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CALIFORNIA'S COASTAL HAZARDS: A CRITICAL ASSESSMENT OF EXISTING LAND-USE POLICIES AND PRACTICES

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EXECUTIVE SUMMARY

California has 1100 miles of coastline; 86 percent of it is actively eroding and 80 percent of the state's 30 million people live within 30 miles of the shoreline. The state now has over 25,000 residents for each mile of coastline, or five people per front foot. The conflict between accelerating oceanfront development and the inherent geological instability of the shoreline is becoming a dilemma of increasing magnitude. The coastline is caught between rising sea level and ocean storm waves from the front and the increasing waves of humanity from the rear.

The ongoing natural processes of cliff retreat, storm inundation, and beach erosion were either not recognized, appreciated, or completely understood or were ignored by many coastal builders, developers, and homebuyers in the past. Much of California's oceanfront development took place from the mid-1940s to the mid-1970s, a period characterized by below average rainfall and storm frequency. The wave impact and shoreline erosion accompanying the storms of the last 15 years, however, have been responsible for over $150 million in damage. High tides and storm waves during the winter of 1983 inflicted over $100 million in damage to oceanfront property; thirty-three oceanfront homes were completely destroyed and 3000 homes and 900 businesses were damaged. In addition, public recreational facilities suffered an estimated $35 million in damages. In mid-January 1988 an intense storm accompanied by strong winds and extremely large waves struck Southern California with little warning and produced another $25 million in damage. At King Harbor in Redondo Beach wave heights in excess of 20 feet were reported, which overtopped a 14-foot high section of breakwater and destroyed the front of the Portofino Hotel.

Thus the California coast has suffered about $150 million in storm damage over the past 15 years, or an average of about $10 million annually. This damage total only reflects losses from catastrophic or episodic events. An equivalent sum of money (about $10 million) is spent each year on maintenance dredging of California's harbor entrances. Of even greater importance is the cumulative public and private cost of additional shoreline protection. Approximately 45 miles of California's shoreline were armored between 1985 and 1990. At average costs of $1500 per front foot, this represents an annual cost of $64 million. None of these numbers reflects the incremental expenditures on repair of public infrastructure (for example, roads and beach-access stairways) or the individual repairs to private property. Although these data have not been adjusted to current dollars, it is clear that the overall costs to Californians of maintaining our foothold on the shoreline is close to $100 million annually.

Conflicts between oceanfront development and coastal hazards are increasing for several reasons: (1) the progressive erosion of shorefront property has led to the undermining of structures and utilities previously protected by adequate setbacks, (2) cliff-top construction has induced acceleration of seacliff erosion with its increased runoff and landscape watering, (3) the width of protective beaches has been reduced due to reduction of beach-sand delivery to the coast, (4) increases in the frequency and magnitude

of hazards are due to larger storms bringing heavy rainfall and large waves, and (5) there is an increased migration to coastal communities (including an influx of people who have not experienced storm damage firsthand) and a corresponding increase in pressure to develop oceanfront property and recreational facilities.

The two interrelated but distinct hazards of concern to most coastal residents or property owners that must be considered in coastal land-use decisions are shoreline erosion and wave impact and inundation. Although the type and magnitude of hazards vary widely along California's coast, it is usually only a matter of time before the threat is apparent to property owners, who are then faced with four options: (1) do nothing and face the inevitable loss, (2) sell and pass the problem on, (3) move or relocate the building or other improvements, or (4) attempt to control or reduce the hazard through some type of protective structure or measure.

Over the past 50 years, the typical response to coastal hazards in California has been the construction of seawalls and revetments, for the most part intended to protect eroding or wave-impacted shorelines. At present, an astonishing 130 miles, or 12 percent of the state's 1100-mile shoreline, has been protected or armored. Protective structures have usually been constructed only after existing shoreline development has been threatened. Rarely has a protection strategy preceded development.

