Some Important Statute-based Definitions
Oregon Senate Bill 96 (1991) Section 12 amended ORS 455 to require site specific evaluation of essential facilities, hazardous facilities, major structures, and special occupancy structures for vulnerability to seismic hazards. Definitions of these terms, used throughout this report, are quoted from ORS 455.447:

(a) Essential facility means: (A) Hospitals and other medical facilities having surgery and emergency treatment areas; (B) Fire and police stations; (C) Tanks or other structures containing, housing or supporting water or fire-suppression materials or equipment required for the protection of essential or hazardous facilities or special occupancy structures; (D) Emergency vehicle shelters and garages; (E) Structures and equipment in emergency-preparedness centers; (F) Standby power generating equipment for essential facilities and; (G) Structures and equipment in government communication centers and other facilities required for emergency response.

(b) Hazardous facility means structures housing, supporting, or containing sufficient quantities of toxic or explosive substances to be of danger to the safety of the public if released.

(c) Major structure means a building over six stories with an aggregate floor area of 60,000 square feet or more, every building over 10 stories in height, and parking structures as determined by agency [Building Code Agency] rule.

(d) Seismic hazard means a geologic condition that is a potential danger to life and property which includes but is not limited to earthquake, landslide, liquefaction, tsunami flooding, fault displacement, and subsidence.

(e) Special occupancy structure means: (A) Covered structures whose primary occupancy is public assembly with a capacity greater than 300 persons; (B) Buildings for every public, private, or parochial school through the secondary level or day care centers with a capacity greater than 250 individuals; (C) Buildings for colleges or adult education schools with a capacity of greater than 500 persons; (D) Medical facilities with 50 or more resident, incapacitated patients not included in subparagraphs (A) or (C) of this paragraph; (E) Jails and detention facilities; and (F) All structures and occupancies with a capacity greater than 5000 persons.

particular levels of detail, depending on the nature and location of the site and the type and intensity of the proposed project.

b. Establish a list of “triggering mechanisms” that will initiate the geotechnical site report process, and determine the appropriate topics to be covered and level of detail for each. Possible triggering mechanisms are a particular project type or land use, the dollar value of investment required for a particular project, the location with respect to natural hazard zones, or the discretion of the local government.

c. Require that all geotechnical reports, whether supporting or opposing a particular project, be disclosed and made part of the public record at the local level. Also require that their location and availability be made known to potential users.

d. Require that geotechnical site reports, developed under approved content standard guidelines, be valid for a maximum of 10 years, after which an updated or new report would be required.

e. For geotechnical site reports prepared to support applications for shore protection permits, require peer review by qualified professionals at DOGAMI (see Recommendation 6-2b). If a local development permit is required, require that the local and state peer reviews be concurrent.

f. For geotechnical site reports prepared to support development regulated by local government, require peer review by a qualified professional, with the project applicant bearing the cost of review. The triggering mechanism for peer review might be a particular project type or land use, the dollar value of investment required for a particular project, the location with respect to natural hazard zones, or the judgement of the local government. The local process for preparing a geotechnical report and initiating the peer review might be as follows:

1) Local government determines if a geotechnical site report is required.

2) If a report is not required, the applicant proceeds with the regular project application process. If a report is required, the applicant
This subdivision along the oceanfront at Newport received a favorable geotechnical report and was approved by the city. Roads and utilities were installed, but the property began sliding seaward before any houses could be constructed. The engineering geologist involved lost his license (P. Komar photo).
hires a qualified geologist, engineer, or engineering geologist to prepare the report and submits it to the local government.

3) Qualified professionals at DOGAMI or the Board of Examiners, or a qualified contract person, conducts a peer review of the geotechnical report.

4) If the report is found to be satisfactory by the peer reviewer, the applicant continues with the regular project application process. If it is not satisfactory, the applicant returns the report to the consultant for additional geotechnical evaluation or analysis, such evaluation is conducted, and the report is submitted once again to the local government.

5) Additional evaluation and analysis continues until a satisfactory geotechnical report is completed and approved or the project is withdrawn.

Implementing Actions for Recommendation 2-1

2-1 A. DOGAMI, in coordination with DLCD, BCD, OSSPAC, OPRD, appropriate professional examining boards, and local governments, should develop and implement administrative rules for the following: (1) standards for the contents of geotechnical site reports, (2) site report triggering mechanisms, (3) public disclosure and filing of site reports, and “sunset” periods, (4) and peer review processes for site reports prepared for state shore protection permit applications. In developing and implementing these rules, DOGAMI should seek authority from the Oregon State Legislature if needed.

2-1 B. Local governments, following state rules and in collaboration with DLCD and DOGAMI, should establish local procedures for geotechnical site reports, including a peer review process for geotechnical reports prepared to support development proposals.

2-1 C. Administrative fees for state shore protection or local development permits requiring geotechnical site reports should include the cost of peer review.

Recommendation 2-2

Improve the licensing process for geologists, engineering geologists, and engineers who work in the coastal zone.

a. Require certification of geologists, engineering geologists, and engineers who prepare geotechnical site reports and recommendations for coastal areas, documenting their qualifications to evaluate coastal processes related to beach, dune, and sea cliff erosion, and to evaluate earthquakes, tsunamis, and related hazards.

b. To maintain coastal certification, require effective continued education or updates specific to the knowledge and skills required for Recommendation 2-1a.

Implementing Actions for Recommendation 2-2

2-2 A. The Oregon State Board of Geology and Engineering Geology Examiners and the Board of Engineering Examiners should develop administrative rules to improve the licensing process for geologists, engineering geologists, and engineers who work in the coastal zone. If necessary, authority should be sought from the legislature.

2-2 B. DOGAMI, in collaboration with appropriate licensing boards and academic continuing education programs, should develop and deliver annual basic coastal certification and update programs for professionals working in coastal areas.
Information about coastal natural hazards is not readily available, nor is it well understood by users and effectively applied in decision making.

Existing information on coastal natural hazards, including academic research, government studies, reports and maps produced for local planning or site development, hazard assessments in permit records, aerial photographs, and other information, is widely dispersed and difficult for most users to access. Further, no means exist to catalog and store new information. As a result, collections of natural hazards data are incomplete, much of the information goes unused after initial application, data collection and mapping efforts are sometimes duplicated, and individuals who could benefit from coastal hazards information do without. Furthermore, many who could benefit from this information do not have the knowledge or skill to apply it.

Findings

Information on coastal hazards that is useful for decision making is widely dispersed and not easily accessible. Special collections that do exist, such as the DOGAMI library, the University of Oregon's Ocean and Coastal Law Library, and other departmental collections at academic institutions, are not physically or electronically accessible to most users. Information available at the local government level or at management agencies is often outdated. Geotechnical site reports prepared for projects are often buried in permit files or remain in the possession of private landowners or consultants. No record is kept of their existence or location. Other potentially useful hazards information developed by government agencies or academia is not widely disseminated, not easily accessible, not in a format or language that is understandable to nontechnical individuals, or simply not available. No single agency is responsible for collecting and making information available or for educating potential users about its existence and potential utility. As a consequence, the same information must be regenerated and decision-making periods lengthened, increasing both the public and private cost of development and shore protection.

Even when information on natural hazards is available, individuals who need to apply it to decision making often do not have the knowledge or skill to do so. For example, public and private professionals working in natural hazards management often do not have appropriate training and are not required to enroll in continuing education. As a result, they sometimes make uninformed decisions. Informal education programs, such as those offered by DOGAMI or OSU's Extension Sea Grant Program, are sporadic and reach only a fraction of those who need them. Information in print and other media is sparse and outdated. Individuals, companies, and organizations involved in land development and property transfer, including the buying public, are a largely overlooked audience for hazards education. Education initiatives aimed at these audiences, combined with regulatory and nonregulatory incentives, could be particularly effective strategies for hazard avoidance and mitigation.

Recommendations

Recommendation 3-1

Establish a coastal hazards information system and repository with several staged components:

a. Establish an ocean shore database in an easily accessible, geographically referenced format, with information organized by land parcel. Applications of this database could include keeping records and reporting permit activity, assessing the initial impact of shore protection proposals, and coordinating agency decision making. The database should contain locational data, environmental and hazard conditions, land use and cultural data, shore protection activity, and permit information. As soon as possible, this
database should be made accessible to the public through the Internet.

b. Develop a special collection of coastal hazards publications, reports, maps, digital data, and other information useful for coastal hazards research, evaluation, and decision making. Catalog this special collection and make it available to the public through the Internet using Mosaic or a similar easy-access interface. Geotechnical reports prepared to support coastal development or other projects might also be filed and cataloged as part of this collection (see Recommendation 2-1c).

Implementing Actions for Recommendation 3-1

3-1 A. OPRD, in consultation with DLCD, DOGAMI, and local governments, should establish and maintain the ocean shore database, making it available to all users through the Internet.

3-1 B. DOGAMI should inventory and collect hazards information and maps it does not already have. Before doing so, it should establish priorities in consultation with DLCD, OPRD, DSL, OLM, OSSPAC, and other relevant state agencies, coastal cities, counties, emergency management offices, parks and other special districts, FEMA, the Corps of Engineers, and other relevant federal agencies; and academia.

3-1 C. The library at the OSU-EMSC should develop a special collection on coastal natural hazards, make it physically available to coastal users, and make it and other information (for example, that from DOGAMI and the Ocean and Coastal Law Center) available through an easily accessible electronic database, including the information developed in the DOGAMI inventory above.

3-1 D. Possible funding mechanisms for collection, inventory, cataloging, and creating user access of natural hazards information are DLCD, through the Oregon Coastal Management Program, and other state agency sources.

