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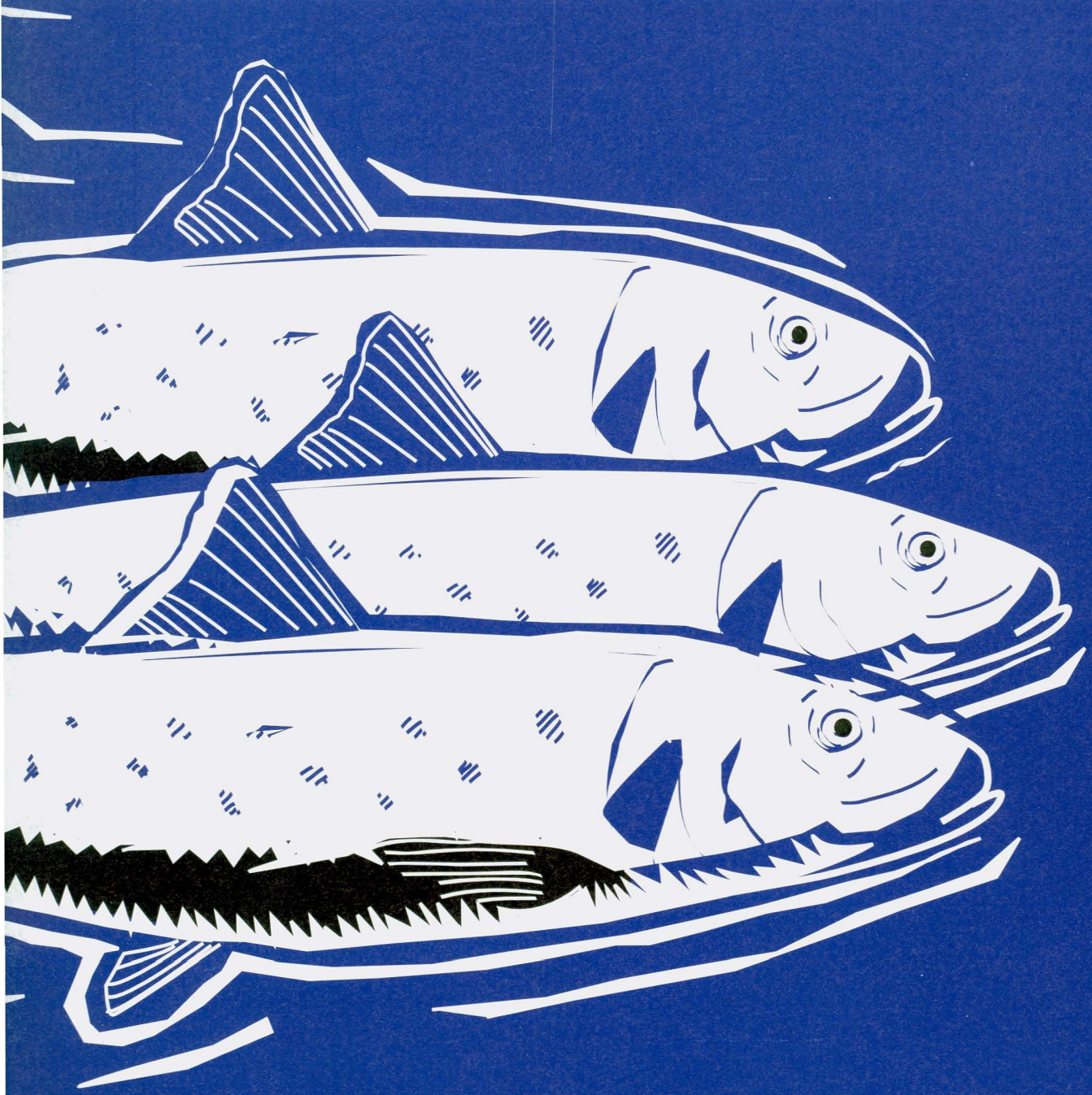

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The Coastal Conservancy is a state agency working to preserve, improve, and restore public access and natural resources along the coast and on San Francisco Bay. It builds trails and walkways, purchases threatened coastal land from willing sellers, enhances and restores wetlands and watersheds, protects open space and farmland, supports commercial fishing, helps cities develop and improve waterfronts, and crafts innovative solutions to land use conflicts. The Conservancy undertakes projects in partnership with nonprofit organizations, landowners, local governments, and other public agencies. It is funded primarily by bonds authorized by California voters.

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—Editor

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"The beauty of the coast results from its erosional nature of sandy beaches backed by sculptured seacliffs."—Douglas Inman

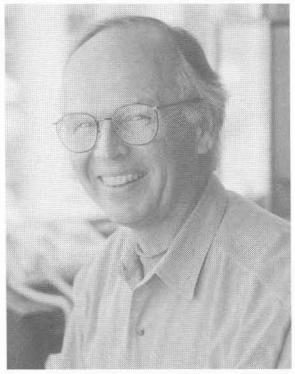
WE SHOULDN'T EXPECT A SHIFTING COAST TO BE STABLE

I WAS AT my Coastal Commission desk late on a rainy, windy evening in 1983 when the telephone rang. On the line was the president of the Seadrift Homeowners Association, shouting—shouting to be heard over the wind and waves. He held his telephone out the patio door so I could get a sense of the storm's fury, and formally requested an emergency permit to build a boulder riprap barrier to protect the homes on the sandspit across the mouth of Bolinas Lagoon in Marin County. After asking some questions, I granted permission. The barrier was built, the homes were saved, and a long story—a story of contested access, of public versus private rights, of construction on a patently hazardous spit—grew longer.

California's "collision coast" is inexorably moving inland. It was formed by the pressure of two tectonic plates against each other, and is on the far downwind edge of a not always Pacific Ocean. It is an erosion area. It is not solid ground.

Those who own property at the edge, however, wish it were solid ground, act as though it were solid and, when challenged, seek to make it solid. As a result, 13 percent of our 1,100-mile coastline is "armored" by seawalls and other hard structures, and more such structures are being planned.

Articles in this issue of *Coast and Ocean* explain that the natural erosion process is being accelerated by sand "starvation" of beaches (the result of upstream dams, water diversion, and shoreline structures) and development on blufftops and back beaches. This issue's authors also demonstrate that armoring the shore may be a "cure" worse than the "disease." Coastal-dependent tourism is a major contributor to our economy—to the tune of $9.9 billion per year—and much of it depends on beaches. Walls and piles of boulders can destroy beaches. They are also often ugly.



DEWEY SCHWARTZENBURG

Some excellent regional efforts to solve the problem have been launched—at Encinitas, the reSANDiego "opportunistic" beach renourishment, under the leadership of SANDAG; on the Santa Barbara–Ventura County coast, BEACON; in the Monterey Bay region, the Coastal Commission's Regional Cumulative Assessment Project. These are important moves in the right direction. They do not suffice, however, to address the basic issue.

Our eyes should be on beach restoration, now and in the future, even though the pace of shoreline development continues for now. To that end, I have three recommendations. Two will require new legislation, but the most important one will not. It will require money, but less than it will cost to continue along the current course.

First, federally secured insurance for homes built on designated "blufftop retreat areas" should be proscribed, just as flood insurance is proscribed for development in flood zones. Second, prospective purchasers of blufftop and beachfront lots or homes should be notified through the title search process of geologic hazards. Third and most important, the Coastal Conservancy (and other public and nonprofit groups) should acquire future development rights, from willing sellers, to properties destroyed, or at risk of destruction, by natural disaster.

If we are to reduce the demand for seawalls or unnatural sand replenishment, we must move out of harm's way. Since shoreline erosion is inexorable, the harm is caused by standing in its path with unsuitable development. By selling future development rights, coastal property owners could continue to enjoy their time on the edge until they can no longer do so except by armoring the shoreline. Then they (or their successors) would step back from disaster.