The hazards/risks dilemma is not restricted to private property owners. Two state agencies (in addition to the Coastal Commission) are extensively involved in the use and protection of the shoreline. Shoreline protection is one of the major activities of the Department of Boating and Waterways, an agency that spends millions of dollars annually at various sites along the coast. The Department of Parks and Recreation has many coastal facilities that are regularly threatened or damaged. Neither of these agencies has had clearly defined policies regarding the construction or protection of oceanfront facilities.

AN ANALYSIS OF EXISTING PRACTICES OF LOCAL AND STATE GOVERNMENT AGENCIES

In spite of a growing body of scientific information on the location and nature of coastal geologic hazards and their associated risks, oceanfront development continues. In some instances, coastal property that was designated as hazardous a decade ago is now being declared as buildable due to a combination of political pressure and increased property value. Undeveloped oceanfront lots along the Malibu coast, for example, typically have price tags in the $1 to $3 million range. Despite knowledge of the inherent hazards of building on the beach or bluff in Malibu, however, permitting agencies, such as the Coastal Commission, tend to approve permits with elaborate mitigating measures intended to reduce the risks rather than deny the projects.

Although the state Coastal Commission has been in existence for over 15 years and a number of local coastal plans have been approved by the commission, three of the state's fourteen coastal counties and sixteen of the coastal cities still do not have approved local coastal plans. Thus there is a wide disparity in the manner in which local governments deal with oceanfront hazards.

One might assume that the Coastal Act and the Coastal Commission would have provided the state with a set of policies and an institutional system for dealing with coastal hazard issues. This has not been the case, for several reasons. At the time the Coastal Initiative was written and approved by the voters, the principal issues were

environmental concerns, beach access, and wetlands preservation. Issues of coastal storm damage, shoreline retreat, littoral drift, and sand availability were not as obvious and pressing as they are today. As a result, the Coastal Act policy statements and subsequent Interpretive Guidelines were notably deficient in these areas. For these reasons, as well as local political climates and coastal property values, the translation of the acquired knowledge of coastal geologic hazards and risks into policy and planning guidelines, practices, and standards appears to be deficient at all levels of government.

The objective of this research was to address this deficiency through a systematic analysis and assessment of the coastline policies, plans, and practices of local government and state agencies. Our approach used a combination of questionnaires, staff interviews, and a review of planning and policy documents to investigate how city and county planning departments, as well as various state agencies, deal with the issues of coastal hazards in the land-use planning and permitting process.

Planning department staff from thirty-four of the state's forty-two coastal cities and fourteen of the state's fifteen coastal counties were interviewed. Although this research project was directed primarily at local government agencies and their policies and practices, because of the extensive state involvement in the coastal zone of a number of state agencies, an effort was made to study the documents and enabling legislation that control the activities of the individual agencies, and also to interview state-level staff involved in coastal programs.

Policies and practices regulating oceanfront property and its development vary widely throughout the state. Some communities have articulated a set of policies that encourages community or state purchase of remaining undeveloped oceanfront property, as well as rigorous guidelines and requirements for any new development or protection plans. Others are openly encouraging shoreline development adjacent to areas of documented high coastal erosion rates. A combination of local politics and economics appears to be the most important factors controlling these policies and practices, rather than the history of shoreline erosion and storm inundation.

The 1978 Policy for Shoreline Erosion Protection from the secretary of the California Resources Agency provided both a clear description of the role of each department within the agency in dealing with the shoreline and a comprehensive set of policies that is as appropriate today as it was a decade ago.

Despite this 1978 policy, there is considerable variation in the actual working policies of the individual state departments or, in some cases, a lack of a clear policy altogether. There is a hierarchy of codes or policies controlling the various state agencies that extends from state code or law, to commission policy, down to departmental policy, guidelines, and in-house memoranda. Due to the vague or generalized wording of existing policy, the separation and autonomy of the local district or regional offices of some state departments from Sacramento, and the forces of politics, many individual state projects are inconsistent with existing state policy.

The state Department of Boating and Waterways has shoreline protection as one of its major roles and it typically responds to requests by local governments for technical and monetary assistance in shoreline protection projects. The department cannot meet all of the requests received and does not have any overriding policies or directives affecting its beach erosion program and how monies are spent. As a result, the agency works in a reactive mode, responding to individual requests as they are submitted, rather than having a master plan or a clear set of priorities.