Recommendation 3-2

Develop and implement educational programs about coastal natural hazards to increase the knowledge, skills, and effective application of hazards information to decisions. Applicable techniques and media include brochures, displays, videos, workshops, field trips, short courses, technical guides and procedures, and access to electronic databases. Some desired outcomes are better preparation and interpretation of geotechnical site reports; improved personal, business, and public agency decisions related to hazards; and effective preparation for and response to earthquakes and tsunamis (see Issue 16 and Appendix D for details on earthquake- and tsunami-related education needs). Following are the audiences for education about chronic hazards and the specific needs of each audience.

a. The general public: natural hazards and their effects on beaches, dunes, and other shorelands; natural hazard planning and mitigation strategies and programs.

b. Oceanfront property owners and prospective owners and their agents (real estate personnel, consultants, architects, contractors, lenders, insurers, etc.): natural hazards affecting beaches and oceanfront properties; land use and shore protection program goals and general and site-specific requirements; appropriate hazard mitigation techniques for different situations; decision-making considerations and standards; available technical assistance.

c. Hazard mitigation consultants: land use and shore protection program goals and general and site-specific requirements; content standards for geotechnical reports and appropriate methods for assessing oceanographic and geologic hazards for oceanfront properties, and appropriate hazard mitigation techniques, consistent with requirements of the Statewide Planning Goals and the OPRD regulatory program.

d. Local planners and state agency permit administrators, reviewers, and evaluators: natural hazards affecting beaches and oceanfront properties; land use and shore protection program goals and general and site-specific requirements; ways to review and evaluate geotechnical reports that assess oceanographic and geologic hazards for oceanfront properties; and ways to determine appropriate hazard mitigation techniques, consistent with requirements of the
Statewide Planning Goals and the OPRD regulatory program

**Implementing Action for Recommendation 3-2**

3-2. Agencies involved in hazard management (FEMA, the U.S. Geological Survey, NOAA, DOGAMI, DLCD, OPRD, local governments, etc.) and state and local educators (universities, community colleges, and outreach programs, such as OSU Extension Sea Grant) should collaborate in the development and delivery of education programs about chronic natural hazards. They should use existing public and private funds for such programs, supplemented by additional initiatives as necessary.
Issue 4

Hazard disclosure during property transactions is insufficient.

Oregon has only minimal requirements for disclosing information on natural hazards that affect a property at the time of sale or transfer. Consequently, individuals involved in or affected by property transactions are not well informed about the nature and extent of these natural hazards or about the resulting constraints on development.

Findings

Over the years most of the easily developed lots on the Oregon coast have been developed. As a consequence, sites that were once passed over because of their susceptibility to natural hazards are now being developed. Unfortunately, people who want to own and develop coastal property are often unaware of possible coastal natural hazards affecting some coastal sites. Similarly, individuals selling or brokering coastal property are unaware of natural hazards that might decrease the value of their property.

The recent passage of Oregon Senate Bill 1095 (1993) was a first step in requiring some form of disclosure in real estate transactions. However, this law has so many exceptions that it will likely apply only to a small fraction of property transactions. Furthermore, natural hazards disclosure requirements in the new law are incomplete because property owners have the option to disclaim all knowledge of hazards or other potential defects.

Recommendations

Recommendation 4-1

Revise the real estate disclosure form in ORS 696 to require that all known or potential natural hazards affecting a property be disclosed by all sellers (the owner or the owner's agent) to all potential buyers before a property transaction is finalized. This proposal would remove exemptions from the disclosure requirement but would not eliminate the option for sellers to file a disclaimer in lieu of filling out the disclosure form. Specifically, natural hazards issues now covered in disclosure form section 8 (General) should be deleted and a new category called "Geotechnical" established. Questions under this new category should include the following:

Information on natural hazards affecting a property is not readily available to prospective buyers (4. Good photo).
a. Is the property or any portion of it within a designated hazard area or zone, including floodway, floodplain, landslide or slump area, groundwater or drainage hazard area, erosion or accretion hazard area, dune hazard area, or earthquake-related hazard area (amplified ground shaking, soil liquefaction, fault zone, landslide potential, tsunami inundation)?

b. Is the property or a portion of it subject to special zoning or other land use requirements for development that are related to the above hazards (for example, hazard overlay ordinance or geotechnical report requirements prior to site development)?

c. Are all structures on the property built to current earthquake building code standards (zone 3)? If not, to what seismic zone standard are they constructed and in what year did the construction occur?

d. To your knowledge, has there ever been a geotechnical report prepared for this property to address the hazards listed in 4-1a above?

e. To your knowledge, is there a record of any past hazard-related damage to the land or improvements caused by the hazards in 4-1a above or by wind or rain?

Implementing Action for Recommendation 4-1

4-1. OSSPAC should propose state legislation that amends ORS 696 to require complete hazard disclosure according to Recommendation 4-1.

Recommendation 4-2

Establish and maintain a database that includes all known information on natural hazards affecting real property, and make this database available to the public so that it can be determined if a property is located in a hazardous area (see Recommendation 3-1 for implementation).

Recommendation 4-3

Prepare and make available to prospective buyers of potentially hazardous coastal property a "buyer’s guide" or hazards evaluation checklist. In the guide, include information on how to access additional information or contacts (for example, through the database in Recommendation 4-2).

Implementing Action for Recommendation 4-3

4-3. The OSU Extension Sea Grant Program, in collaboration with the Oregon Board of Realtors, lenders and insurers, DLCD, DOGAMI, local governments, and other relevant agencies, should prepare such a publication as part of its natural hazards education program.
Over the last few decades, population growth and accompanying development have increased dramatically along the Oregon coast. Much of this growth has occurred in hazardous, low-lying beachfront areas and along erodible sea cliffs. New houses, motels, and condominiums and earlier development are increasingly threatened by gradual erosion, bluff slumping, and other hazards. The response to these hazards has generally been to construct SPSs—riprap revetments, seawalls, bulkheads—that are designed to fend off waves, stabilize cliffs, and retain the shoreland (figure 5). Permits for these structures, required by several agencies, are generally approved because of pressure from concerned property owners and because few alternatives seem to be available. As more development occurs adjacent to the beach, normal episodes of erosion create a demand for more and more SPSs.

Continued development pressure along the coast and the proliferation of SPSs have raised questions about the effectiveness of Oregon’s shoreline development and shore protection policies and decision-making procedures. Four such issues are addressed in this section, with recommendations for each:

- lack of clear, consistent state policies for shore protection generally, and hard SPSs in particular
- gaps and overlaps in regulatory jurisdiction and interagency review and coordination
- inadequate procedures and standards for permit application review and decision making
- the ad hoc, inconsistent process for emergency shore protection.

A new timber-pile retaining wall (left) and old concrete-reinforced seawall (right) at Arch Cape on the northern Oregon coast (J. Good photo).
Figure 5.—Design characteristics typical of riprap revetments (above) and seawalls (below) along the Oregon coast.
Goals and policies for shore protection are inconsistent and outdated, particularly with regard to hard structures.

State goals and policies for shore protection, spread among a variety of statutes and administrative rules, are inconsistent, incomplete, and sometimes outdated. One result is an overdependence on hard SPSs to solve problems of erosion and mass wasting to the exclusion of less-damaging methods. These hard structures may have significant, adverse, short-term impacts and long-term cumulative effects on beaches and adjacent shorelands.

Findings

Oregon's shore protection program consists of a variety of state and local policies and regulatory programs designed principally to protect the recreational values and uses of the beach and the integrity of adjacent shoreland property. These programs, described earlier in this report (table 1), were created at different times and for somewhat different, but interrelated purposes. Consequently, many of the policies are outdated or incomplete with respect to beach processes, coastal hazards, and hazard mitigation strategies. They are also inconsistent, often suggesting opposite courses of action for the same project. Overarching goals and policies guiding shore protection are needed, particularly with respect to hard shore protection structures that fix the shoreline in place. The proliferation of these hard shore protection structures along some parts of the coast has raised concerns about their adverse short-term and cumulative effects on beaches and adjacent shorelands.

Much of the scientific and engineering research on the effects of hard structures, including seawalls, revetments, groins, and jetties, has focused on physical impacts, such as acceleration of erosion in front of and adjacent to the structures, loss of sand supply, and gradual loss of beach sand volume and width. However, there may be other impacts as well, including blockage of public access to the beach or of escape access from the beach during high tides or waves and loss of biological habitat or resources, including threatened or endangered species (for example, snowy plover). Hard structures also detract from the natural beauty of the shoreline and the beach recreational experience.

Kraus (1988) reviewed about 100 technical papers on the effects of seawalls on beaches, concluding that beach change near seawalls, both in magnitude and variation, is similar to that on beaches without seawalls, if a sediment supply exists. However, on beaches with seawalls, the form of erosional response is different, with toe scour and flanking effects common. Laboratory studies conducted by Komar and McDougall (1988) quantified this effect, but their field studies along the Oregon coast have been inconclusive because few storms have affected monitored structures during the study period.

Other field studies by Griggs and Tait (1988) along the central California coast found that seawalls and revetments cause excess winter scour in front of and at the ends of the structures. The researchers believed this resulted from a combination of wave reflection and sand impoundment upstream. Pilkey and Wright (1988) compared the dry beach width of a number of protected and unprotected beaches on the east coast. They found that dry sand widths in front of seawalls is consistently and significantly narrower than beach width along unprotected shores. They point out that beach destruction may take place over several decades and that the study of single events or short-term changes may be of limited value in understanding the effects of seawalls. Another aspect of the debate over the effects of hard SPSs has to do with cause and effect relationships (Wegge 1988, Kraus 1988). Do SPSs exacerbate erosion, or is it simply that beaches with chronic erosion problems attract SPSs? Terich and Schwartz (1990), in their literature review of the subject, conclude that while more SPSs may be installed on chronically eroding beaches, the preponderance of evidence suggests that seawalls do accelerate erosion of nearby beaches and adjacent properties.
There has been no systematic examination of the effectiveness of hard structures along the Oregon coast. At the same time, nonstructural shore protection options often seem limited because there is little information available about alternative protection methods and their feasibility along the Oregon coast.

**Recommendations**

**Recommendation 5-1**

Establish clear, consistent goals and policies for operating the beach and shore protection program administered by OPRD under the Beach Law (ORS 390.605-390.770, Ocean Shores; State Recreation Areas). Recommended goals for the program are to:

a. Protect, and where appropriate, restore the beach and its natural resources for public use and enjoyment in perpetuity.

b. Protect human life and property from natural hazards, giving priority to mitigation alternatives that avoid hazards or use nonstructural techniques (see table 3 for examples).

c. Conserve, protect, and where appropriate, develop or restore oceanfront shorelands consistent with 5-1a and 5-1b above.

**Implementing Action for Recommendation 5-1**

5-1. The Oregon State Legislature should amend the Beach Law (ORS 390.605-390.770, Ocean Shores; State Recreation Areas) to establish specific goals and policies for regulating beachfront and ocean shore alterations, consistent with Recommendation 5-1.