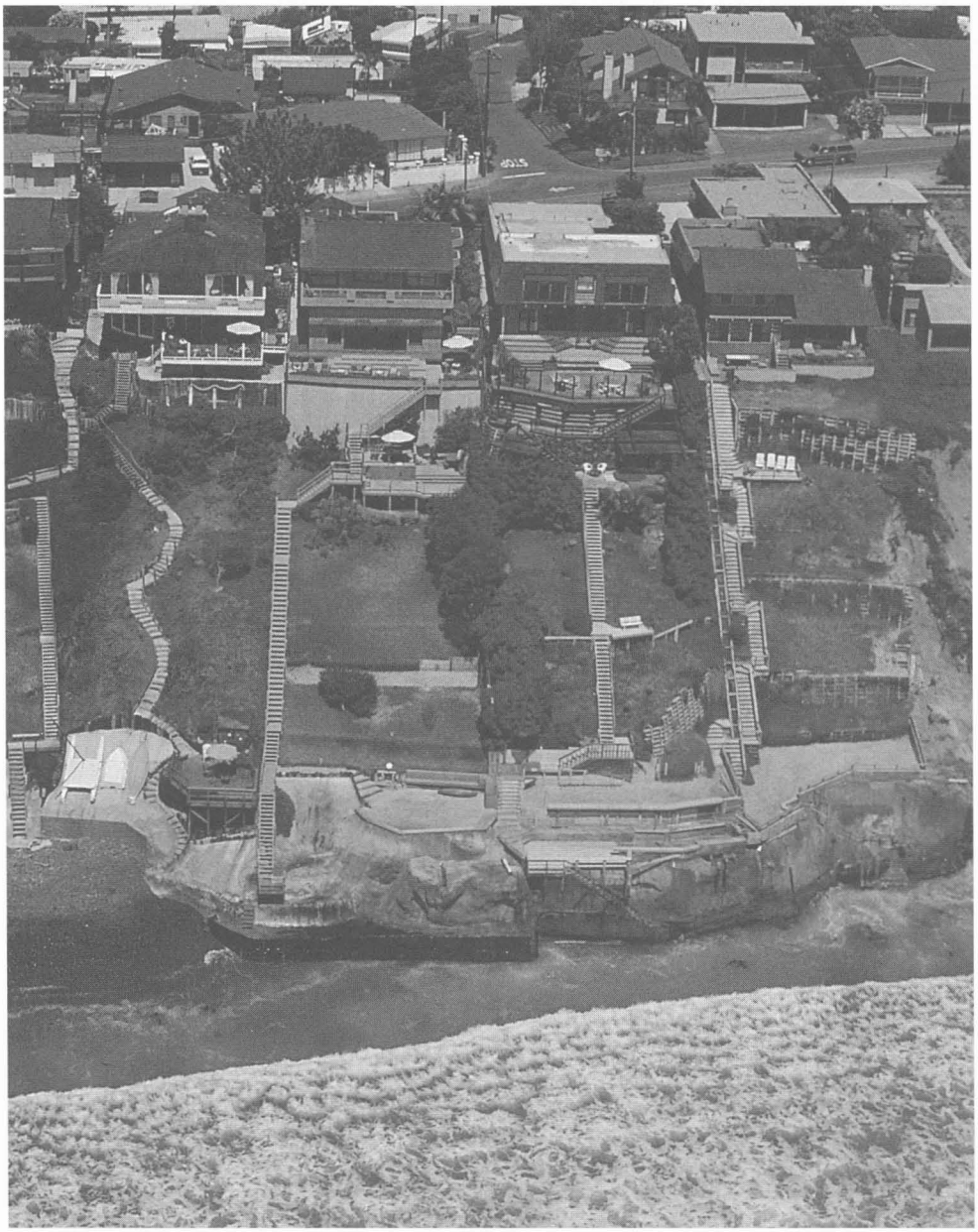
We'll need to buy back the beach, in some instances. But let's do it now, when we can buy future development rights at a discounted price. Later, maybe, we can afford to remove some seawalls so we can, in fact, restore the beach.

This is the third column—and *Coast & Ocean* issue—to take a 20-year look at the Coastal Plan. We have now reviewed access, agriculture, and coastal hazards; the next topic will be wetland restoration and watershed management.■

—Michael L. Fischer, the Coastal Conservancy's executive officer, was executive director of the California Coastal Commission from 1978 to 1985.

California's Vanishing BEACHES

EDWIN H. STERRETT



Fifteen years ago people used to play volleyball on the beach in Leucadia and leave the net up all summer. Now maybe there is some sand here at low tide. Most of the time there is only cobble.

Trying to Balance the Sand Budget

RASA GUSTAITIS

JUST SOUTH of the spot where the Self-Realization Fellowship temple foundered on the seabluff in 1941–42, a white wooden stairway descends 100 feet to

nowhere. It was built here in north San Diego County for the Swami Yogananda, so he could walk down to the wide sandy beach below. But the beach, like the temple, has been swept away. The blocked-off stairs end at a pile of boulders and a rocky shore only thinly veiled with wisps of sand.

The swami's Spanish-style white house, built in the 1920s, still stands on the bluff, above the famous surfbreak known as Swami's. To protect it—along with the other buildings, well-kept gardens, and mature trees along a quarter mile of ocean frontage—Fellowship members have worked hard to minimize bluff erosion. They use water very carefully on the grounds and have installed an underground drainage system to capture runoff from farms and gardens farther inland. It was seepage from inland that undermined their temple.

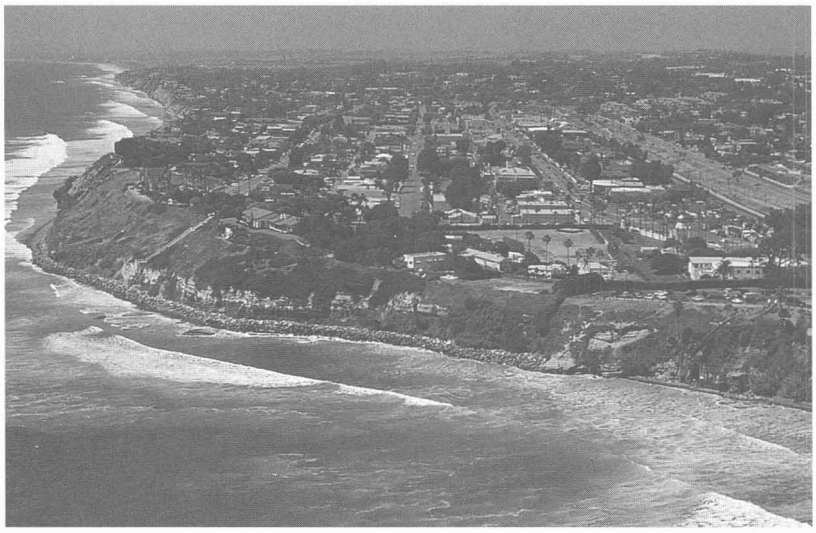
They know, however, that all their work atop the bluffs can easily be undone by the ocean if there is little or no sand on the beach to dissipate storm waves before they assault the cliffs. And why has the sand disappeared? Brother Anilananda, a monk with the order for 30 years, has researched and pondered this question. Just the other night, he says, "I had an illumination. The reason we have no sand on the beach is that it's nobody's job to make sure it's there."

To remedy that perceived vacuum, the Fellowship has joined with neighbors to form ReSANDiego, an organization "committed to keeping the San Diego beaches in a healthy/sandy state from this time forward as long as waves break and the tide flows." They have support from the San Diego Association of Governments (SANDAG). The immediate objective is to get for local beaches some of about 7 million cubic yards of sand the Navy will dredge this year from San Diego Harbor, in order to prepare it to become the home port of nuclear aircraft carriers.

It may seem strange, to people unfamiliar with California's coastal history, that keeping beaches sandy could be anyone's job. Most people assume that beaches are natural. Taking sand to a beach would seem to make as much sense as taking rocks to a quarry. Yet many of this state's best-known beaches are on technological life-support to avert what coastal scientists and engineers call sand starvation. Without repeated applications of sand by human effort, many of them would diminish or disappear, leaving rocky shores.

This import of sand from elsewhere (offshore or inland) is called beach nourishment. It is meant to compensate for the

SAN DIEGO HISTORICAL SOCIETY



EDWIN H. STERRETT

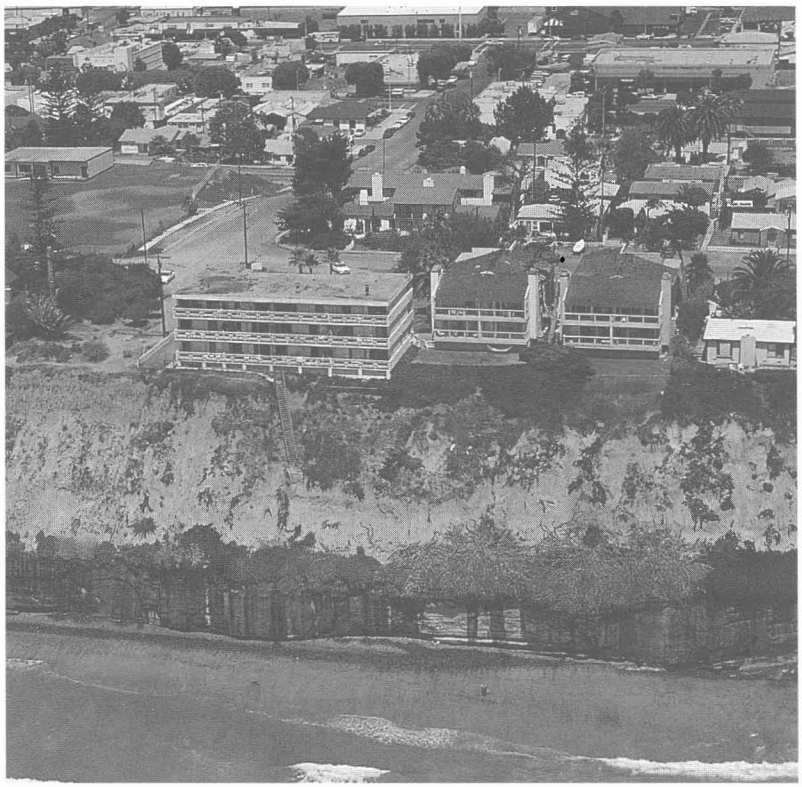
At left, the Self-Realization Temple before it was washed out. At right, Swami's Point. The stairs to the right lead from Swami's City Park to the shore. Beach nourishment might cover the riprap and build a beach the public could use at all times, not only at low tide.

damage done to beaches by the loss of natural sand supplies, which are trapped upstream behind dams and diverted by various shoreline structures. Between 1930 and 1992, an amazing 131 million cubic yards has been pumped or trucked to various southern California beaches, according to a study by Reinhard E. Flick of the California Department of Boating and Waterways. That's the equivalent of more than 13 million trucks hauling 10 cubic yards each. Some of this sand created wide beaches, some kept other beaches from being swept away, some restored beaches that had vanished.

Along this coast, sand travels a complex one-way path from the mountains to submarine canyons and other offshore sinks, spending time on beaches en route. Floods bring sand from the mountains to river mouths; the littoral (longshore) current distributes it gradually to beaches. Each winter, beaches narrow as storm waves from the north pull some of the sand offshore. In the summer they widen as gentler waves from the south bring much of it back. Eventually the sand is trapped in the submarine canyons—drowned river mouths from the time when the continental shelf was the coast.