The state Department of Parks and Recreation is responsible for managing over 210 miles of California's coastline. The storms of 1978, 1980, 1982, and 1983 resulted in extensive damage to state park facilities. Beach-level campgrounds, access roads, parking lots, stairways, restrooms, seawalls, and other support facilities were damaged, rebuilt, and damaged again. Due to the costs involved in continual reconstruction in some of these hazardous locations, a new Coastal Erosion Policy was developed by the department following the 1983 storms with a goal to "avoid construction of new permanent facilities in areas subject to coastal erosion, and to promote the use of expendable or movable facilities where the expected useful life is limited due to their location in erosion prone areas." Despite this official policy, major reconstruction of a seawall and beach-level facilities at one site took place following seven prior episodes of destruction, an effort that was clearly contrary to the policy. There is considerable uncertainty in the minds of state-level staff about the status of this policy and whether or not staff at the local level are even aware of its existence.

A PLAN FOR ACTION AT THE STATE LEVEL

Significant changes are needed in how to approach and deal with coastal hazards and the continuing pressure to develop in coastal areas. The marked inconsistencies among local governments and these state agencies who have responsibilities to regulate development indicate the lack of a guiding direction and the heavy influence of local economics and politics.

Through a process of hazard recognition and evaluation, and then a standardized set of avoidance, mitigation, or hazard reduction policies, the private and public losses from future shoreline erosion, storm impact, and sea-level rise can be significantly reduced. The objective is to reduce the number of people, as well as dwellings, structures, and utilities, both public and private, directly exposed to the hazards of both shoreline erosion and wave impact and inundation. The model of the Alquist-Priolo program, which established Special Studies Zones along California's active faults, is an appropriate one to follow for the coastline.

RECOMMENDATIONS

Of the ten recommendations and objectives briefly summarized below, the first advocates an overall policy direction of hazard avoidance and the second sets forth the legislative framework within which this direction would be implemented. These two broadly cast recommendations are followed by six detailed policy recommendations, each specifically formulated to address a particular aspect of larger coastal hazard issues. The final two recommendations address matters concerned with state agency policy compliance and the pressing need for coastal hazard information at both the state and local levels.

Recommendation 1: Mandate that coastal hazard avoidance is the overriding state policy

Prohibit both new development and replacement projects in areas designated as high-hazard coastal environments. The designation of such high-hazard areas should be the responsibility of the California Division of Mines and Geology and carried out under the mandate of a state Coastal Hazards Act (see Recommendation 2).

Recommendation 2: Establish a state Coastal Hazards Act

1. Adopt legislation creating a state-level coastal hazards program patterned after the successful Alquist-Priolo program for fault zones.

2. Empower the California Division of Mines and Geology with the responsibility and authority to establish Coastal Hazards Zones.

3. Augment the guidelines for Division of Mines and Geology geotechnical reports. The California Division of Mines and Geology has guidelines for the preparation of engineering geologic and geologic/seismic reports that are often used directly or slightly modified by individual municipalities as their report requirements. These guidelines provide an appropriate starting point for the investigation of coastal hazard zones. Specific report requirements for different coastal geologic hazards (for example, cliff erosion and wave impact and inundation) would be developed as part of the proposed legislation.

4. Augment the Division of Mines and Geology budget and staff, and create an advisory board to assist in the establishment of Coastal Hazards Zones. Funding necessary to undertake the delineation of Coastal Hazard Zones is a high priority within this proposed program. A component of the funding for this task should be borne by the coastal permit process, particularly through development applications and permits for protective devices.

5. Require every local government with coastal land-use authority to have a comprehensive Coastal Geologic Hazards Ordinance.

6. Require all state agencies to comply with coastal hazards legislation (see Recommendation 9).

7. Seek maximum federal agency compliance with state coastal hazards legislation. Require thorough state review and consultation on all federal actions involving coastal hazards.