**Recommendation 5-2**

Strongly discourage hard SPSs that fix the shoreline in place and interfere with the physical processes of the natural beach and shoreland. As a first-level guide, classify oceanfront shorelands as follows for making decisions about shore protection.
a. For "undeveloped" oceanfront property, do not allow hard SPSs in any case. Undeveloped shorelines are defined in Statewide Planning Goal 18, Beaches and Dunes (LCDC 1990), as vacant parcels of oceanfront shorelands that lacked physical improvements, such as streets and utilities, as of January 1, 1977.

b. For "infill" oceanfront property, do not allow hard SPSs unless applicants can provide clear and compelling evidence that hazard avoidance and other less damaging nonstructural shore protection methods are not feasible. Infill properties are vacant parcels-usually small to moderate sized-that are committed to development because of existing roads, utilities, and other improvements.

c. For "developed" oceanfront property, allow hard SPSs, but only if applicants can demonstrate that hazard avoidance and other less damaging nonstructural shore protection methods are not feasible. Developed parcels are those that contain a permanent structure or building and are serviced by streets, utilities, and other improvements.

Implementing Action for Recommendation 5-2

5-2. The Oregon State Legislature should amend the Beach Law (ORS 390.605-390.770, Ocean Shores; State Recreation Areas) to limit use of hard shore protection structures consistent with Recommendation 5-2. OPRD should develop appropriate administrative rules to implement these provisions.

Recommendation 5-3

Conduct a thorough review of studies of alternative shore protection techniques throughout the U.S. and the world. Test and evaluate promising alternatives to revetments, seawalls, and other hard shore protection structures; some alternatives are dune construction, vegetative stabilization, and beach nourishment (table 3). The feasibility of dynamic revetments, which are composed of movable gravel- and cobble-sized materials placed on the backshore, should also be investigated (Ahrens and Heimbaugh 1989, Lorang 1991).

Implementing Action for Recommendation 5-3

5-3. OPRD, DOGAMI, and DLCD, in cooperation with the U.S. Army Corps of Engineers (USACE) and coastal local governments, should establish a program to systematically evaluate alternatives to hard shore protection structures, using state or federal property or voluntary, privately owned property as test sites. Test results should be incorporated into the evaluation of shore protection permit applications.
Table 3. Land use management and non-structural alternatives to hard shore protection structures.

<table>
<thead>
<tr>
<th>Alternative or Method</th>
<th>Description</th>
<th>Applicability</th>
<th>Information Sources</th>
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<tbody>
<tr>
<td>Construction setback</td>
<td>Horizontal setback from shoreline based on beach type, upland landform and erosion resistance, elevation, long-term erosion or recession rate, susceptibility to episodic erosion, relative sea level rise, relocation factor, etc.</td>
<td>Feasible for new or relocated construction where lot is sufficiently deep and topography relatively flat</td>
<td>Godschalk et al. 1989&lt;br&gt;Howlahan 1989&lt;br&gt;Krillor and Miller 1987&lt;br&gt;National Research Council 1990</td>
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<td>Building design</td>
<td>Proper foundation, infiltration &amp; drainage controls, roof design, building materials, utility location, etc. with respect to wind force, maximum storm surge and wave setup &amp; run-up, flooding, landslide potential, earthquake shaking, liquefaction, and subsidence</td>
<td>Feasible for all new and remodelled construction; varies based on hazards and landform</td>
<td>Collier Undated&lt;br&gt;Godschalk et al. 1989&lt;br&gt;Pilkey et al. 1983</td>
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<tr>
<td>Relocation</td>
<td>Moving existing upland buildings landward, on-site or off-site</td>
<td>Feasible on level, deep lots or where another site available; applicable to existing development or remodels</td>
<td>National Research Council 1990&lt;br&gt;USACOE 1981&lt;br&gt;Griggs 1986</td>
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<tr>
<td>Infiltration/drainage controls</td>
<td>Prevention of water from entering ground or removal of existing water from ground to improve slope stability; uses collectors, drains, wells, dewatering pumps, outlets.</td>
<td>Feasible for new and existing sites and buildings; applicable principally on high and/or stratified bluffs</td>
<td>Herdendorf 1984&lt;br&gt;Krillor 1986&lt;br&gt;Tainter 1982&lt;br&gt;USACOE 1981</td>
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<tr>
<td>Dune creation &amp; restoration</td>
<td>Placement of mound or sand seaward of existing shorelands fronted by beaches, stabilized by sand fences and vegetation</td>
<td>Useful as buffer against upland erosion; most effective in episodic (not chronic) erosion situation; not very resistant to direct wave attack; more effective in combination with &quot;soft&quot; structure core and vegetative stabilization</td>
<td>Broome et al. 1982&lt;br&gt;Jacobsen 1988&lt;br&gt;Mauriello 1989&lt;br&gt;McLaughlin and Brown 1942&lt;br&gt;Ternyik 1979&lt;br&gt;USACOE 1984&lt;br&gt;Carlson et al. 1991</td>
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<th>Alternative or Method</th>
<th>Description</th>
<th>Applicability</th>
<th>Information Sources</th>
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<tr>
<td>Vegetative stabilization</td>
<td>Use of native and exotic vegetation to stabilize soil or sand along the shorefront or on dunes</td>
<td>Feasible on bluff slopes &gt;1:1.25 where there is some soil development and where roots can penetrate, and on dunes or bare sand; not effective in stabilizing toe of bluff or dune susceptible to direct wave or wave swash attack</td>
<td>Herdendort 1984&lt;br&gt;Jacobsen 1988&lt;br&gt;McLaughlin and Brown 1942&lt;br&gt;Tainter 1982&lt;br&gt;Ternvik 1979&lt;br&gt;USACOE 1981&lt;br&gt;USACOE 1984&lt;br&gt;Carlson et al. 1991</td>
</tr>
<tr>
<td>Bank/bluff sloping</td>
<td>Creation of a stable slope angle by placement of material at the toe (e.g., dune creation), and/or regrading the slope</td>
<td>Feasible for some over-steepened bluff slopes, especially in combination with infiltration and drainage control, vegetative plantings, and dune creation at base (or other toe protection)</td>
<td>Herdendort 1984&lt;br&gt;Kuiller 1986&lt;br&gt;Tainter 1982&lt;br&gt;USACOE 1981</td>
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<tr>
<td>Beach fill/nourishment</td>
<td>Placement of substantial quantities of beach-compatible sand to advance the shoreline seaward</td>
<td>Applicable to important recreational beaches where there is ready compatible sand source and reasonable expectation of nourished beach stability; expensive alternative; not used in Oregon</td>
<td>Chisholm 1990&lt;br&gt;Clayton 1989&lt;br&gt;Dean 1983&lt;br&gt;Dixon and Pilkey 1989&lt;br&gt;Dornblatt 1987&lt;br&gt;National Research Council 1987&lt;br&gt;USACOE 1981&lt;br&gt;USACOE 1984</td>
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There are gaps and overlaps in shore protection regulatory jurisdiction and in the interagency review and decision-making process.

There are geographic gaps in regulatory jurisdiction over SPSs installation that result in SPSs being built in some areas without public oversight, evaluation, or permits. There are also jurisdictional overlaps of regulatory authority, resulting in duplication of efforts, public frustration, and added public and private costs. The present interagency review process for permits is also inconsistent and does not involve all agencies with relevant responsibilities or expertise.

Findings

OPRD and DSL, the two state agencies that regulate SPSs, differ in what they regulate and where they have jurisdiction (figure 6 and table 4). Specifically, OPRD regulates only beach alterations (any type of structure or material) that extend west of a fixed line called the beach zone line. The beach zone line, established by survey in 1967, approximated the vegetation line or the 16-foot elevation (referenced to National Geodetic Vertical Datum of 1929 or mean sea level) (table 4 and figure 6). DSL, on the other hand, regulates all structures that involve 50 cubic yards or more of material and that are installed seaward of the highest measured tide (about 8.5 feet referenced to mean sea level [DSL 1973]) or the line of established upland vegetation, whichever is further inland (figure 6 and table 4). The consequence of such gaps was illustrated in a recent study of the Siletz littoral cell (encompassing Lincoln City, Gleneden Beach, etc.), where 31 percent of oceanfront SPSs built from 1967 to 1991 did not come under the regulatory jurisdiction of the programs; that is, no permit was required by the state (Good 1992). Some of these gaps were closed when DSL assumed joint jurisdiction in 1977, but some remain.

These gaps in jurisdiction mean that significant numbers of SPSs may be built in the future without state oversight. In such cases, there will be no evaluation to ensure that (1) there is a clear need for the project; (2) less damaging alternatives have been evaluated and judged not to be feasible; (3) the design of the structure is appropriate to the hazard; and (4) site-specific and cumulative impacts are evaluated and avoided or minimized.

Overlapping permit authority and jurisdiction is also a problem. At present, property owners may be required to get permits from four separate agencies to obtain permission to build a beachfront SPS in Oregon (table 4): city or county government, two state agencies—OPRD and DSL—and the U.S. Army Corps of Engineers. City and county requirements are highly variable; some jurisdictions require separate SPS permits that operate independently of the state process and duplicate it, while others defer to the state. However, all have local comprehensive plan policies that must be complied with. At the state level, OPRD and DSL jurisdictions overlap in the majority of cases. A recent study of the Siletz littoral cell, a 16-mile stretch of coastline that includes Roads End, Lincoln City, Salishan, and Gleneden and Lincoln Beaches, revealed that 63 percent of the SPS permits processed since 1977 were processed by both agencies. At the federal level, the U.S. Army Corps of Engineers has regulatory authority for SPSs along Oregon's beachfront. In most cases, however, shore protection proposals are automatically approved because they fall under the Corps' nationwide authorization for bank stabilization projects (Nationwide Permit 13) or under their more specific regional permit for ocean erosion control. The net effect of this is to delegate Corps authority to OPRD/DSL and the state process.