Douglas L. Inman, founding director of the Institute of Coastal Studies at the Scripps Institution of Oceanography, has shown that the sand travels within geographical compartments, which he calls littoral cells. Each cell has its own sand sources, pathways, and offshore sinks. Each has a sand requirement—a sand budget—that must be met if the beaches are to maintain their dynamic equilibrium. Most sand does not travel from one cell to another.

This is the natural process, but it has been enormously revised by humans. Sand nourishment is but one of the many complex interventions introduced to keep shoreline features and structures where people want them on the coast, despite the fact that the coast is inexorably eroding. It is a "soft" approach, in contrast to "hard" measures, which include bluff fortifications, seawalls, and revetments (rock barriers and cliff facings). So vast is the investment in these interventions that some coastal experts have suggested that beaches in densely populated areas be thought of as part of the state's infrastructure, like water projects, roads, and utilities, rather than simply as natural features. They point out that the economic well-being of many communities along the coast depends on beaches as much as, or more than, it depends on good roads and water systems. Properties on or above the beach are prime real estate, despite the hazardous nature of many sites and the certainty that they will eventually—and often unpredictably—be destroyed.



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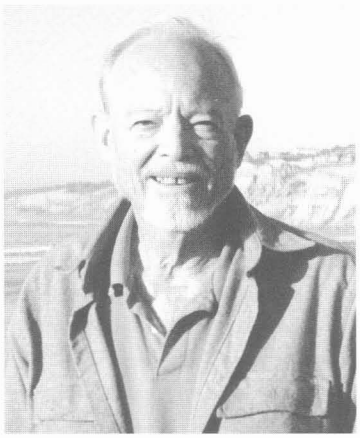
Don't run down these stairs!

Oceanographer Flick points out that New York City has long considered its beaches as infrastructure. The first beach to be artificially nourished in this country was that of Coney Island, in the 1920s. "In the West the people take beaches for granted," he says.



Douglas L. Inman

How to Keep Sand on the Beach?

GIVEN A CHOICE between coastal fortification and beach nourishment, the current consensus among coastal experts is that nourishment is preferable, if done carefully and selectively and repeated as necessary. This is a conclusion of a newly published report, *Beach Nourishment and Protection,* by a National Science Foundation committee headed by Richard J. Seymour.

Lately, however, funding for any kind of shoreline protection has been severely cut back. Since the 1930s, most of this money

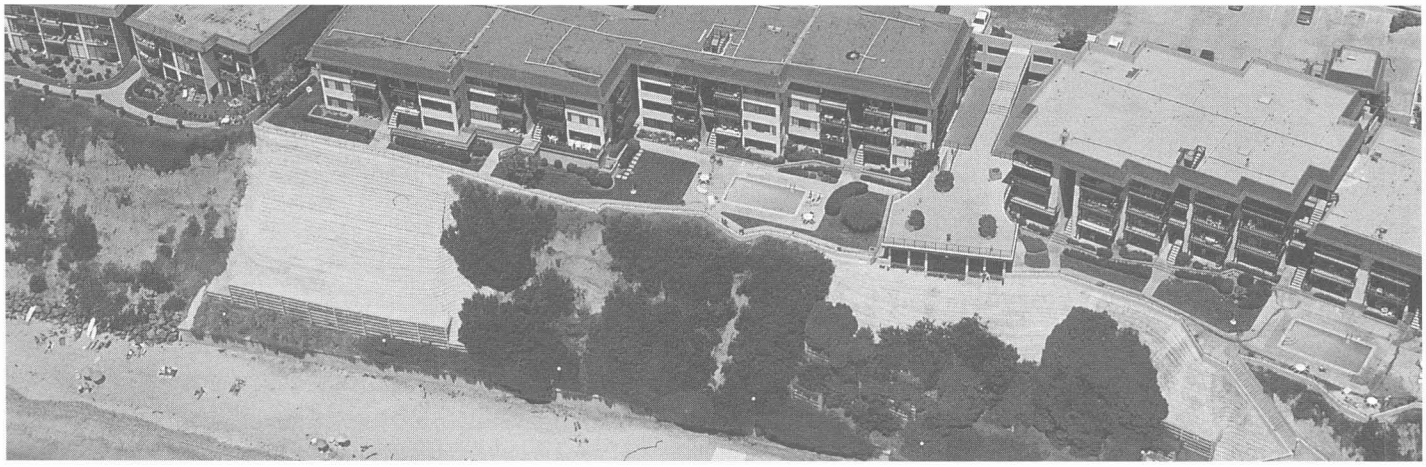
has come from federal sources, especially the U.S. Army Corps of Engineers. Last November, the Corps announced that it will no longer be funding local shoreline protection projects (see pp. 11–15). The response of those with a stake in beach protection has been to lobby the White House and their Congressional representatives. At the November 1995 Annual Conference of the American Shore and Beach Association, held in San Diego, many participants signed a letter to President Clinton pointing out that "sound, safe beaches protect lives and property and also generate needed tax dollars for all levels of government." Studies that attempt to quantify the economic benefits of beach-related tourism were repeatedly cited.

At the same time, however, the new budgetary realities at all levels of government have prompted a search for alternatives. ReSANDiego is one manifestation of a new local sand activism. Beach protection advocates are seeking out sources of sand that had earlier seemed too negligible to bother with, and are scrutinizing development projects that affect beaches and demanding compensation for their impacts. One result of this need-driven activity may be a shift toward the kind of carefully crafted, comprehensive, and informed coastal management that scientists have long advocated.

With the Corps pulling out, those with a lot to lose now focus on "targets of opportunity." Material excavated from local shoreline projects and construction sites, which earlier might have been dumped in the ocean or a landfill, is now examined for possible use as beachfill. The Coastal Commission and other permit-granting agencies have encouraged such efforts, and although there is still much red tape to get through, this recycling benefits all concerned. Landfill and ocean disposal is not as simply accomplished as it used to be. By turning appropriate excavated material into beachfill, the developer helps to balance the sand budget while avoiding costly challenges and procedures.

The Navy's home-porting project is the biggest current opportunity to replenish San Diego County beaches. The Navy has offered to place 7 million cubic yards of sediment in the nearshore zone off Del Mar, Imperial Beach, Oceanside and Mission Bay beaches, calculating that most of this material will be washed ashore. Local sand advocates want to have it pumped from barges directly onto their beaches, but that transfer would require $17 million. Senator Barbara Boxer told them recently that the Clinton Administration has agreed to earmark $13 million in unused military funds in the 1996 budget. Use of military funds is appropriate, she said, because the construction of the U.S. Marine boat basin in Oceanside during World War II interrupted the natural sand flow and accelerated beach erosion on this stretch of coast. Last year, SANDAG's Shoreline Erosion Committee succeeded in

Solana Beach. This area typically has some pocket beaches. Plants along the fortified bluff probably grow there because of water seeping down from lawns above.



EDWIN H. STERRETT

securing $4 million from state sources. The Navy may start transporting the sand in October.

Another big opportunity came with the $50 million Bolsa Chica wetland restoration project being undertaken in Orange County by the ports of Long Beach and Los Angeles to mitigate coastal impacts of port expansion projects. Some of the sand removed from the lagoon was placed on the beach in Carlsbad in 1994.

Using sand from big projects such as these for beaches is not a new thing. Los Angeles County beaches, including Santa Monica Beach, were widened in 1948 with 14.5 million cubic yards of sand that was moved by slurry from the Hyperion Dunes, south of Marina del Rey, during construction of the Hyperion wastewater treatment plant. Cabrillo Beach in San Pedro was created in the 1920s with sand dredged from Los Angeles Harbor.

Now, however, much smaller quantities of available sand are considered valuable as beachfill. In addition to the sand from Bolsa Chica, Carlsbad's beach benefited from sand excavated at a time-share apartment project site nearby. Solana Beach is hoping to acquire sand from a railroad grade improvement project. Developers will sometimes even pay for the transport of appropriate excavated material to the shore. When the Hyperion wastewater treatment plant needed to dispose of excavated sand recently, Gregory Woodell, planning specialist for the Los Angeles County Department of Beaches and Harbors, not only obtained it for Point Cabrillo Beach, he had it hauled in free of charge. (It's the same shift toward carefully crafted conservation solutions that was achieved in the Sonoma Baylands Marsh Restoration Project on San Francisco Bay, in which the Coastal Conservancy, the Port of Oakland, and the Corps of Engineers are partners. See Autumn 1994 issue of *Coast & Ocean*.)

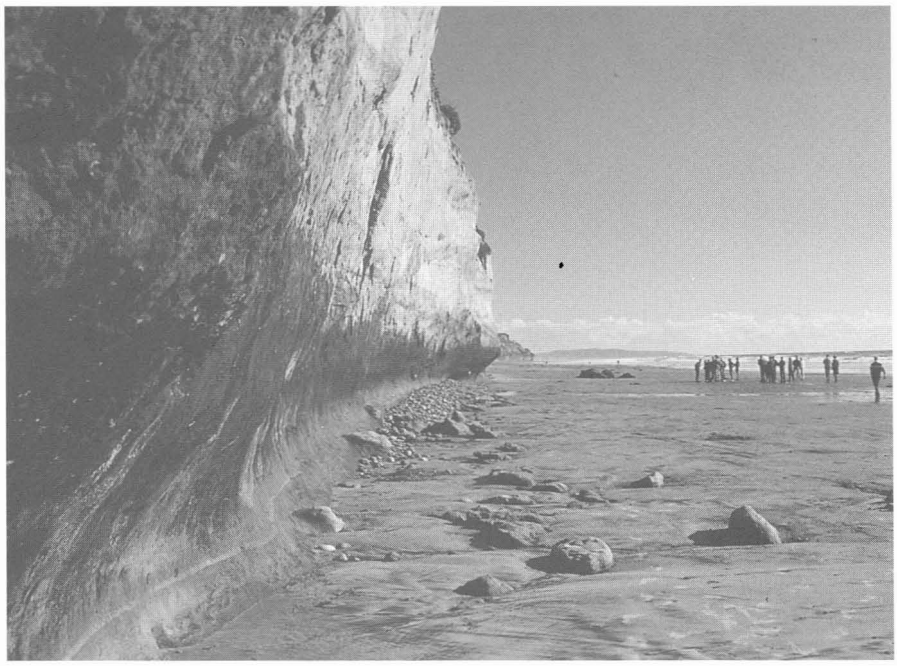
Mother of Invention

DRIVEN BY NECESSITY, beach advocates and coastal managers are also directing their attention to previously ignored side-effects of various public and private projects and seeking compensation from the beneficiaries of those projects.