Objective 1: Geotechnical reports in hazardous shoreline areas

Require geologic or geotechnical reports for all public and private projects proposed in Coastal Hazards Zones. Reports should be prepared according to state standards, followed by a peer review by qualified professionals to ensure complete investigations, sound conclusions, and appropriate hazard avoidance or mitigation measures.

Objective 2: Bluff-top and cliff-top environments

1. All development proposals, including reconstruction or remodeling that increases the square footage of a structure by more than 25 percent, should be evaluated on the basis of safety from all coastal geologic hazards.

2. All local governments with shoreline jurisdiction should develop and maintain adequate baseline information on longterm cliff retreat rates and coastal bluff stability. This information should be in a usable form and available to all parties involved in development proposals for bluff-top or cliff-top environments.

3. All local governments with shoreline jurisdiction should be subject to statewide safety guidelines in approving bluff-top or cliff-top building sites and development, providing:

   a. a 100-year structural life of principal buildings

   b. a minimum safety setback based on longterm erosion rates and applied in conjunction with (a) above.

Objective 3: Beach and backbeach environments

All development and reconstruction or remodeling that increases the square footage of any structure by more than 25 percent should be permitted only when safety from wave impact and inundation throughout a projected 100-year lifetime of the structure can be demonstrated without reliance on a protective device.

Recommendation 3: Phase out reliance on hard protective structures for both public and private properties

1. Armoring the coastline should be phased out as a solution to the problem of shoreline erosion.
2. Alternatives to hard protective devices, both for private and public properties, should be vigorously pursued by local and state agencies.
3. Every proposal for a hard coastal protective device should be accompanied by a technical evaluation of site geology and oceanography, longterm erosion history, structural design criteria, and an evaluation of the effectiveness of any adjacent protective devices, all prepared by experienced professionals and appropriately peer reviewed.
4. Hard protective devices should only be permitted when a complete technical and environmental assessment can make the following findings:
   a. Historical erosion rates substantiate the need for a solution.
   b. The structure will not produce a significant loss of public beach.
   c. Existing public access will not be reduced.
   d. Scenic values will not be significantly reduced on contiguous public-trust land.
   e. The proposed structure is the most acceptable and durable longterm solution.
5. All new protective devices should be monitored during construction and during ongoing maintenance to ensure their effectiveness.
6. Existing protective structures that are ineffective, dysfunctional, or hazardous should be removed. Visually intrusive structures should be modified to minimize adverse visual effects.
7. Existing pipelines, roads, and other elements of the public infrastructure that are repeatedly damaged by wave action should be relocated away from coastal hazards to better guarantee uninterrupted service and to reduce future reliance on protective devices.
8. In locations where protective devices are built on public land but are protecting private property, one of two measures should be taken. Either
   a. require that such protective devices be removed or
   b. initiate a lease program to compensate the public for the loss of beach/beach access or for the use of public property by the private property owner.

Recommendation 4: Reduce public liability and public costs associated with coastal hazards

1. Require geologic hazard disclosure statements and deed posting of existing geologic and geotechnical reports relevant to specific parcels.
2. Mandate state-level delineation of Coastal Hazard Zones with associated requirements for geological/geotechnical report preparation and review.

3. The state attorney general's office should be involved as legal counsel/participant in support of local government's compliance with state coastal hazards legislation when these entities are threatened with legal action resulting from permit denial.

4. Establish clear policies for the state agencies involved with coastal facilities and infrastructure to reduce the reliance on protective structures and expenditures for new or reconstructed facilities in hazardous locations.

5. All local government agencies would be subject to the same hazard evaluation and review process for any proposed project in a state-designated Coastal Hazards Zone.

Recommendation 5: Establish a program to assist threatened properties in hazardous areas

1. Establish a statewide program administered at the local government level to inform and assist owners of threatened oceanfront property with respect to hazard-response options.

2. Identify those oceanfront areas or properties which face imminent wave or storm damage as part of the state-level Coastal Hazard Zones evaluation so that local governments can work with affected property owners on solutions before an emergency response is necessary.

3. Phase out and eliminate the need for emplacement of emergency or permanent protection structures by early recognition of threatened properties and alternative approaches or solutions.