Proposed ocean shore protection projects, whether structural or nonstructural, involve a number of interrelated decisions, for example, determining the hazard, selecting the appropriate hazard mitigation techniques, and designing the project. Such projects also require an assessment of possible adverse impacts, including cumulative impacts, for example, to the beach, to adjacent property, and to scenic and recreational resources. No single public
agency has all the expertise needed to make all of these decisions or evaluate all of these impacts. At the same time, no single agency has all the responsibility. Therefore, while it is important that one agency have ultimate decision-making authority, the review and evaluation process needs to involve those persons or agencies that have appropriate experience and responsibility. The existing process covers some but not all needed areas of expertise. For example, the oceanographic and geologic hazards associated with ocean shore protection are not reviewed by agencies with experience in that area. The designs of structures are not reviewed according to engineering criteria, and they are not thoroughly evaluated for possible adverse impacts. Another part of the problem is that neither state agency nor local government staff involved in the decision-making process have sufficient training to make well-informed decisions on shore protection.

Figure 6. - Geographic comparison of jurisdiction of state regulatory programs for shore protection in Oregon.

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Table 4. Jurisdictional comparison of shore protection regulatory programs in Oregon.

<table>
<thead>
<tr>
<th>Governmental Level/Agency</th>
<th>Type of Permit</th>
<th>Types of SPSs Regulated</th>
<th>Area of Regulatory Jurisdiction</th>
<th>Threshold of Jurisdiction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal—Corps of Engineers (COE)</td>
<td>NWP 13 w/regional conditions (new/repair)</td>
<td>Riprap revetments; others if notification procedures, followed and impact minimal</td>
<td>Below ordinary high water (OHW)—rivers or high tide line (HTL)—tidal areas</td>
<td>&lt;500 ft in length and &lt;1/2 cu yd of riprap below OHW or HTL</td>
</tr>
<tr>
<td></td>
<td>Regular (new/repair)</td>
<td>Vertical concrete and other retaining walls, all structures not covered by NWP 13</td>
<td>Same as above</td>
<td>&gt;500 ft in length and &gt;1/2 cu yd of riprap below OHW or HTL</td>
</tr>
<tr>
<td>State—Parks and Recreation Department (OPRD)</td>
<td>Regular (new only)</td>
<td>All structure types, including sand or other fill</td>
<td>West of the 1967 surveyed beach zone line (BZL)</td>
<td>None—all improvements covered, but no permit required for repair to original condition</td>
</tr>
<tr>
<td></td>
<td>Emergency (new only)</td>
<td>All structure types (usually riprap revetments)</td>
<td>Same as above</td>
<td>Same as above</td>
</tr>
<tr>
<td>State—Division of State Lands (DSL)</td>
<td>Regular (new/repair)</td>
<td>All structure types, including sand or other fill</td>
<td>Line of established upland vegetation or highest measured tide, whichever is higher</td>
<td>&gt;80 cu yd of riprap or other fill (sand, concrete, etc.)</td>
</tr>
<tr>
<td></td>
<td>Emergency (new/repair)</td>
<td>All structural types (usually riprap revetments)</td>
<td>Same as above</td>
<td>Same as above</td>
</tr>
<tr>
<td>Local—city or county</td>
<td>Regular (may defer to OPRD/DSL process)</td>
<td>All types, but varies with city/county</td>
<td>Varies, but may include areas landward of state jurisdiction</td>
<td>Varies</td>
</tr>
</tbody>
</table>
Recommendations

Recommendation 6-1

Regulate the installation of all ocean shore protection structures, other activities designed to stabilize or protect the beach or oceanfront property, and other construction on or immediately adjacent to the beach, including repairs of existing structures. Examples of regulated structures and activities are riprap and other revetments, seawalls, and other hard structures that fix the shoreline in place; dynamic structures; beach fill or sand removal; beach nourishment, dune construction, or other sand alteration; sloping, lowering, fencing, or other alteration of oceanfront banks, bluffs, or dunes; vegetative stabilization of oceanfront dunes, cliffs, banks, or bluffs; and other beach construction for any purpose.

Precise jurisdiction should be determined jointly, in advance, by OPRD, DLCD, DOGAMI, and the affected local government, and include the following:

a. all oceanfront beaches along the Oregon coast, including stream and river outlet beaches strongly affected by ocean processes
b. all sand dunes adjacent to beaches (as defined above) that are subject to wave undercutting or overtopping during high tides and severe storms
c. all sea cliffs, bluffs, and banks adjacent to beaches (as defined above)
d. other oceanfront areas potentially subject to severe erosion, accretion, or other chronic hazards.

Implementing Actions for Recommendation 6-1

6-1 A. The Oregon State Legislature should amend the Beach Law (ORS 390.605-390.770, Ocean Shores: State Recreation Areas) to establish new policies and procedures for regulating beachfront and ocean shore alterations, consistent with Recommendation 6-1.

6-1 B. Following legislative changes, the OPRD, in cooperation with DLCD, DOGAMI, and affected local governments, should implement a program to determine precise regulatory jurisdiction, based on the criteria in Recommendation 6-1.

Recommendation 6-2

Place exclusively under OPRD’s control both regulatory permit administration and decision-making authority for ocean shore protection structures and activities. No other state agency or local government should be allowed to require a separate permit for SPSS’s and activities. Minimize administrative costs by establishing an OPRD-coordinated permit review and evaluation process. Base the review and evaluation responsibilities of state agencies and local governments on the legal authority and expertise of each agency. These responsibilities include the following:

a. OPRD: serve as lead shore protection agency and final decision-making authority; evaluate shore protection proposals for their potential effects on beach recreation, scenic and aesthetic issues, public access to and along the beach, public safety, and cultural resources
b. DOGAMI: assess the factors affecting shoreline stability and proposed mitigation strategies, including design and engineering; review and evaluate permit documentation or conduct peer review of consultant reports that include similar information (see Recommendation 2-1e)
c. DLCD: evaluate shore protection proposals for consistency with state land use goals and policies and the state permit consistency rules
d. DSL: evaluate proposals for conflicts with state proprietary interests in tidelands, and public trust interests in navigation, commerce, fishing, and recreation

1 The shore protection regulatory boundary should be established in advance to make it clear to the regulated public; however, until such boundary is mapped, it should be determined on a case-by-case basis. Shore protection jurisdictional boundaries should be reviewed and updated, as appropriate, every five years.

2 As an interim measure, OPRD and DSL have executed a Memorandum of Understanding implementing, to the degree possible under current law, consolidation of permit responsibilities with OPRD.

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e. ODFW: evaluate shore protection proposals for impacts on fisheries and wildlife

f. DEQ: evaluate proposals for water quality effects and provide certification if applicable

g. Cities and counties: evaluate shore protection proposals for compatibility with the local comprehensive plan and state permit consistency, retaining veto power for inconsistent projects. Such review shall not be considered a land use decision and is not subject to separate local appeals or hearings (all such appeals and hearings shall instead be part of the state permit decision-making process).

**Implementing Actions for Recommendation 6-2**

6-2 A. The Oregon State Legislature should amend both the Beach Law (ORS 390.605-390.779), Ocean Shores; State Recreation Areas and the Removal/Fill Law (ORS 196.800-196.990), vesting sole regulatory authority for beachfront and ocean shore alterations with OPRD, eliminating DSL's separate regulatory authority for such decisions, and establishing review and advisory roles for DOGAMI, DLCD, DSL, ODFW, DEQ, and cities and counties consistent with Recommendation 6-2.

6-2 B. The Oregon State Legislature should authorize and the OPRD should establish an equitable administrative fee that covers the cost of administering the shore protection regulatory program, including costs of the principal review agencies, particularly DOGAMI.
The shore protection permit process is poorly structured, and has weak review standards and limited enforcement authority, and the appeals process is antiquated.

The process for receipt, review, and technical evaluation of shore protection applications lacks sufficient structure and review standards, resulting in inconsistent decisions. OPRD lacks enforcement authority, and the appeals process is out-of-date and overly expensive and time consuming.

Findings

State and local shore protection policies in the Statewide Planning Goals, local comprehensive plans, the Beach Law, the Removal/Fill Law, and OPRD and DSL administrative rules imply a step-by-step decision-making process and various review criteria and standards. However, this process and these criteria and standards have not been fully and consciously implemented. The implied process includes the following general steps: (1) assessing the hazard and determining the threat or need; (2) evaluating alternative hazard mitigation measures while giving preference to nonstructural and land use management methods over structural methods; (3) evaluating potential adverse impacts associated with each feasible technique; (4) designing shore protection solutions that minimize individual project and long-term cumulative impacts, including compensatory mitigation. These steps suggest the need for decision-making support tools and information. They include a hazard assessment model, criteria to decide what hazard poses sufficient threat or need; a set of alternative nonstructural and structural techniques that may work in given situations; a checklist for impact assessment and more detailed guidelines where needed; and engineering and design guidelines. Finally, once a decision is made, weak enforcement procedures and penalties provide little incentive for compliance.

Another process-related issue is that the circuit court appeal procedure is antiquated, costly, and inefficient. Currently, all other state natural resource agencies with permit jurisdiction operate using the contested case hearing process. This process was established in 1973 in the Administrative Practices Act, eight years after the Beach Bill was passed. It is costly for an applicant to hire an attorney and pay court costs when appealing to circuit court. It is also costly to the state to provide legal representation and costs. Finally, circuit court workloads can unnecessarily delay a decision for up to several years, causing frustration for all parties involved.

Recommendations

Recommendation 7-1

Establish a coordinated process for making decisions on shore protection proposals. The process should include an evaluation of hazards and threats to property, alternative mitigation techniques and designs, impacts of alternatives, and compensation needs. To determine the least damaging, effective shore protection method, include the following sequence of steps in the evaluation process:

Step 1. Assess hazards affecting the property, including the following:

a. wave attack, erosion, flooding, or accretion history; wave attack, erosion, flooding, or accretion potential, based on wave run-up calculations and assessment of rip current potential.

b. mass wasting (landslides, slumping, weathering) and slope stability (lithologic units [rock and surface deposit types and composition], unit structure [jointing, bedding planes, etc.], and interrelationships [stratigraphy, nature of contacts])

c. human activities (foot and vehicular traffic, cliff carving and graffiti, adjacent development, or other human alteration)

Step 2. Determine what property is threatened and the need for shore protection, based on the following:
a. determine permissible shore protection techniques for the particular class or type of property, that is, whether it is developed, infill, or "undeveloped as of January 1, 1977" (see Recommendation 5-2a)

b. an evaluation of the actual hazards as they relate to the physical safety of a building or infrastructure for its present uses

Step 3. Evaluate alternative hazard mitigation measures (table 3). In solving problems of ocean flooding or erosion, give preference to hazard avoidance and nonstructural methods over structural methods.

a. Hazard avoidance techniques include building construction and infrastructure setbacks, relocation of existing buildings and infrastructure, and abandonment of threatened buildings.

b. Nonstructural shore protection includes vegetative stabilization, preferably with native species, dune construction and other sand alterations, and bank sloping and revegetation.

c. Dynamic revetments, if feasible, are preferred over engineered revetments or seawalls.