In the 1930s, when most of the dams on major rivers in coastal watersheds were built for agriculture and flood control, their potential impact on beaches was considered even less than their potential impact on salmon and other anadromous fish. Now some are advocating a use tax on water that would compensate downstream communities for erosion resulting from these water works. Katherine E. Stone, a Los Angeles attorney specializing in land use and environmental law, has proposed the concept of sand rights, which would protect the supply of sand to beaches by applying public trust principles to mitigate impacts of development that interfere with the flow of sand within a littoral cell. That suggestion has not yet progressed beyond the discussion stage, but it is gaining currency.

The Coastal Commission recently imposed mitigation fees as a permit condition for a seawall built by homeowners in Encinitas to protect blufftop properties. The fees will help pay for beach nourishment of downdrift Moonlight Beach (see pp. 18-23). Seawalls and other hard structures can have deleterious side-effects: they diminish the sand that eroding bluffs may contribute to beaches, may increase downcoast erosion, occupy space on a public beach, and are often visually intrusive.

All this will not compensate California communities for the loss of federal support for beach maintenance, but it could lead to more thoughtful coastal management, crafted with due respect to the natural forces that govern the coast. It was the lack



GARY TAYLOR

This undermined cliff will eventually fail, contributing sand to the beach. During storms, waves smash cobbles against the bluff. A wider beach might buy some time for anyone who lives directly above.

of attention to natural processes in the first place that created the current predicament.

Courting Disaster

THE COAST OF CALIFORNIA was shaped by the collision of two tectonic plates millions of years ago. It is a high-hazard zone, with narrow terraces backed by steep mountains, with many fractures and fault zones. Studies have shown that 85 percent of this coast is actively eroding as the sea level keeps rising. "Erosion events are a necessary part of sea level rise," says Inman.

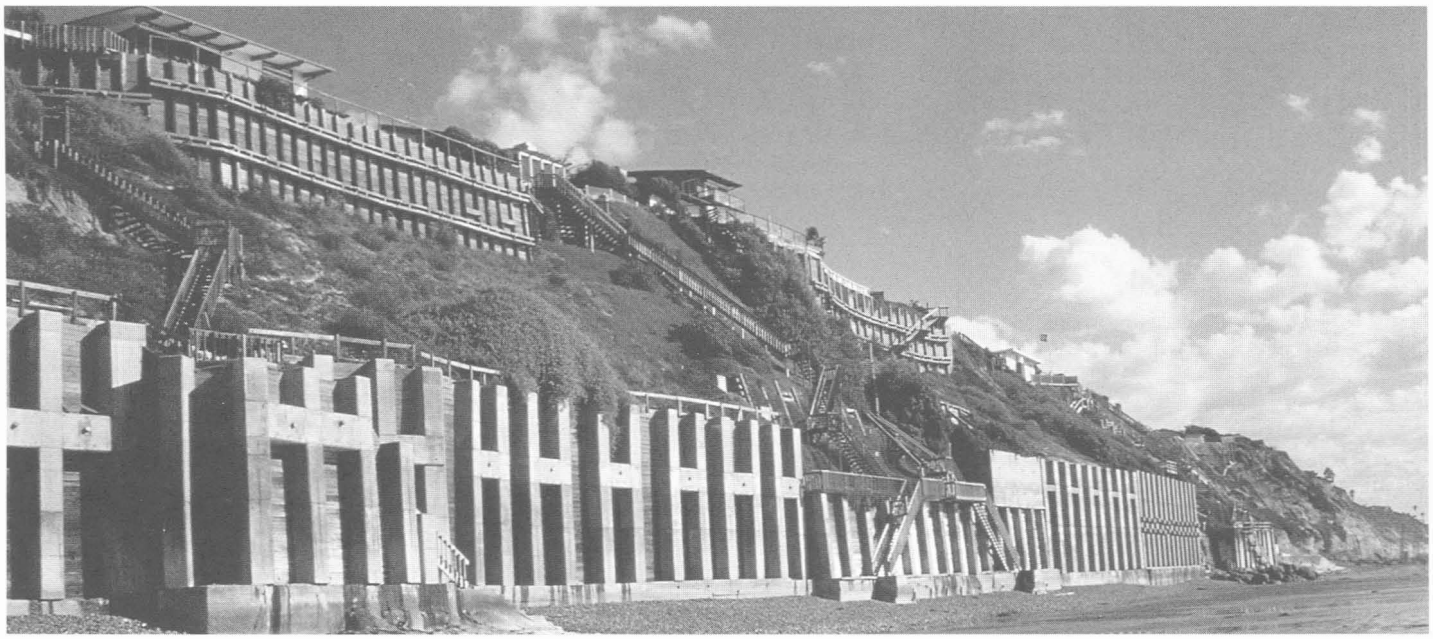
Most erosion events—bluff failures, sea cave collapses, sudden denuding of beaches—occur during storms and floods, which come unpredictably. Although flooding has been largely controlled by dams, nothing can manage storms. Pre-Columbian shoreline dwellers moved back when necessary; today's Californians, however, are heavily invested in the present shoreline alignments. "The basic problem with man's intervention here is that whatever he places on the beach—whether it's a groin or a jetty to stabilize a harbor entrance or houses—he wants it to stay there when in fact it wants to migrate inland," Inman observed.

Most people, however, value ocean views and a house on the beach far more than they care about events on a geologic time scale, and more and more are moving to places that are known to be hazardous. "In some instances, coastal property that was designated as hazardous a decade ago is now being declared as buildable due to a combination of political pressure and increased property value," Gary B. Griggs, James E. Pepper, and Martha E. Jordan wrote in 1992. "Undeveloped oceanfront lots along the Malibu coast, for example, typically have price tags in the $1 to $3 million range." When disaster strikes in such places, however, the public ultimately pays for much of the damage.

Because major geologic and climatic events occur infrequently and irregularly, people dismiss them and tend to consider them as anomalies. Intense blufftop and shoreline development began after World War II, during a time of exceptionally dry and mild winters. Then in the winters of 1978, '82–'83, and '88 huge storm waves arrived simultaneously with very high tides. All along the California coast, sand was pulled from beaches, cliffs failed, and homes were damaged or inundated, along

Massive timber and concrete seawall in Leucadia

EDWIN H. STERRETT



with some seawalls built to protect them. At least $150 million in damage was sustained, especially in high-hazard areas that had been developed despite known risks. These included Seadrift, an exclusive second-home community built on the Bolinas sandspit in Marin County; Malibu; and Oceanside, where the sediments brought by a flood in 1916 had been treated as prime real estate.

After each of these disasters, property owners lobbied for permission to erect riprap barriers, seawalls, and other fortifications to keep the ocean at bay. Emergency permits were granted without environmental impact assessments, and much of the funding for these projects came from public sources. According to Griggs, Pepper, and Jordan, by 1992 about 130 miles—12 percent—of the state's 1,100-mile shoreline was armored with various hard surfaces.

Inman tends to oppose attempts at structural solutions because, he says, they interrupt longshore transport of sand, cause downdrift erosion, and create the need for even more interventions. "Once you start, you can't stop," he says. "Almost all man's involvement in coastal problems begins with one man-induced event and then goes to another and yet another until he is totally involved in maintaining the shoreline." One structure necessitates another. It's the domino effect.

Eventually, defying the forces of the ocean may become prohibitably expensive, even before it becomes physically impossible. A seawall comes in at $5 to $15 million a mile, says Griggs, director of the Institute of Marine Sciences at the University of California, Santa Cruz. The price of importing sand is less easily established because it depends on many factors. Nevertheless, he has calculated that if it were necessary to replace what the longshore current now supplies to Santa Cruz beaches, a 10 cubic yard truck would have to bring in a load every 17 minutes, around the clock, year round.

Griggs and his associates have proposed a far-reaching preventive policy that involves lessening exposure to coastal hazards, thereby diminishing public and private costs of dealing with such hazards. Key to this proposal is a recommendation that Coastal Hazardous Zones be established by the California Division of Mines and Geology and that the Division assume

MARC BEYELER

Resist or Retreat? It's Ventura vs. the Ocean

THE CONTROVERSY about an eroded bike path in the city of Ventura shows how difficult it can be to defy the ocean's forces, and also how hard it is to agree to yield.

Ten years ago, the city requested permission from the California Coastal Commission to pave, widen, and add gutters to a bike path that had been built on fill along the ocean edge of the Ventura County Fairgrounds in 1981. Coastal Commission staff granted permission but stipulated that the improvements to the Omer L. Rains Trail had to be considered temporary, that they might only last for five years, and that no shoreline alterations would be allowed. Storms had damaged recreational facilities in this location several times already.