4. Identify and acquire particular parcels that are suitable by virtue of hazards exposure for public acquisition through the Coastal Conservancy, land trusts, or other appropriate institutions or organizations.

Recommendation 6: Strengthen policies governing emergency protection projects and reconstruction or replacement structures

1. All reconstruction after storm damage (where damage is greater than 25 percent of property value) should be subject to the same basic safety criteria that do not allow reliance on a protective structure for the 100-year lifetime of the structure. The safety and stability of the principal structure (dwelling) needs post emergency review.

2. Reconstruction policy should pertain to all development along the coastline subject to coastal geologic processes, including beach, backbeach, dune, bluff face, and bluff top.

3. Separate reconstruction policies and guidelines should be formulated for principal structures (buildings, homes) and protective devices.

Recommendation 7: Reduce interference with sand supply and littoral drift system

1. Any proposed coastal engineering project that has the potential to significantly reduce the supply of sand to the shoreline (dams, diversions, recharge basins, aggregate removal, cliff/bluff/dune protection structures), or impound and restrict longshore transport of sand (jetties, groins, breakwaters) should be preceded by a complete analysis of the sand budget of that littoral cell, the impacts of the proposed project on the system, and proposals for mitigating the impacts.

2. Any such project, whether public or private, needs to be independently reviewed

and evaluated, and requires approval from local government as well as the Coastal Commission and the Division of Mines and Geology.

3. Where any project is deemed to have a significant impact on littoral sand supply or transport, appropriate mitigation measures are to be required and funding for implementing these measures should be integral to the project budget.

4. All permits for existing sand/aggregate removal operations should be evaluated for the significance of their impacts on littoral sand supply at the time they come up for review and renewal. Permit cancellation or modification and the provision of additional mitigation measures should be considered at the time of permit review or renewal.

Recommendation 8: Initiate planning to mitigate the impacts of sea-level rise associated with global warming

1. Longterm planning and policy development should explicitly consider the high probability of future increased rates of sea-level rise.

2. Options should be kept open to enable the most appropriate response to future changes in the rate of sea-level rise.

3. Feasibility studies and proposals for all new coastal projects (harbors, shore protection projects, oceanfront development) should consider the high probability of accelerated sea-level rise and respond accordingly.

4. All reconstruction after storm damage (where damage is greater than 25 percent of the value of a structure) should be subject to the same safety criteria as for new construction, including protection from sea-level rise impacts.

5. Infill development needs to be strictly defined so that new development in low-lying or hazardous coastal areas is discouraged.

6. A state-level multi-disciplinary advisory board should be established to deal with the sea-level rise issue and advise the state on changing predictions.

Recommendation 9: Ensure implementation of existing policies governing state agencies

1. The Department of Boating and Waterways should establish clear priorities for shoreline protection projects, including recommendations of which projects are appropriate for state funding.

2. The state should not attempt to fund all proposals for shoreline protection and beach nourishment. Proposed new hard protective structures should receive particularly close scrutiny and should be funded only when compelling circumstances so warrant.

3. The practices of the Department of Parks and Recreation should reflect the agency's adopted policy that prohibits construction of new facilities in areas subject to coastal erosion or wave impact and inundation. Policies governing construction, reconstruction, maintenance, and protection in hazardous shoreline areas should be applied uniformly at all jurisdictional levels: state, regional, and district.

4. The technical and scientific responsibilities and authority of the Coastal Zone Conservation Commission concerned with coastal geologic hazard evaluation should be transferred from the Coastal Commission to the California Division of Mines and Geology (see Recommendation 2).

Recommendation 10: Develop a statewide coastal hazard information system and increase the coastal hazards knowledge of citizens and public officials

1. The California Division of Mines and Geology should have the responsibility and authority to delineate Coastal Hazards Zones along the state's coastline (see Recommendation 2) and to transmit these maps to local government planning agencies.

2. A coastal hazards data base needs to be developed at the local government level that is available to landowners and their consultants to ensure an up-to-date and complete assessment of geologic hazards exposure.