Step 4. For each feasible hazard mitigation technique, estimate individual and cumulative impacts on public access and recreation, visual and scenic resources, the beach and adjacent land erosion and sediment supply, public safety, and cultural and natural resource values.

Step 5. From among feasible techniques, select the shore protection solution, including its design and engineering specifications, that balances the need for effective hazard mitigation with the need to minimize adverse impacts.

Step 6. Require compensation for unavoidable, short- or long-term adverse impacts on sand supply, public access and safety, recreational beach use, scenery, wildlife, etc. Examples are contribution to a "sand bank" for beach nourishment, replacement of public access, or funding for such access. Compensation

Relocation of existing buildings threatened by erosion is a viable mitigation strategy in many cases, but is rarely used. This house at Cape Beach in southern Clatsop County is an exception (f. Good photo).
should be directly related to the adverse impact caused by the project.

**Implementing Action for Recommendation 7-1**

7-1. Oregon State Legislative amendments to the Beach Law (ORS 390.605-390.770, Ocean Shores; State Recreation Areas) should include the general permit application review and decision-making framework outlined in Recommendation 7-1. OPRD, in cooperation with review agencies, should adopt administrative rules outlining specific procedures for permit application review and evaluation. OPRD should also develop an improved application form for shore protection permits that includes the information needed to implement the process.

**Recommendation 7-2**

Vest sufficient administrative and civil enforcement authority in OPRD to ensure an effective beachfront and ocean shore regulatory program. Model such authority after DSL's enforcement powers under the Removal/Fill Law (ORS 196.860-990). Change the appeals process so that any person aggrieved by an OPRD permit decision under ORS 390.650 can petition the OPRD director for reconsideration of the final decision. The aggrieved person may also petition the OPRD for a formal contested case hearing, as prescribed in ORS 183.310. The outcome of the hearing should be final.

**Implementing Action for Recommendation 7-2**

7-2. The Oregon State Legislature should amend the Beach Law (ORS 390.605-390.770, Ocean Shores; State Recreation Areas) to vest enforcement authority in OPRD and revise the appeals process, consistent with Recommendation 7-2.
Emergency shore protection policies and procedures are lacking.

Because emergency shore protection procedures are essentially ad hoc, they result in inconsistent, uncoordinated decisions and violate both the letter and the spirit of other shore protection policies. There are also no guidelines for actions following the emergency, such as site restoration.

**Findings**

There are no criteria for what constitutes an "emergency" with respect to hazards and threat or need. This situation presents special problems for property that was undeveloped as of January 1, 1977 because of the prohibition on hard SP5s on such property. Alternative permissible methods of emergency shore protection have not been outlined, sometimes resulting in poorly placed or built structures. There is also no policy on what to do with emergency structures once the emergency has passed; at present, they become permanent structures.

**Recommendations**

Recommendation 8-1. Establish clear, consistent definitions, policies, procedures, and conditions for allowing "emergency" shore protection, beginning with the following:

a. A shore protection "emergency" is a severe, short-term episode of erosion or related hazard that threatens to damage or destroy an upland building, road, street, highway, sewer or water line, or other infrastructure or improvement.

b. OPRD, as lead shore protection agency, should make emergency determinations, consulting with DOGAMI, if needed.

c. Design emergency shore protection actions to provide immediate and temporary protection from an active ocean erosion event or other natural hazard. Such measures may include the following:

1) dumping riprap or other erosion-resistant material, the size of which is the minimum needed to halt the erosion
2) grading or placing beach sand
3) placing sand bags or tubes
4) moving or placing driftwood
d. Construction of revetments or seawalls or other devices or alterations that provide more than immediate protection from active erosion are inappropriate for emergency shore protection.

e. Require the following standard conditions for emergency shore protection authorizations:

1) Placement or movement of rock, sand, or driftwood shall be limited to the area immediately seaward of the threatened oceanfront property and be carried out in a manner that does not deflect erosive forces toward adjacent properties or the beaches that front them.

2) Within one year of their emergency authorization, recipients shall remove all rock or other permanent, erosion-resistant materials used for emergency shore protection and restore any damage to the recreational or scenic values of a beach that are attributed to the emergency measures that were taken. Restoration may include smoothing excavated areas and restoring dunes or beach access points damaged during emergency shore protection activities.

3) Emergency authorizations for shore protection may not be converted to regular shore protection permits. The regular process for obtaining a shore protection permit is a separate procedure requiring independent evaluation of long-term solutions to erosion or related natural hazard problems.

4) For properties that were undeveloped as of January 1, 1977, only nonstructural hazard mitigation techniques may be used as long-term solutions to erosion.

**Implementing Action for Recommendation 8-1**

8-1. The Oregon State Legislature should amend the Beach Law (ORS 390.605-390.770, Ocean

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Shores; State Recreation Areas) to establish emergency shore protection policies consistent with Recommendation 8-1. OPRD should implement this emergency process through administrative rules.

Some erosion events clearly create shore protection emergencies, such as this one on Siletz spit (P. Komar photo).
Land Use Planning, Governmental Coordination, and Fiscal Responsibility

The vulnerability of development to natural hazards is an increasingly important concern along the Oregon coast. Part of this concern stems from the acceleration of building construction in recent years, much of it in areas subject to erosion, landslides, and other chronic hazards. But probably a more significant factor is the growing awareness that very large earthquakes have occurred in the past just offshore along the CSZ and that another quake could occur at any time. The likelihood of such an event in the future, despite uncertainty as to its timing, places new and existing development at risk, particularly development on steep slopes, unconsolidated and fill soils, and low-lying ocean and estuary shorelands.

Oregon’s land use policies and local comprehensive plans prohibit development in hazardous areas without appropriate safeguards, but implementation of these policies along the coast has not been uniformly effective. As might be expected, given the relatively recent revelations about past coastal earthquakes and tsunamis, few if any local governments have factored the threat of such events into their land use plans or decisions. But more surprising is that development continues to be sited in areas vulnerable to chronic hazards, particularly along the oceanfront. Some problems can be attributed to a lack of state policy guidance on hazards concerns, while others stem from weak local plans or ordinances or poor communication and coordination among agencies with hazard management responsibilities.

Escalating property values are one of the principal forces driving development of many areas subject to natural hazards. Many hazardous sites, particularly along the oceanfront or bayfront, and on steep hillsides, that would be considered unbuildable under normal circumstances, are simply deemed too valuable not to develop. Recent dramatic increases in assessed values and real property prices support this assertion. Because local governments derive much of their revenue from property taxes, they often support such development, regardless of potential hazards. For example, required oceanfront construction setbacks are routinely avoided through variances, which then lead to requests for seawalls or revetments. Another problem is that many of these sites were committed to future development earlier in the century; in many cases these commitments were included in state-approved local comprehensive plans. Further, many property owners believe that they should have the right to do with their land as they please, regardless of the hazards present. For the government to require otherwise would raise the specter of a “taking” of private property without just compensation.

Other development in hazardous areas occurs because technical information about hazards is of poor quality or simply not available. If it is available, it may not be accessible to those who need it or applied properly to the situation. For example, people who purchase property for development are often unaware of hazards.

Often, when owners do learn of the hazards, they believe they can be adequately mitigated through engineering or other approaches. While this is true in some cases, there are often hidden public and private costs involved. Failure to account for the public costs may, in effect, result in a public subsidy of private development. Such hidden costs are rarely accounted for or factored into decision making. Examples are the installation and repair of public infrastructure (sewer, water supply, streets); grants, loans, and loan guarantees; and subsidized insurance.

In this section, we address the following six issues, making recommendations for each:

- lack of integration and coordination of hazards planning in land use, shore protection, and beach management
- public subsidies for development in hazardous areas
- lack of guidelines for determining whether an oceanfront lot is buildable
- effects of past decisions and existing uses on future development in hazardous areas
- ineffective oceanfront construction setbacks
- siting of development in earthquake and tsunami hazard areas

Undeveloped, erosion-prone dunes and shorelands along the southern Oregon coast. Will they be developed in the future and, if so, how will hazards be avoided (ODOT photo)?
Issue 9

Land use planning and site-specific land use decisions, as they relate to coastal hazards, suffer from ineffective integration of existing and new hazards information, piecemeal decision making, and poor communication and coordination among administrators of land use, shore protection, beach management, and hazards research programs.

Although there is broad recognition of the need to thoroughly integrate natural hazards concerns into land use planning, and to coordinate this planning with shore protection, beach management, and hazards information development, the principal mechanism for accomplishing this—the local comprehensive plan—has not been particularly effective. Comprehensive plan policies are vague and inconsistently applied by planners with little of the needed expertise. Further, there is little impetus for improving plans, policies, or their implementation. As a consequence, hazard-related decision making is usually limited to simplistic site-specific or single-jurisdiction concerns. More complex site development issues and offsite effects of projects are not generally identified or considered. Similarly, the strong influences and controls on hazards exerted by larger-scale geologic, hydrologic, and oceanographic processes or conditions are not considered.

Findings

The principal authorities and responsibilities for beach and upland management are divided among OPRD, DSL, DOGAMI, DLCD, FEMA, the Corps of Engineers, and local governments, although other agencies may be involved in some cases. But the specific roles and responsibilities in any given project are often unclear, not just to the affected public, but sometimes to the regulatory agencies themselves. This situation has led to a high level of frustration for the general public when faced with the prospect of involvement by more than one agency, each with its own set of standards and criteria for approval. It has also led to conflicts between the various governmental agencies involved as to who is responsible for what and when. Gaps and overlaps in jurisdiction result in inadequate oversight of some projects, duplication of effort in others, and public complaints about the loss of two very important resources—time and money. Unclear division of responsibility has also raised concerns over the lack of accountability and the enforcement of existing regulations.