Commission and State Department of Parks and Recreation staff urged the city to set the path back 100–200 feet, along with the adjacent parking lot the city was planning. Friends of the Ventura River, the local chapter of Surfrider Foundation, and others supported this suggestion. The city, however, relied on an engineering study that showed it could take as long as 50 years for the path to erode. It moved back the path only 30–50 feet to get the maximum possible number of parking spaces.

In November 1991 the city sought to shore up the path with riprap, as it was beginning to erode. The commission denied permission, reiterating the conditions for the permit it had granted and again urging that the path be moved inland. The city and the fairgrounds, however, worried about the loss of parking spaces.

In February 1992, heavy storms eroded another part of the bike path and pieces of it slumped into the surf. The following December, defying the commission, the city and the Ventura County Fair Board paid $35,000 to shore up the pathway with 1,200 tons of boulders.

The sections of the bike path affected are at Surfers' Point at Seaside Park, just south of the Ventura River estuary, an area that is rich in productive habitat and in which erosion is a constant force.

During the past year, the Coastal Conservancy has been meeting with the parties involved in this controversy, seeking a solution all can accept. The city and the fairgrounds have agreed to fund a $100,000 environmental review process that will examine alternatives ranging from a seawall to setback.

—Marc Beyeler

responsibility and authority in these zones. New development and replacement projects would be prohibited. Outside these zones, all new developments along the coast would be considered only when evaluated on the basis of safety from all coastal geologic hazards. The team also recommended that reliance on hard protective structures be phased out, and that such structures be permitted only when they will not reduce public access, do not produce significant loss of public beach, and meet several other requirements.

So far, none of these recommendations have been adopted. However, now that fiscal necessity drives policy more than it used to, "we need to think very cautiously of where we are going to dump $100-$200 rocks on the beach," Griggs said. "We have to plan ahead, set back, move back, relocate structures when necessary, and not try to save the entire coastline of California."

Knowing the Collision Coast

THE CONTEXT for scientifically informed coastal planning is the coastal zone, which Inman defines as extending "from the highest mountains in the drainage area into the shore zone and past that to the continental shelf. . . . It's necessary, in studying the coast, to take in these wider terms. The driving forces—wave action, currents—come from the shelf and the open ocean, and we need to know what's driving the coastal systems."

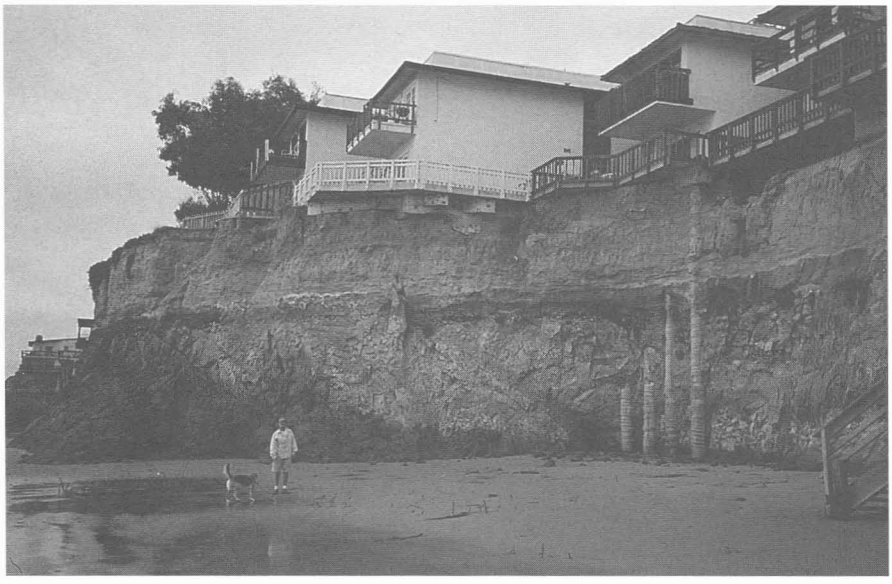
Speaking at the Shore and Beach conference last November, California Secretary of Resources Douglas Wheeler called for attention to "a larger canvas" on which many diverse but connected problems could be considered. The Coastal Conservancy's executive officer, Michael L. Fischer, struck a similar note in urging participants to "think like a drop of water" and "look upstream." A start has been made to manage entire watersheds as bioregional units. So far, however, most agencies with coastal management jurisdiction have not extended the concept to include the continental shelf.

Inman is the founder of the field of coastal oceanography, or nearshore processes. During the past several decades he has explored human involvement with coastal processes in many parts of the world. He went, for example, to Caesarea harbor, built by Herod 2,000 years ago in Israel on a straight coastline, without any natural protection. It was in the path of the longshore drift of sand, but "I understand from reading Josephus and others who were there at the time that the Romans thought they had enough engineering ability to cope with the wave action; but they overlooked the littoral drift problem," he said. The harbor trapped sand on one side, creating dunes that migrated and inundated the city. It caused erosion downdrift, and this erosion destroyed the aqueducts that supplied the city with water. Eventually the aqueducts served to provide entry to the Arabs, who took Caesarea from the Christians. "We haven't learned much in 2,000 years," Inman reflected. "But again, you see, it's a matter of what time scale. The harbor stood for many years; it was a wonderful engineering design. For several centuries it was quite a success."

Rasa Gustaitis is the editor of California Coast & Ocean.

It's just a matter of time before this house will have to be dismantled or moved back. It already hangs over the public beach, which has moved inland here in Isla Vista, Santa Barbara County, as the cliff receded.

EDWIN H. STERKETT



Why it Makes Sense to Take Sand to the Beaches

THE POLITICS OF BEACH NOURISHMENT

JIM McGRATH

WHAT WILL HAPPEN to the beaches of California if the proposal to end the U.S. Army Corps of Engineers' role in beach nourishment becomes national policy? The owners of the Hotel Miramar in Carpinteria would know. After the city of Santa Barbara and the Corps built Santa Barbara Harbor in 1927–1928, beaches for seven miles south disappeared. The harbor stopped downcoast movement of sand, trapping about four million cubic yards behind its breakwater. After the beach in front of the hotel vanished, the owners sued and lost (*Miramar Co.* v. *City of Santa Barbara*), with the courts deciding that they could not collect damages from the city. Eventually the Corps began a practice of "bypassing" sand by dredging it from shoals within the harbor and pumping it to downcoast beaches. The beaches south of Santa Barbara gradually recovered, although erosion had done serious damage. If the Corps abandons that practice, however, not only Carpinteria's beach but also many others will be in serious trouble.

There is not much public beach at this spot in Oceanside.

EDWIN H. STERRETT

There Was More Pier Here

No longer is the Ventura Pier the longest wooden pier in California. On December 15, 1995, 420 of its 1,958 feet were claimed by heavy waves coming in from the north. Only a year ago it was restored—not for the first time—at a cost of $3.5 million, partly with Coastal Conservancy funding. Most of the new wave-powered fountain was retrieved on the beach, as were some of the new interpretive panels. Debris was scattered all the way to Point Mugu, 10 miles south. Although it is temporarily shorter, the pier was reopened to the public within 10 days. Insurance will cover restoration.

R. F. DEEX

R. F. DEEX

The administration is considering just such a policy. During congressional budget hearings in February 1995, John H. Zirschky, acting assistant secretary of the Army for civil works, called for continued "streamlining" that would "phase out the Corps' role on smaller projects." Most beach nourishment projects would fall into this category. The Corps has abandoned its sand bypassing at Oceanside and did not include any new beach nourishment projects in its 1995-96 budget. That Congress will go along with this change is by no means certain, but, as we all know, the budget battle is far from over.

California's second-largest industry, tourism and recreation, depends heavily on the attractions of its sandy beaches. Many

EDWIN H. STERRETT

In the foreground is the Del Mar Boat Basin breakwater, with a dredge pumping sand that builds up in the harbor entrance channel to the downcoast beach. Beyond the Oceanside pier the beach narrows rapidly.

of those beaches require nourishment. The beaches in Santa Barbara County, Ventura County, and northern San Diego County all depend on sand bypassing from small harbors built by the Corps. To some, it might seem like a good idea to reduce human intervention along the shoreline. Unfortunately, at this point California's beaches are so altered that a "natural shoreline" can no longer be achieved in many areas (except by some cataclysmic event). The present shoreline is an intricate mix of engineered structures and natural forces. In addition, most watersheds and streams have been dramatically altered and no longer bring significant amounts of sand to beaches during storms.

South of Santa Cruz, beaches depend on sand dredged by the county from the Santa Cruz Harbor with a dredge funded by the Corps. Beaches beyond Capitola and Aptos are largely natural until you reach Morro Bay, where beaches both north and south of the harbor depend on dredging and pumping. In Santa Barbara County, sand bypassing from the harbor is even more important than it was in the 1930s, when the Hotel Miramar lost its beach: major streams have been dammed, cutting off the flow of sediment to the shore. Problems are even worse farther south, in Ventura County, where shoreline erosion was seriously aggravated by the construction of Port Hueneme in the early 1940s, as well as harbors at Ventura and Oxnard and dams on the Ventura River. The whole beach system now depends on the regular dredging and pumping of about 3 million cubic yards of sand from behind harbor jetties each year. That's the equivalent of 300,000 double truckloads, each hauling 10 cubic yards.

The beaches of Santa Monica Bay are among the most altered beaches in California. The combination of structures and placement of over 31 million cubic yards of sand has widened those beaches by 150–500 feet, according to Craig B. Leidersdorf and others writing in the July 1994 issue of *American Shore and Beach.* Although the structures have largely stabilized the beaches, the sys-

tem does depend on periodic maintenance dredging of Marina del Rey.

