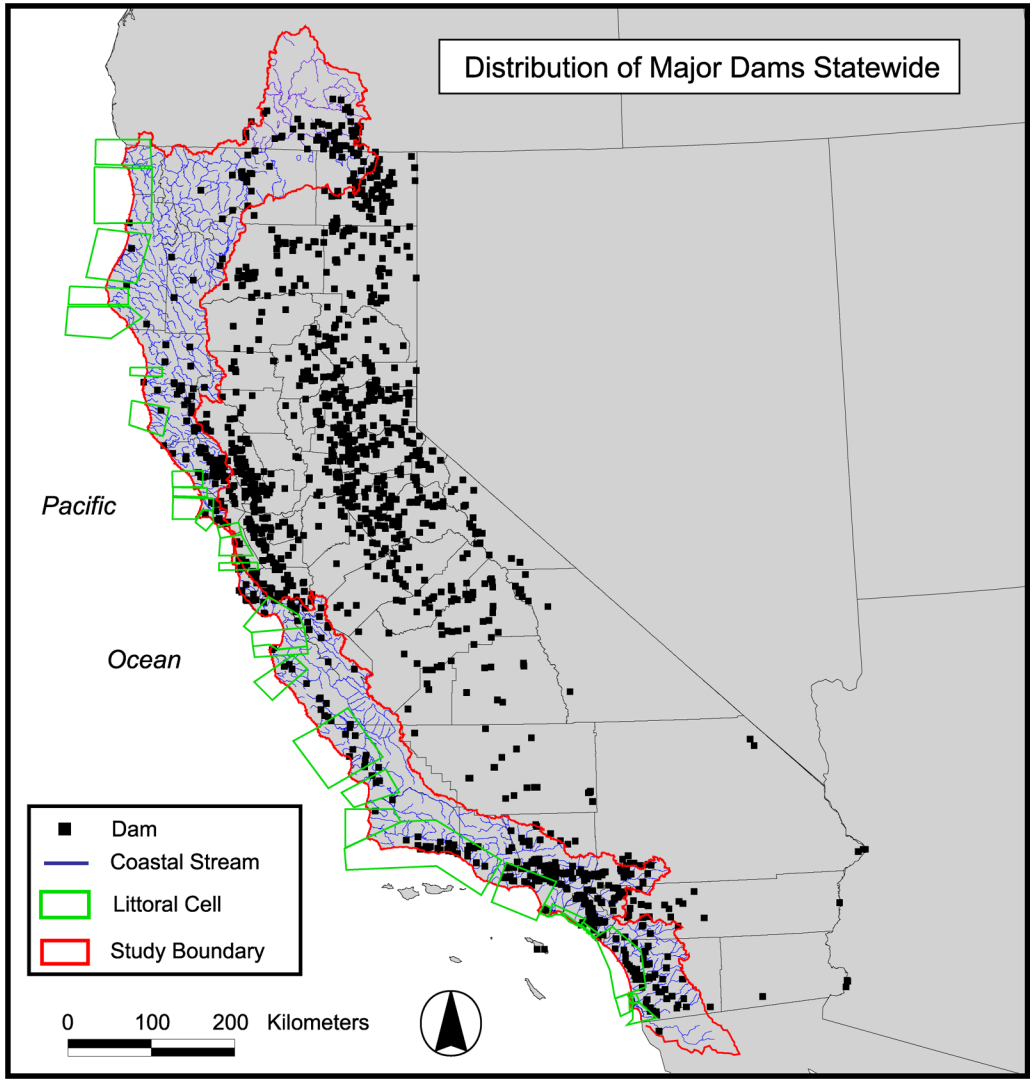

Figure 1. Distribution of major dams statewide from Willis 2001 back to text

Figure 2. Rindge Dam back to text