For example, there is a recurring coordination problem between local governments that issue oceanfront development permits and the state agencies that regulate shore protection. Local governments are not required to notify shore protection regulators (OPRD and DSL) when they issue local development permits. If building construction setbacks and other hazard mitigation are insufficient, as they often are, subsequent erosion or bank slumping can generate requests for hard shore protection structures. The need for these hard structures could be avoided if the state agencies responsible for beach management were adequately informed and could recommend more appropriate setbacks. In the absence of improved local-state coordination, hard SPs are likely to proliferate along developing shorelines.

Except for several efforts at regional, advanced planning for foredune areas, oceanfront development and shore protection decisions are made case-by-case, are based on weak local comprehensive plan policies or general coastwide policies, and rarely take into account the highly variable physical character and patterns of human development found along the coast. For example, the subdivision of the coast by rocky headlands into discrete littoral cells and subcells is given little consideration in planning and management. These cells form natural planning units for natural hazards management, varying in a number of important ways: tectonic uplift rates and relative sea level rise; supply of sand from rivers and sea cliffs and distribution along the shore; beach and land erodibility and stability related to
geologic and oceanographic factors; susceptibility to ocean flooding and tsunami inundation; and potential for amplified ground shaking and liquefaction caused by major earthquakes. Also contributing to this variability are institutional and cultural factors such as jurisdiction and management authorities, ownership patterns, land use and development pressure, and attitudes toward development and private property rights. These physical and cultural differences among and within cells suggest that no one set of planning or management solutions to natural hazards problems will work for every area along the coast. They also suggest that natural hazard management cannot work well without some more effective means of coordination, because decisions or actions in one community sometimes have adverse effects on the beach or upland properties in adjacent jurisdictions.

A planning process that promises improved coordination and more rational planning boundaries is “special area management planning” (SAMP). Variations of the SAMP process have been developed and applied to many geographic areas and situations throughout coastal United States and the world, including harbors, revitalization of waterfronts for mixed use, groundwater quality protection, and ocean shore and beach areas. The federal Coastal Zone Management Act encourages states and local jurisdictions to use the SAMP process. Oregon’s Estuarine Resources Goal 16 and the local estuary plans that resulted were based on a SAMP-like framework and process; they are considered one of the most effective problem-solving parts of Oregon’s Coastal Management Program.

Such a planning process, adapted to Oregon’s beachfront areas, could address the variety of issues discussed above, as well as other issues dealt with later in this report, such as unbuildable lots (Issue 11), the differences between developed and undeveloped areas (Issue 12), building construction setbacks (Issue 13), new information on earthquake and tsunami hazards (Issue 14), and shore protection procedures (Issues 5 through 8).

The Special Area Management Planning (SAMP) Process

General features of the SAMP process include:

1. intergovernmental collaboration among local, state, and federal agencies, along with other stakeholders (for example, property owners and beach user groups);

2. agreement by consensus;

3. integration of federal, state and local legal requirements;

4. meaningful public involvement;

5. specified mechanisms for implementation that are “owned” by those who must use them; and

6. decision making processes that are stratified and well-coordinated.

Recommendations

Recommendation 9-1. Adapt the SAMP process to oceanfront beaches and shorelands along the Oregon coast. Undertake a pilot SAMP for a high-priority oceanfront area to test, evaluate, and refine the planning guidelines outlined below. Identify other priority coastal areas for application of the refined SAMP process.

The overall goal would be to improve coordination among local and state regulatory programs by establishing consistent policies and procedures in advance of specific applications for upland development, dune grading, shore protection, or other beach or shoreline activity related to natural hazards.

Following is a preliminary framework for SAMP along the Oregon coast:

a. Establish potential SAMP areas based on these criteria:

1) cultural and physical interconnections, both alongshore (for example, jurisdictional boundaries, littoral cells or subcells) and cross-shore (for example, inland streets and highways, land use, shorelands with unstable cliffs and bluffs, areas subject to wave undercutting and overtopping, earthquake-
related hazards, including tsunami inundation areas, soil liquefaction, and landslides.

2) the mix of public and private shoreland ownership, giving priority to areas that are predominantly private.

3) an inventory of developed and undeveloped lands, and a forecast of development pressures on these lands.

4) the nature and severity of coastal natural hazards.

5) existing or potential land use or beach-related conflicts, and similar criteria.

b. For the entire coastline, classify hazard-influenced ocean coastlines where SAMP might be appropriate, identifying the highest intensity of development that will be permitted to occur in each area. Factors to be considered might be regional and local geologic and oceanographic features, existing land ownership and the location and intensity of development, the vulnerability of existing and potential development to chronic and potentially catastrophic natural hazards, the existing and potential need for hard shore protection structures, existing beach, dune, and other recreational resources, scenic and aesthetic values, aquatic and upland wildlife resources, and conflicts.

c. To begin the individual SAMP process, develop an inventory that identifies, describes, and maps chronic and catastrophic hazards as they affect beaches and oceanfront and estuary shorelands and relevant cultural, recreational, economic, and other
resources and values. Include the following specific inventory requirements:

1) Chronic hazards—identify beach and upland areas made unstable by erosion or flooding caused by ocean waves, or mass wasting caused by geologic instability, stream or groundwater hydrology, physical or chemical weathering, or human alterations.

2) Catastrophic hazards—using a credible CSZ earthquake and tsunami scenario, map the areas and expected degree of amplified ground shaking, coseismic subsidence, soil liquefaction or settling, induced landslides, tsunami inundation, and seiches.

3) Cultural characteristics—determine land ownership and values; existing patterns, types, intensities, and location of development with respect to natural hazards (for example, building setbacks) and how these might influence future development; beach and other recreational resources; scenic and aesthetic values; and aquatic and wildlife resources; land use and related conflicts.

d. Consistent with the overall area classification, establish beach and shoreline management units within SAMP areas; each management unit should provide for appropriate types and intensities of development and require the use of particular strategies and techniques for hazard avoidance and mitigation. As needed, also provide for especially tailored management units within SAMP areas.

e. Implement oceanfront SAMPs using a model ordinance that covers all local land use decision making and at the state level issuing shore protection permits (for example, a multipurpose coastal hazard overlay), modified as needed to suit local conditions. The ordinance should require the incorporation of new information as it becomes available. Include appropriate management techniques detailed elsewhere in this report, including setbacks, coordination requirements, and enforcement procedures.

**Implementing Actions for Recommendation 9-1**

9-1 A. The Land Conservation and Development Commission (LCDC) should establish an oceanfront SAMP framework and process as Statewide Planning Goal amendments to Goal 7 (Natural Hazards), Goal 17 (Coastal Shorelands), and Goal 18 (Beaches and Dunes).

9-1 B. LCDC should establish a Coastline Classification Task Force to establish and apply classification criteria; the results of the classification process should be adopted by administrative rule.

9-1 C. DLCD, in consultation with local governments, OPRD, DOGAMI, and other relevant agencies and interest groups, should select a pilot SAMP area, giving priority to areas within the pilot mapping project area (see issue 1); the pilot SAMP should be funded with federal coastal zone management grants.

9-1 D. Cities, counties, special districts, DLCD, OPRD, DOGAMI, DSL, other relevant state and federal agencies, interest groups, and affected and interested citizens should develop SAMPs for appropriate oceanfront areas. Funding assistance should be provided through federal coastal zone management grants.

**Recommendation 9-2**

Establish a local land use notification process for oceanfront development projects that could lead to future OPRD-regulated shore protection proposals. Because most such projects are single-family dwellings, keep the process as simple as possible. Notifications could be triggered by an existing process (for example, individual building permits, subdivisions, or other discretionary land use actions). Requirements for geotechnical site reports, the availability of improved hazard maps and information, or other criteria, at the discretion of local governments. Send notifications to OPRD, who will notify other agencies, such as DOGAMI and DLCD, as needed. For areas with an approved oceanfront SAMP, such a process could be eliminated.

**Implementing Action for Recommendation 9-2**

9-2. If it has sufficient authority under ORS 197, ORS 215, or ORS 227, LCDC should amend Goal 17 (Coastal Shorelands) and 18 (Beaches and Dunes) to require a local land use notification process for natural hazards, according to Recommendation 9-2. Alternatively, if it does not have authority, LCDC should seek such authority or propose appropriate legislative action to implement this recommendation.
Issue 10

Development in hazardous areas is often subsidized by public funding.

Land development in hazardous areas is often subsidized by public investments in community and transportation infrastructure, through grant and loan programs, insurance programs, and federal or state disaster response and postdisaster bailouts.

Findings

Coastal land development in areas subject to natural hazards is often promoted or subsidized through local, state, and federal programs or incentives. The full cost of these programs, particularly the costs of maintenance and repairs, and disaster relief and reconstruction, is rarely considered in decision making. Examples of subsidies in hazardous areas are (1) the extension of public services at public cost (water, sewer, streets, etc.); (2) the increased local cost of regulation, technical assistance, and inspection of such development; (3) the provision of subsidized hazard insurance (for example, for flooding), government grants, low-interest loans, and loan guarantees; (4) tax deferments, write-offs, or other tax relief; and (5) disaster relief. Disaster relief is often paid out in greater sums than would be required if individuals, businesses, and the public sector had taken voluntary hazard mitigation measures ahead of time. Perhaps most troublesome is the additive nature of some of these subsidies; public tax monies are used to encourage unwise development that later must again be publicly subsidized with disaster relief monies.

The National Flood Insurance Program is one of the major programs cited as examples of subsidies that promote unwise development. On the other hand, the National Flood Insurance Program requires that developers take certain measures to mitigate the effects of hazards, and its proponents argue that these measures limit potential losses. Whatever the case, a number of studies have shown that individuals, businesses, and even public entities do not voluntarily adopt protective measures against flood hazards (Kunreuther 1993). The result is huge disaster relief bills. No data is available for Oregon, but significant natural hazard damage risks exist, particularly for large CSZ earthquakes. Given this reality, there is increasing interest in expanding federally subsidized insurance programs to cover other hazards. For example, for several years, the U.S. Congress has been debating legislation to expand the program to cover erosion hazards (the program would require substantial coastal construction setbacks as mitigation). The insurance industry has encouraged the government to enter the earthquake insurance arena. This is supported by a recent government study that cites the lack of private coverage in earthquake-prone areas as a serious threat to the federal treasury due to potential disaster relief costs.