In Orange County, flood control projects (dams and river channels) have nearly eliminated the natural flow of sand from the Los Angeles, San Gabriel, and Santa Ana Rivers. Construction of the outlet to Anaheim Bay and the Long Beach breakwater have sheltered some areas from wave energy, and subjected other areas to more severe erosion. The Corps periodically nourishes the beach at Surfside, just south of Anaheim Bay, to mitigate the effects of all those structures. Without that nourishment, beaches from Surfside to Irvine would begin to erode.

In northern San Diego County, urbanization has left a similar legacy. Dams have reduced the natural flow of sand, and construction of Del Mar Boat Basin at Camp Pendleton has had effects resembling those at Santa Barbara Harbor. Along most of northern San Diego County, beaches had narrowed and lost much of their sand by the early 1990s. The cobbles, seawalls, and riprap along the shore indicated how severe the problem had become.

Except for Santa Monica Bay, all the beaches mentioned above need human intervention to survive. If the practice of beach nourishment is stopped, these beaches will begin to erode, and perhaps disappear. With budgets shriveling at all levels of government, the 1930s story of Carpinteria could be repeated.

Coastal states, particularly Florida, California, and New Jersey, have objected to the new policy direction. In the first skirmish over the Corps' budget, the House Appropriations Committee indicated that this way of saving money "is clearly the wrong way to go" and urged the Administration to reconsider.

The Corps' Role Is Changing

ALTHOUGH the Corps of Engineers has played a major role in construction of infrastructure in this country since the early nineteenth century, political support for its programs has diminished, and it faces a future of tight budgets and

MARC BEYELER

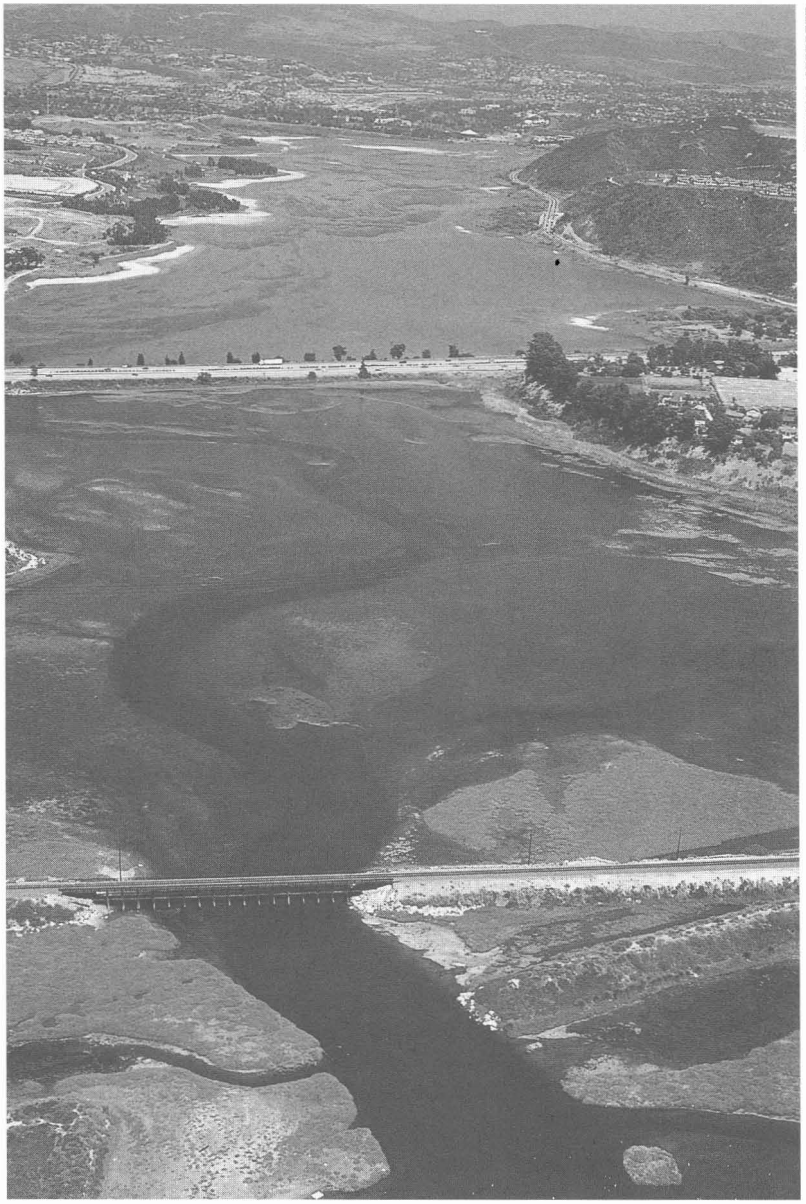
Storms undermined these steps in Imperial Beach in 1994–95

staff reductions. The Corps undertakes public works projects in three areas that are germane to the current policy debate: navigation projects, flood control projects, and beach nourishment projects. Traditionally, these projects are funded by a Water Resources Development Act (WRDA), with a new act passed about every two years.

As of 1995, the Corps had built 82 congressionally authorized shore protection projects covering 226 miles of shoreline and costing nearly $700 million. The largest such project is at Channel Islands Harbor, Oxnard, in Ventura County, where 36 million cubic yards of sand (3.6 million double truckloads) have been cleared from harbor channels and placed on downcoast beaches, according to R. Anne Sudar and others writing in the April 1995 issue of *American Shore and Beach.*

The Corps' public works projects became controversial with the advent of the environmental movement in the early 1970s. Indeed, the Corps of Engineers and the U.S. Bureau of Reclamation came to stand as symbols for environmental damage. The tradition of authorizing water projects every two years stopped after the 1976 WRDA, which had become a battleground for fiscal and environmental issues. After nearly a decade of acrimonious debate, the issues were resolved with the WRDA of 1986, which fundamentally changed the ground rules of water policy, particularly in fiscal terms. First, it mandated that costs for new navigation and harbor construction projects be shared by local sponsors—a policy modeled after the successful construction grant program in the Clean Water Act. And second, it established a cargo taxing and funding mechanism, the Harbor Maintenance Trust Fund, which has generated more than enough money to cover the costs of maintenance dredging of all of the navigational facilities and small harbors maintained by the Corps, and of bypassing dredged sand. The alternative to bypassing is to send the sand offshore. It is cheaper—if you ignore the cost of erosion.

Enactment of the WRDA in 1986 broke the impasse over public works projects that had lasted nearly a decade, and subsequent WRDAs, authorizing new projects, passed every two years through 1992. Beach erosion projects were included in the 1986 WRDA, but at lower levels of support than ever before. The local share of costs for beach nourishment was established at 50 percent, substantially more than the 35 percent share for navigational facilities. The higher local share for beach nourishment is compounded by Corps internal policy that doesn't value recreational benefits. Although recreation and tourism are major driving forces in the United States' economy, enhancement of recreation is not a traditional Corps function. The Corps does not seem completely comfortable with enhancing recreation, or perhaps does not have as much experience in calculating recreational benefits as it does in other areas. For whatever reasons, the Corps' internal policy allows only 50 percent of a project's recreational benefits to be considered, and as a result, many beach nourishment projects fail to meet the Corps' economic tests.



EDWIN H. STERRETT

Batiquitos Lagoon in 1992. Since then it has been deepened to restore tidal flow. Some of the excavated sand built nesting islands for the endangered least tern, some was placed on a beach upcoast, in Carlsbad.

Changing Political Forces

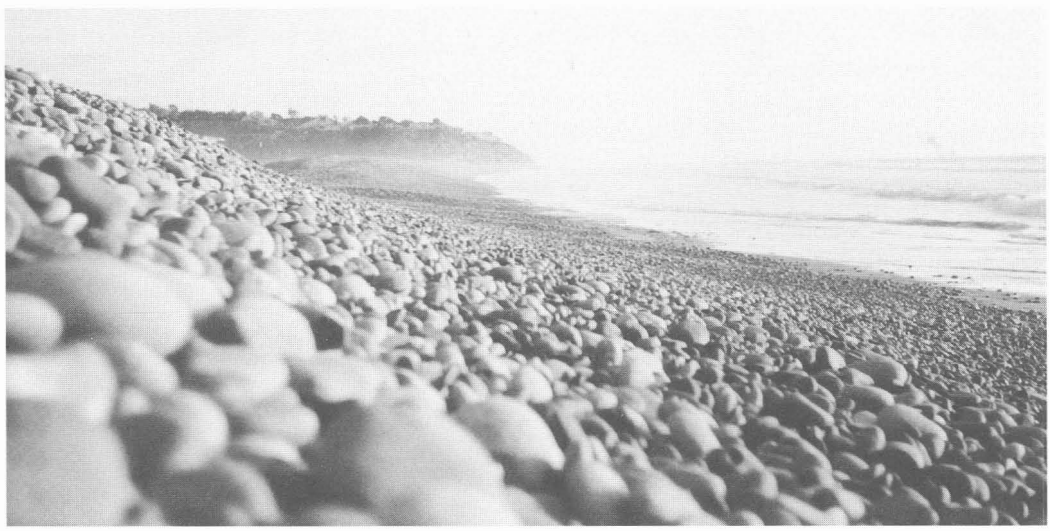
SINCE 1986, the political coalition that then broke the impasse on water projects has been weakened by three developments: the federal deficit, disagreements about the cargo tax, and the Mississippi floods.