Figure 3. Matilija Dam back to text

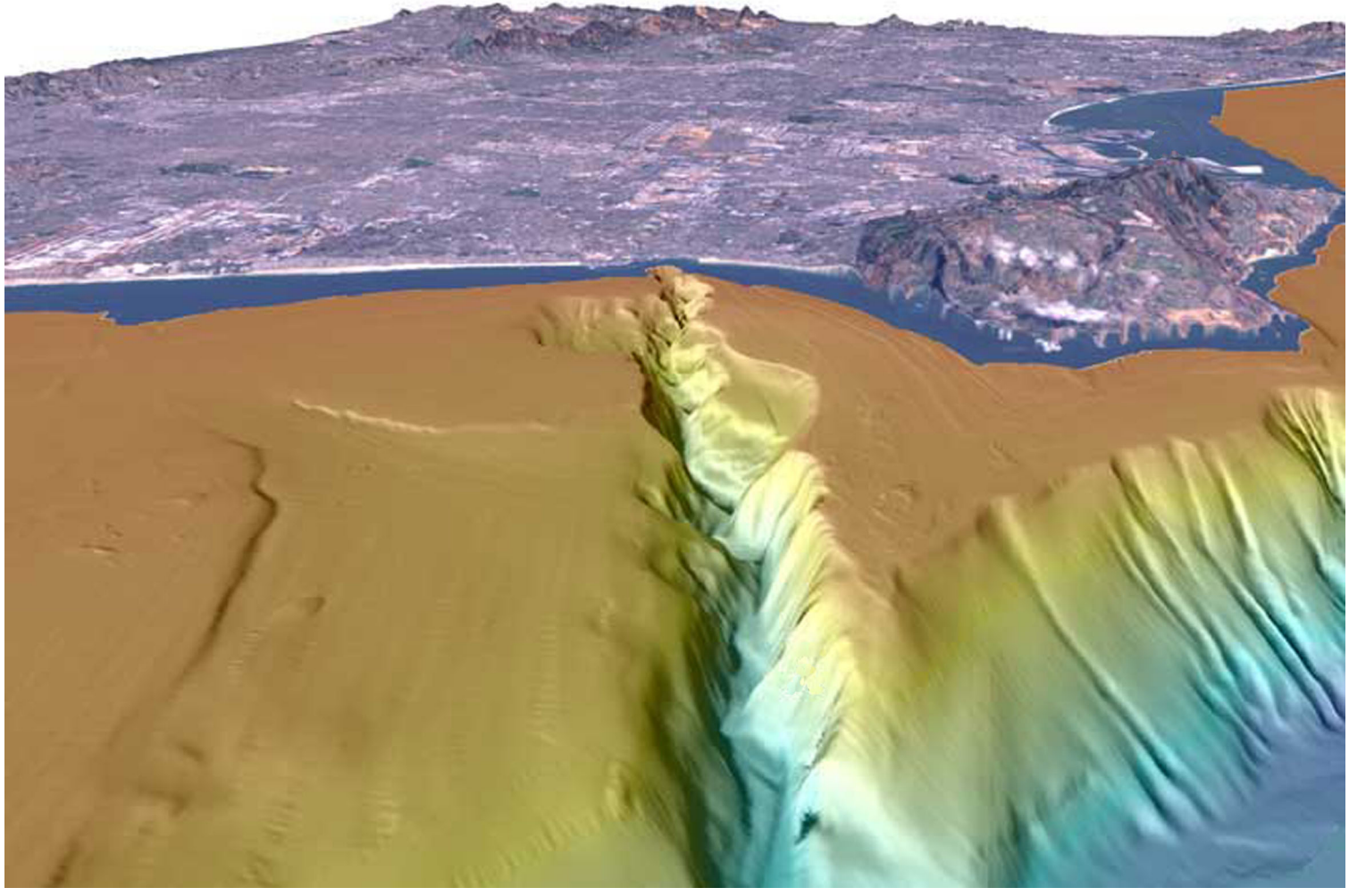

Figure 4. Redondo Beach Canyon back to text