Recommendations

Recommendation 10-1

Eliminate tax write-offs for capital losses for new structures or major additions to existing structures, built after January 1, 1996 (or some other date), when that loss is caused by erosion, landslides, or other chronic hazards, or by earthquake or tsunami hazards in designated high-hazard areas. High-hazard areas are those designated on maps developed in response to Recommendation 1-3. Until such maps are available, determine high-hazard areas by evaluating site-specific geotechnical information provided for land use decisions or building permits.

Implementing Action for Recommendation 10-1

10-1. The Oregon State Legislature should amend the tax code to eliminate hazard-related tax write-offs according to Recommendation 10-1.

Recommendation 10-2

Establish development surcharges for building permits and land use actions in high-hazard areas consistent with the actual costs of development. The charges should include the full cost of project review, evaluation, and decision making. If feasible and defensible, include the estimated future costs of maintenance, repair, or removal of associated infra-
structure, basing these costs on well-defined criteria.

**Implementing Action for Recommendation 10-2**

10-2. Cities and counties should establish appropriate development surcharges for hazardous areas.

**Recommendation 10-3**

Establish a process for evaluating coastal natural hazards in government development, grant, and loan procedures. Hazard evaluation should, at a minimum, include an assessment of erosion, landsliding, and earthquake and tsunami hazards.

**Implementing Action for Recommendation 10-3**

10-3. Each federal, state, and local development, grant, or loan agencies should establish, by administrative rule or policy, a means for evaluating natural hazards as part of its decision-making process.

**Recommendation 10-4**

Prohibit direct public development, grants, loans, or loan guarantees for essential facilities, hazardous facilities, major structures, and special occupancy structures (as defined by ORS 455.477; see Issue 3) in high-hazard areas. Exceptions would be situations where such hazards are fully mitigated by structural or nonstructural means or when the facility cannot be feasibly located outside high-hazard areas (for example, port facilities, marinas, other water-dependent facilities, water and waste treatment facilities, and similar uses). Public subsidies of other types of development in high-hazard areas should generally be discouraged.

**Implementing Action for Recommendation 10-4**

10-4. Federal, state, and local agency policies governing approval of government development, grants, loans, or other assistance should be amended to prohibit public subsidy of essential facilities, hazardous facilities, major structures, and special occupancy structures in high-hazard areas. Public subsidies for other types of development in high-hazard areas should be discouraged.

Programs of the Economic Development Department should be given particular scrutiny, but all federal, state, and local agencies should carefully evaluate their programs for possible direct or indirect subsidies to development in high-hazard areas. The A-95 process used to review federal grants and programs should incorporate an evaluation of high-hazard areas.

**Recommendation 10-5**

Expand the National Flood Insurance Program to an all-hazards program, covering at least erosion, earthquakes, and tsunamis for residences, businesses, and public buildings. Specific provisions for such a program are as follows:

a. Couple all-hazards insurance with stringent mitigation requirements designed to minimize disaster losses (for example, coastal construction setbacks [see Recommendations 13-1 to 13-4] and building standards appropriate for high-hazard areas [see Recommendation 15-3]; and others).

b. For earthquake and tsunami hazards, ensure consistency with other recommendations in this report, particularly Recommendations 14-1 to 14-5 concerning the siting of development in earthquake and tsunami areas.

c. Require that such insurance be a condition for receiving and maintaining mortgage loans in these hazard areas.

**Implementing Action for Recommendation 10-5**

10-5. FEMA should support and the U.S. Congress should enact an all-hazards insurance program that combines substantive mitigation requirements for reducing actual damages with financial protection in the event of losses. Provisions for tailoring the federal program to West Coast conditions should also be included in such legislation and any implementing regulations.
Issue 11

There is no consistent way to determine what properties along the Oregon coast are "unbuildable" due to natural hazards.

There are no clear or consistent guidelines for determining whether a property is buildable or unbuildable with respect to natural hazards. Definitions of buildable and unbuildable, responsibility for making such determinations, and decision-making procedures are lacking. It is also unclear what the legal and political consequences of such determinations would be, particularly with respect to infill development, public liability, and the "taking" issue. Finally, current policy does not address how properties change over time from being buildable to unbuildable or vice versa based on new information, new technology, the effect of actions on neighboring properties, and natural hazard events.

Findings

Natural hazards effectively render some coastal properties unbuildable, although engineering technology makes development of many hazard-prone sites possible if the property owner or developer is willing to invest the needed dollars. However, there is a difference between what is physically possible at a specific site at a given time and what may be consistent with the public interest. Unfortunately, there is no policy or mechanism for local governments to factor in the public interest when making a decision as to whether or not a lot in a hazard-prone area is buildable. Instead, the site development process focuses on whether or not hazards on the site can be sufficiently reduced to allow development to go forward.

Rarely have decisions about whether a site is buildable or unbuildable been made in advance (that is, during local comprehensive planning). However, one clue to this question as it relates to individual properties is the assessed value of a site as determined by local tax assessors. For example, if a shallow oceanfront lot is assessed at $3,000 while the adjacent deep lot is assessed at $60,000, it might be assumed that the assessor felt the former property was unbuildable (figure 7). However, such determinations have little meaning in the land use decision-making process.

Not having explicit policies to determine whether or not a site is buildable or unbuildable results in a number of problems: protracted deliberation, debate, or litigation over specific proposals at either public or private expense; inappropriate development with adverse scenic, visual, and physical impacts on the beach or upland; and diminished beach recreational values.

Recommendations

Recommendation 11-1

Establish a classification system and criteria for determining development capacity of oceanfront lots with respect to hazards. Apply the system on a jurisdiction-wide basis or through an established SAMP process (see Issue 9). A prototype classification system, based on the vulnerability to natural hazards and the possible need for property-owner compensation or hazard mitigation, is outlined below:

a. buildable with no special hazard mitigation requirements other than hazard avoidance (for example, adequate building setback or design features)

b. buildable with appropriate hazard mitigation (mitigation must be privately financed)

c. unbuildable, based on an evaluation of property rights, physical constraints, and public interest factors such as the following:

1) Public ownership or public easements exist (for example, the lot or the major portion thereof is on the beach or in the water).

2) Physical constraints exist which preclude development without extraordinary structural mitigation measures (for example, the lot is very narrow or is located in an active landslide or active foredune area).
3) Construction would constitute a public nuisance under common law principles.
4) Construction would alienate public rights protected by ORS 390 (Oregon Beach Law), including public access to and along the beach, public safety, and scenic and recreational values.

**Implementing Action for Recommendation 11-1**

11-1. **By rule or other enforceable policy, LCDC and DLCD should prepare and adopt rules for determining whether a lot is buildable or unbuildable. Local governments should incorporate the procedures into the SAMP process (see Recommendation 9-1).**

**Recommendation 11-2**

Amend the Oregon Tax Code to provide owners of hazard-prone property with an enhanced tax credit (for example, 150 percent of assessed value) for donating property to a public entity or a private, nonprofit land trust for permanent, nondevelopment-related public use (for example, to OPRD, local park authorities, federal park or conservation authority, or private land conservancy).

**Implementing Action for Recommendation 11-2**

11-2. **The Oregon State Legislature should amend the tax code to provide for an enhanced tax credit according to Recommendation 11-2.**

**Recommendation 11-3**

Establish a public fund to purchase fee simple or development rights to property that is deemed unbuildable based on the criteria in Recommendation 11-1. The deed for such property should be held by OPRD or similar authority, have substantial public value, and be preserved in perpetuity as undeveloped open space.

**Implementing Action for Recommendation 11-3**

11-3. **OPRD should consider and evaluate alternatives for developing, administering, and managing a fund to implement this recommendation. A funding mechanism for such a program is needed.**

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![Diagram](image-url)

**Figure 7.** This parcel in Lincoln City (tax lot 1900), perched 75 feet above the beach on an eroding sea cliff, is a good example of a marginally buildable lot. Assessed for $5,450 in 1991, it was put up for sale at $77,000 following construction of a small seawall at the base of the cliff.
Issue 12

Past land use decisions and existing uses unduly influence decisions on new development.

Past decisions about private and public development that did not fully consider coastal natural hazards often influence or prejudice today's land use decisions. Because of previous commitments to development, critical facilities, industrial, commercial, and residential buildings, streets, highways, infrastructure, etc., are sometimes sited in areas now known to be hazardous or even life threatening. Examples include extension of sewer and water lines into undeveloped areas and subdivisions laid out without due consideration of natural hazards.

Findings

Many coastal properties are committed to development at some level. Examples are existing subdivisions, installed infrastructure, and infill development of vacant lots in areas previously approved for development. Hazardous areas that were undeveloped earlier are now being developed or filled in. This continues to occur despite improved hazard information that suggests that either no development should take place or that changes in site plans are needed to avoid or mitigate natural hazards. The unlimited time frame for subdivision development, particularly in rural lands, creates the potential for similar problems. In the same manner, installing infrastructure without full consideration of its impacts also encourages development of hazardous property.

Recommendations

Recommendation 12-1

Subdivisions. Improve subdivision procedures with respect to natural hazards as follows:

a. Establish a sunset clause for new subdivisions that limits the time allowed for development to occur and provides for automatic vacation of the subdivision at the time of sunset.

b. Review previously approved subdivisions as required by ORS 92.205-92.245 (Undeveloped Subdivisions), modifying or vacating as appropriate. Base the decision to modify or vacate, in part, on an evaluation of natural hazards affecting the property (for example, erosion rates on the potential for oceanfront lot setback requirements, the potential for tsunami inundation).

c. Simplify plat vacation and reconfiguration procedures to expedite the process.

Implementing Action for Recommendation 12-1

12-1. If sufficient authority exists, local governments should implement these recommendations during periodic review of local comprehensive plans, development of oceanfront SAMPs, or independently. If such authority does not exist, DLCD should propose legislative action to authorize these subdivision procedures.

Recommendation 12-2

New Infrastructure. When a public or private infrastructure extension is proposed to service new development, evaluate the extension for its potential to influence land development in hazardous areas. When an evaluation suggests increased hazard risks or impacts, require that the infrastructure extension be modified to eliminate or minimize such adverse impacts.

Implementing Action for Recommendation 12-2

12-2. LCDC should amend the Public Facilities Goal 11 to require a hazards assessment of new infrastructure development. Local governments should update local coordination agreements and ordinances at periodic plan review or during development of SAMPs.