First, the struggle to reduce the federal deficit has made all federal programs subject to close scrutiny and possible cuts and has increased competition for shrinking funds. Second, the coalition of large and small harbors that are maintained through the Harbor Maintenance Trust Fund has eroded. Virtually all the revenues for the fund come from cargo taxes that are paid by shippers in the larger ports, who thus essentially subsidize the many smaller recreational and fishing harbors. Some of the larger ports, such as Seattle and Tacoma, need little or no dredging and so do not benefit from the fund; moreover, they are concerned that the cargo taxes are diverting cargo to Canadian ports. The American Association of Port Authorities is seeking legislation that would roll back the tax, but stress cracks have developed in the broad base of large and small harbors that supported the 1986 WRDA. Shipper opposition to the tax has led to litigation and the Court of International Trade recently found the tax on export cargo unconstitutional. The current pattern of competition, downsizing, and cost cutting is affecting both the shipping and port industries. It remains to be seen whether the larger ports and shippers are willing to subsidize the smaller ports for the benefits of a broader political coalition.

The third major event to change this political coalition was the great floods of 1993, particularly on the Mississippi River. Those floods cost the nation over $20 billion, despite the major investment that had already been made in flood control facilities. Although the Corps estimates that $32 billion in potential damages were prevented that year, the tremendous losses that did occur reignited the debate about the value of traditional structural approaches to flood control, such as levees, versus nonstructural alternatives such as flood plain management. This debate raged in Congress during 1993-94, but was not resolved, which meant that a Water Resources Development Act could not be enacted in 1994. A WRDA was introduced in 1995, but not passed, and continued debate over the budget deficit may prevent enactment of a WRDA in 1996 as well.

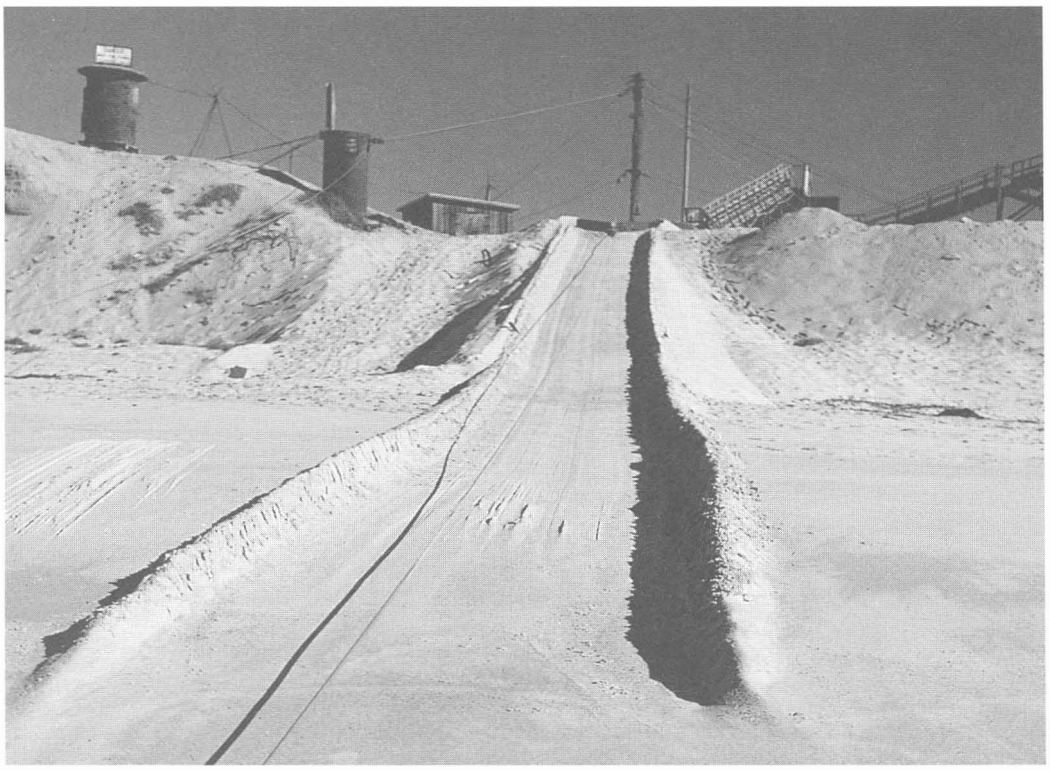
The Corps of Engineers dredges about 300 million cubic yards of material each year simply to maintain existing channels. Yet the basic budget for maintenance dredging remains nearly static, while the

GARY TAYLOR



A cobble beach

STACY GEIKEN



Along Monterey Bay, beach erosion was accelerated by almost a hundred years of sand mining. Now only one operation is active in this area, mining in the dunes. (The only other dune mining is in the Guadalupe-Nipomo Dunes.) Until 1986, however, sand was taken from the surf zone on Monterey Bay. An oversized steam shovel bucket collected the sand and was then dragged upshore to a conveyor belt. Surf zone mining directly aggravated shoreline erosion.

increasing rigor of restrictions on dredging, such as more conservative (and expensive) testing requirements and limitations to protect threatened wildlife, continue to increase the cost of dredging. At the same time, the Corps has seen its overall budget erode, and faces serious budget cuts over the next five years.

The current proposal that the Corps abandon smaller projects, including beach nourishment activities, appears to have arisen in the Office of Management of the Budget, reflecting a deep concern over the structural imbalances in the Corps' long-term budget. Wherever it arose, it has been embraced by many within the Corps, and reflects a very deep concern that the Corps has responsibility for many more facilities than it has been given the funds to maintain properly.

What's At Stake?

IN A TIME of budget cutbacks for the elderly and poor, many think it is frivolous to spend scarce federal funds on nourishing beaches. When some of that sand is washed away by storms, the voices questioning such programs grow louder. Do such programs make economic sense?

I believe that beach-oriented tourism is a driving force in the U.S. economy. Travel and tourism contributed over $700 billion to the gross domestic product in 1995, and produces $47 billion in annual tax revenues. Tourism is the country's largest employer, and beaches remain a favorite destination for travelers. Although most of the nation's beaches are natural, the more densely developed beaches can no longer rely on the forces of nature for their survival. Nourishment is one of the options that must be considered. Corps staff involved in the shoreline protection program estimate that an effective beach nourishment program would cost about $50 million per year—about half what Germany spends on beach protection for its 620 miles of coast, and only 0.1 percent of the direct tax revenues generated by travel and tourism! The nourishment of Miami Beach in the late 1970s led to a near tripling of beach attendance, to 21 million visitors in 1983. If beaches are considered in terms of their economic value, spending public funds to maintain them begins to look as sensible as maintaining highways, harbors, and airports.

Jim McGrath spent 14 years with the Coastal Commission, where he worked on coastal erosion issues, and currently toils as environmental manager for the Port of Oakland. He also serves on the board of the California Shore and Beach Preservation Association.

California's Vanishing BEACHES

Homeowners are fortifying seacliffs to keep their houses and patios from falling to the beaches below. The walls keep some homes in place, at least for a while, but may accelerate erosion of adjacent shoreline properties. They also change the beach experience for everyone who walks along the shore between walls and surf. It's a dilemma. The houses were built too close to the edge.

Neptune Avenue on Edge

GARY TAYLOR

TO THE CASUAL OBSERVER, Neptune Avenue in the north San Diego County community of Encinitas is a quiet residential street typical of an upscale southern California neighborhood: joggers and in-line skaters peacefully share the asphalt with BMWs and Ford Explorers. Most of the well-tended, spacious residences have been here 30 years or more. Yet on the avenue's west side, beautiful homes balanced atop ocean bluffs are losing a battle against relentless waves, tides, and erosion—the forces of the sea god for whom the street is named.

The homeowners are playing for time by armoring the crumbling bluffs with seawalls. Their struggle to build these walls has been emotional and confusing. It has pitted neighbors against one another, a neighborhood against the city, and a community against the California Coastal Commission. It has also raised questions about the ability of public agencies to respond to coastal property owners' needs for protection without undermining the larger public interest in the coast.

For decades, the west side of Neptune was considered the best stretch of real estate in Encinitas, and homes costing upward of a million dollars rose one after another along the bluff, with unparalleled ocean views from virtually every room: on a clear day you can see a 50-mile expanse of ocean blue, from Dana Point to La Jolla. Until the 1970s, little thought was given to the geological character of these bluffs, to the fragile, shifting sandstone and shale. Little thought was given to things known to accelerate bluff erosion—lawn irrigation, massive concrete patios, an active water table occasionally swollen by storms, and runoff from nearby agriculture. A wide sandy beach below kept ocean waves from reaching the bluffs except during the most extreme tides. Little thought was given to Oceanside Harbor 15 miles north, and to other man-made structures that slowly reduced the natural flow of sand to the beaches below Neptune Avenue.