Recommendation 12-3

Existing Infrastructure. Evaluate existing public infrastructure in areas not yet built up for its influence on land development in hazardous areas. Where reasonable, abandon.
relocate, or otherwise restrict development to minimize threats to life or property.

Implementing Action for Recommendation 12-3

12-3. LCDC should amend the Public Facilities Goal 11 to require a hazards assessment of existing infrastructure development. Local governments should update local coordination agreements and ordinances at periodic plan review or during development of SAMPs.

Development continues to fill in on previously subdivided property in Pacific City without regard to obvious erosion hazards; unless the unbuilt lots are abandoned, the only available hazard mitigation is shoreline armoring with riprap (ODOT photo).
Oceanfront construction setbacks, as now implemented, have not proven to be an effective means for avoiding hazards.

Construction setback procedures for buildings along the oceanfront vary among coastal jurisdictions and differ in their effectiveness. Variances to required setbacks are common, leading to development of marginally buildable properties, placing upland improvements at risk, and creating demand for otherwise unnecessary shore protection structures. Overly permissive allowances for density and lot coverage are sometimes the basis of setback variances. In areas where buildable portions of oceanfront lots are shallow, required setbacks may effectively render lots unbuildable.

Findings

The use of mandatory coastal construction setbacks as a means of avoiding hazards and preventing loss of property is a well-accepted coastal management tool throughout the United States and other parts of the world. In Oregon, several state-level general planning policies relate directly or indirectly to setbacks. Statewide Planning Goal 7 states "development shall not be...located in areas subject to hazards without appropriate safeguards."

Goal 17 requires that "land use management practices and non-structural solutions to problems of erosion and flooding shall be preferred...." And Goal 18 prohibits most development "on beaches, on active foredunes, and on other foredunes which are conditionally stable and are subject to ocean undercutting or wave overtopping, and on interdune areas (deflation plains) subject to ocean flooding."

Although these policies provide some guidance to local governments, the state has no specific technical guidelines for determining setbacks. Each local jurisdiction thus uses its own procedures and criteria; some are more effective than others. Setbacks that are too small may quickly place upland buildings at risk and create demand for seawalls or riprap revetments. These SPFs, in turn, may adversely affect neighboring properties, the public beach, and scenic and recreational qualities protected under the 1967 Beach Law.

Other kinds of problems arise in partially built-up areas (infill development) or where required setbacks are large enough to render property unbuildable. In these cases, setback waivers are often granted. Resulting setbacks may be based on existing setbacks for neighboring properties (in the case of infill) or on site-specific analysis and recommendations. These recommendations often call for installation of a SPF or SPF in lieu of an appropriate setback. There is concern that new subdivisions continue to be approved with oceanfront lots that may be too shallow for adequate construction setbacks.

Another problem on lots where only a portion of the lot is deemed buildable (for example, where part of the lot is upland and part is on the beach) is that some local governments use the entire lot, rather than just the buildable portion, to determine lot coverage and density allowances. As a result, developments cannot proceed without setback variances that unnecessarily place development at risk or lead to proposals for seawalls or revetments.

Recommendations

Recommendation 13-1

Develop, test, and refine a coastwide technical methodology for coastal construction setbacks, whereby each property would be evaluated on its unique characteristics using the most up-to-date information available. Factors to consider for this formula-based approach are as follows:

a. wave run-up and surge potential for a 100-year storm (assuming spring tides)

b. local beach and dune erosion or accretion rates

c. landform and geology

d. historic rate of sea cliff recession
e. the type, intensity, and expected life span of the proposed development

f. tsunami inundation limit and run-up height

g. whether the property was “undeveloped” on January 1, 1977, in which case setbacks should be greater because hard shore protection structures are not permitted under Statewide Planning Goal 18

**Implementing Action for Recommendation 13-1**

13-1. LCDC should amend the Coastal Shorelands Goal 17, requiring that DLCD, in cooperation with DOGAMI, OPRD, and coastal local governments, develop a consistent coastal construction setback methodology. Once a reliable method is in place, it should be adopted by administrative rule and included in the content standards for geotechnical reports (see Issue 2). Funding should be provided through the Coastal Hazards component of the Coastal Zone Management Act Section 309 program for Oregon.

**Recommendation 13-2**

Require use of the coastal construction setback method (Recommendation 13-1) for all shoreline development subject to coastal natural hazards. Have coastal construction setbacks for upland buildings and infrastructure determined by a qualified professional and include these setbacks in site-specific geotechnical reports or other project proposals.

**Implementing Action for Recommendation 13-2**

13-2. LCDC should require use of the approved coastal construction setback methodology; it should be adopted by administrative rule and included in the content standards for geotechnical reports (see Issue 2).

**Recommendation 13-3**

Allow variances to required coastal construction setbacks only when all of the following conditions are met:

a. It is demonstrated that building design (footprint and overhangs) and proposed construction techniques minimize exposure to natural hazards.

b. It is agreed upon and established by variance condition that no concurrent or future hard shore protection structures will be permitted on the property.

c. Maximum setback variances on other parts of the property (sides and street or back) have already been granted and incorporated into the design.

**Implementing Action for Recommendation 13-3**

13-3. Through administrative rules or through amendment of the Coastal Shorelands Goal 17, LCDC should set limits on variances to coastal construction setbacks.

**Recommendation 13-4**

Do not allow the use of lot coverage or building density allowances as the basis for a variance to required coastal construction setbacks.

**Implementing Action for Recommendation 13-4**

13-4. Through administrative rules or through amendment of the Coastal Shorelands Goal 17, LCDC should set limits on variances to coastal construction setbacks.
Construction setback regulations differ markedly from jurisdiction to jurisdiction, resulting in distinctly different land-use patterns and scenic character (top, city of Gearhart; bottom, Coronado Shores, Lincoln County) (ODOT photos).
Issue 14

Development continues to be sited in earthquake and tsunami high-hazard areas.

Decisions on land use planning, siting, or capital expenditure for public or private infrastructure, critical and lifeline facilities, and residential, commercial, industrial, and other development do not explicitly factor in potential earthquake-related hazards, including amplified ground shaking, soil liquefaction, ground subsidence or uplift, fault rupture zone location, landslide potential, or tsunami or seiche inundation and run-up.

Findings

In the last few years, Oregonians have become aware of their vulnerability to extreme earthquake hazards, particularly on the coast. Just 20 to 40 miles offshore lies the longest and potentially most dangerous fault zone in North America (the 700-mile long CSZ—see figure 1). There is a 10 to 20 percent probability of a major quake (magnitude 8.0-9.0) along the CSZ in the next 50 years. Hundreds of other crustal faults that crisscross the shoreline could be activated by a major quake. While adequate disaster preparedness is essential for saving lives, it is also critical that the state integrate earthquake-related considerations into its land use planning and development process, especially given the recent acceleration of coastal development. If appropriate land use measures are implemented now, it will save lives, reduce property losses, and facilitate effective disaster response when the inevitable CSZ quake does strike.

Of special concern with respect to hazards is the siting of lifelines and critical facilities (highways, water lines, fire and police facilities, hospitals, etc.) and other development that attracts large groups of people or people with limited mobility (schools, nursing care, shopping centers, etc.). Of particular concern for the latter groups are evacuation times and routes.

To prohibit all new construction in earthquake and tsunami high-hazard areas and to relocate existing development away from these areas would severely curtail economic development in coastal communities and ports. Such a move is not practical or justifiable. However, strictly limiting some kinds of new development and gradual replacement of some older facilities located in these areas make good economic sense and at the same time promote public safety.

Recommendations

Recommendation 14-1

Establish a system of special zones, procedures, restrictions, and conditions to limit development in earthquake and tsunami high-hazard areas (figure 8). Such a system would include the means to determine the appropriate level of allowable activities, depending on the hazard. It would need to be based on relatively sophisticated information and mapping that would include a determination of the hazard area, an evaluation of the hazard, an evaluation of the severity, and the level of allowable risk (see Recommendation 1-3).

Implementing Action for Recommendation 14-1

14-1. LCDC, in cooperation with DOGAMI, cities, counties, and emergency managers, should amend Goal 7, giving special attention to earthquake and tsunami hazards. On the basis of these amendments, they should develop administrative rules that incorporate detailed guidelines for land use related to these hazards, including the special zones, procedures, restrictions, and conditions (for example, see Recommendation 14-2).

Recommendation 14-2

Prohibit the construction of or significant additions to essential facilities, hazardous facilities, major structures, and special occupancy structures in earthquake and tsunami high-hazard areas.

Implementing Action for Recommendation 14-2

14-2. Rules established under Recommendation 14-1 should include the prohibition recommended in Recommendation 14-2. Cities and counties should evaluate high-hazard areas under their jurisdiction and rezone them accordingly.
Figure 8. — Areas that would be inundated by a tsunami generated by a large CSZ earthquake need to be mapped along the coast.

**Recommendation 14-3**

Limit other types of development in high-hazard areas to low-intensity uses. In addition, establish specific conditions and building standards for development that will prevent collapse of structures when they are subjected to expected earthquake or tsunami forces.

**Implementing Action for Recommendation 14-3**

14-3. Following rules established under Recommendations 14-1 and 14-2, cities and counties should evaluate high-hazard areas under their jurisdiction and require them or establish appropriate permitted uses or development conditions and standards for them.

**Recommendation 14-4**

Develop long-range plans to phase out existing essential facilities, hazardous facilities, major structures, and special occupancy structures located in earthquake or tsunami high-hazard areas. Similarly, phase out or relocate utilities and other infrastructure in these high-hazard areas when normal replacement or major overhaul is due.

**Implementing Action for Recommendation 14-4**

14-4. City and county planning and development authorities, in cooperation with emergency management officials, utilities, and other private parties, should develop and implement a long-range plan for phasing out these structures, facilities, and infrastructures.

**Recommendation 14-5**

Incorporate information on tsunami run-up associated with forecasted CSZ earthquakes into the National Flood Insurance Program and rate maps as data becomes available.

**Implementing Action for Recommendation 14-5**

14-5. In coordination with DOGAMI, FEMA should revise its flood insurance rate maps to incorporate locally generated CSZ tsunami hazards.
What, where, and how to develop in areas subject to tsunami hazards poses a conundrum for Oregon communities and ports (ODOT photo at Brookings).