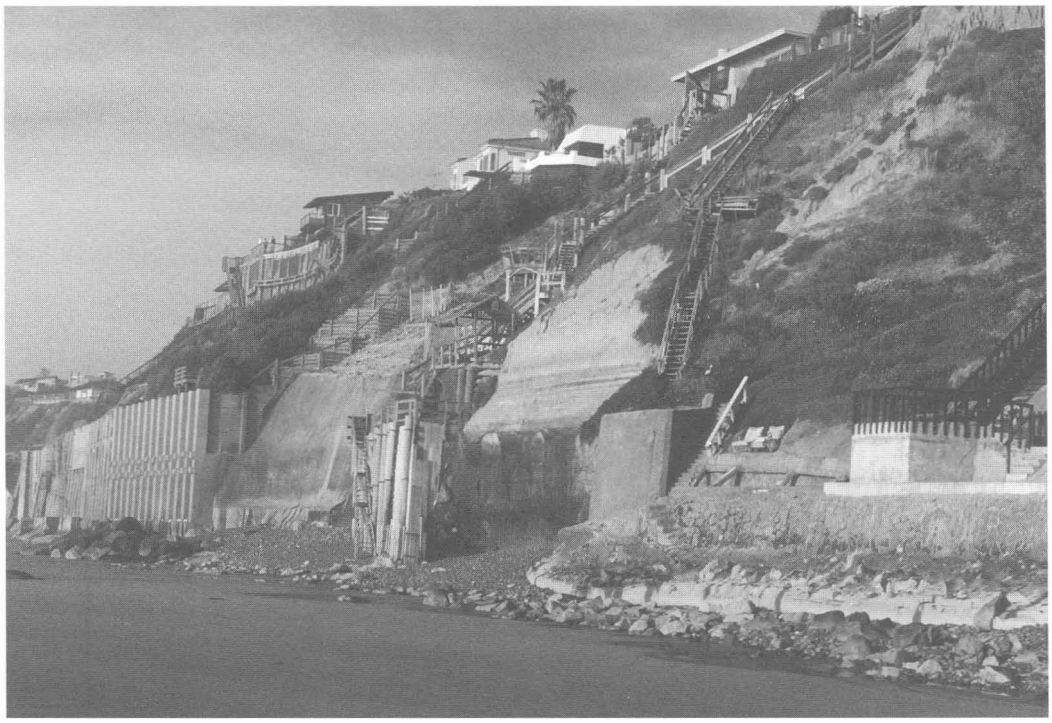
"Would I have purchased the home if I knew I was going to lose 400 square feet of patio?"
—David Oakley

Architect David Oakley bought his bluff-top residence as a second home in 1981, although he was told by the county that it was in a "moderate hazard zone" of bluff failure. After retiring a few years later, he made this home his primary residence. His lot is about 120 feet long from street to bluff's edge, and 40 feet wide. (The width is typical of lots on Neptune, though many property owners have built on two or more lots: some homes have 100 feet of bluff frontage.) Like most of his neighbors, Oakley has a small front yard and a bluff-top patio with a million-dollar view. The patio was 400 square feet larger before the night of January 21, 1993, when part of it fell to the beach.

"Would I have purchased the home if I knew I was going to lose 400 square feet of patio?" he reflected. "It's hard to say, but I guess it was an 'it's not going to happen to me' type of thing."

A block south of Oakley's house, Gwen Truax, a soft-spoken pottery instructor, has been living a modest life in a larger two-story home since 1957. Her property has not been damaged by erosion or bluff failure,

GARY TAYLOR



Bluff armoring upcoast from the newest Neptune Avenue seawall, which is seen on page 21.

and she staunchly believes it never will, at least in her lifetime. But she does recall the night "when I woke up and heard a sound I had never heard before, like a clacking sound. I realized it was the cobbles on the beach knocking against each other, back and forth. It was in the early '80s. I'll never forget that night."

Unwillingly, Truax has found herself embroiled in the Neptune erosion issue, taking an opposite position from that of Oakley. He favors a continuous seawall below their properties; she would rather not have one along her property's edge.

The Beach Is Gone

A WALK ALONG the beach below Neptune today is possible only during lower tides, when patches of precious sand are exposed between algae-covered bedrock reefs. This is not an ideal locale to throw up a volleyball net. Waves are undercutting the bluffs, which are 30 to 100 feet high along the 2.5-mile stretch between Batiquitos Lagoon and Moonlight Beach. The ocean is chipping away at the soft bluff-face, and water seepage from lawns and manicured gardens is softening the sandstone and shale. Mountains of cobble have amassed at the base of the bluffs. An array of seawalls—some low and unobtrusive, others as high as 60 feet—stands guard to protect the Neptune homes.

From the 1920s until the mid-1970s, coastal north San Diego County, including Neptune Avenue, was a quiet weekend destination for southern Californians attracted by its wide sandy beaches and close proximity to the Del Mar Racetrack. The adventure writer Zane Grey was one of several celebrities who kept homes overlooking the sea on Neptune.

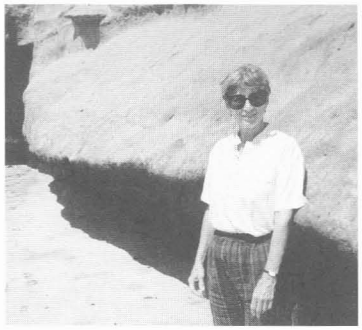
The beaches and bluffs of Encinitas remained relatively stable for 50 years. The only major bluff collapse in Encinitas took place in 1940 a few miles south of Neptune, where a portion of the Self-Realization Fellowship Temple foundered (see pp. 3–4) —undermined by poor drainage of underground water, not ocean forces.

"People were lulled into this false sense of security that they could develop the bluff," said David Skelly, a coastal geologist who has designed several seawalls for Neptune residents. "Then we came out of what was a 30- or 40-year drought and had severe winters in 1978, and again in 1982–83.

"You can measure erosion over a few hundred years and conclude that beaches erode six inches a year, or whatever," Skelly continued. "But what happens is that shorelines don't erode for many years, then erode a hell of a lot in one year. So we had some massive erosion events, and everybody started panicking."

The 1978 and 1982–83 storms savaged the

GARY TAYLOR



"I woke up and heard a sound I had never heard before. . . . I'll never forget that night."
—Gwen Truax

southern California coastline and served as a wake-up call for many Neptune homeowners. Almost overnight, the wide sandy beach below was gone, replaced by cobbles and waves.

"Nineteen eighty-three was the first year that the ocean reached the cliff at high tide," recalled Robert Frickman, a bluff-top homeowner. "I think we lost about four or five feet of beach at the base of the cliff in that one year alone. You add that up over several years, and we figured it was time to develop a way to protect our properties."

After the storms of 1978, a series of massive wood and steel walls were quickly built in the 600 block of Neptune, unencumbered by city review (Encinitas did not incorporate until 1986) and free of stringent seawall policies later developed by the California Coastal Commission. Most Neptune homeowners, however, did not yet believe their homes were in imminent danger, even though incremental bluff damage was occurring literally under their noses. Heavy rains in 1991—dubbed the "March Miracle" elsewhere because they came in the fifth year of a drought—were not welcomed on Neptune Avenue, where water-soaked upper bluffs began failing. Record rainfall soaked the upper bluffs, while large winter waves cut further into the lower bluffs. Nearing the panic stage, one group requested that riprap be placed on the beach temporarily to control erosion while the permitting process was under way.

"We knew the storms were coming, and we figured riprap was the quickest, easiest solution," said Frickman. "It could be installed quickly to stop erosion, then removed later. But of course there was a problem with aesthetics."

Not to mention safety. A group called Save Our Steps (SOS), referring to a nearby beach-access stairway, opposed the riprap plan, contending that it would pose a hazard to curious beachgoers and intrude on what little precious beach was left. The group circulated a petition, and the plan was scrapped.

The Coastal Commission granted emergency permits to some residents to build retaining structures directly underneath their patios and decks. Then the homeowners organized and focused on the lower bluffs. To save money on geological studies and to streamline the permitting process, 14 households split into two groups. One group would work to obtain permits for upper-bluff armaments, such as concrete walls under patios; the other would concentrate on getting permits for seawalls. Eventually, after upper-bluff protection was completed, both groups were to focus on the seawalls.

The homeowners then began a frustrating tug-of-war with the Coastal Commission over the seawall permits. The California Coastal Act permits property owners to protect homes that are in danger, even if a

DAVID OAKLEY

Cement trucks during the construction of the new seawall

seawall is required to do so. It seeks to assure, however, that the least possible damage is done to coastal resources and other private properties, and to mitigate unavoidable impacts on the beach.

The executive director denied the Neptune property owners' application for emergency permits on the grounds that an emergency had not been sufficiently documented, and suggested they follow the regular permitting procedures, according to Commission planner Lee McEachern. This required that the city of Encinitas first approve the project.

Meanwhile, Neptune residents were not sleeping well as waves and tides continued to assault the bluffs. "Every time we felt a wave hit the cliff, we wondered what chunk was going to fall next," Oakley recalled.

Eventually, the Coastal Commission approved emergency permits for upper bluff fortifications and, later, also a seawall below eight contiguous properties. Permit conditions included liability waivers and provisions restricting future development on the bluff face. However, the Commission staff recommended that a permit for seawalls to protect six properties spanning 13 noncontiguous properties be denied because "there were multiple gaps in between," said McEachern. "We [staff] were concerned that the gaps were going to be subject to accelerated erosion. The largest gap was about 200 feet."

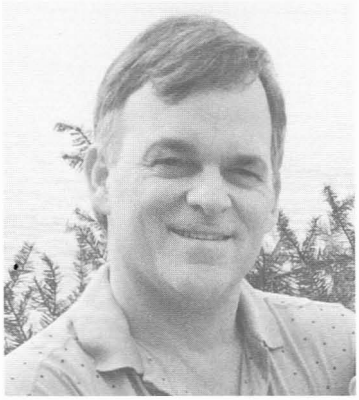
The group whose permit was recommended for denial requested a continuance to work with the Commission and the city on a more comprehensive bluff protection plan. Meanwhile, Encinitas officials were bobbing and weaving, wanting to lend support to the homeowners but also wishing to keep clear of Coastal Commission jurisdiction. Because the young city had not yet adopted a Local Coastal Plan (LCP), it was subject to the Commission's permitting power. (LCPs, mandated by the Coastal Act, are designed to transfer much of the Commission's authority to the city.)

A Way to Get a Wall

THE SUGGESTION was made—no one seems to remember by whom—that the Coastal Commission's demand that the problem be addressed comprehensively could be met if Neptune property owners formed a Geologic Hazard Abatement District. A GHAD is similar in some ways to a homeowner's association but is a public entity. The legislature has authorized the creation of such districts, and one had been formed in Malibu by property owners confronting somewhat related problems. Once created, a GHAD has the power to assess property owners for protection against geological hazards, such as storm damage and erosion. It can borrow money from lending institutions for necessary projects, and can require homeowners to pay back the loans. It is also exempt from Coastal Commission permit fees.

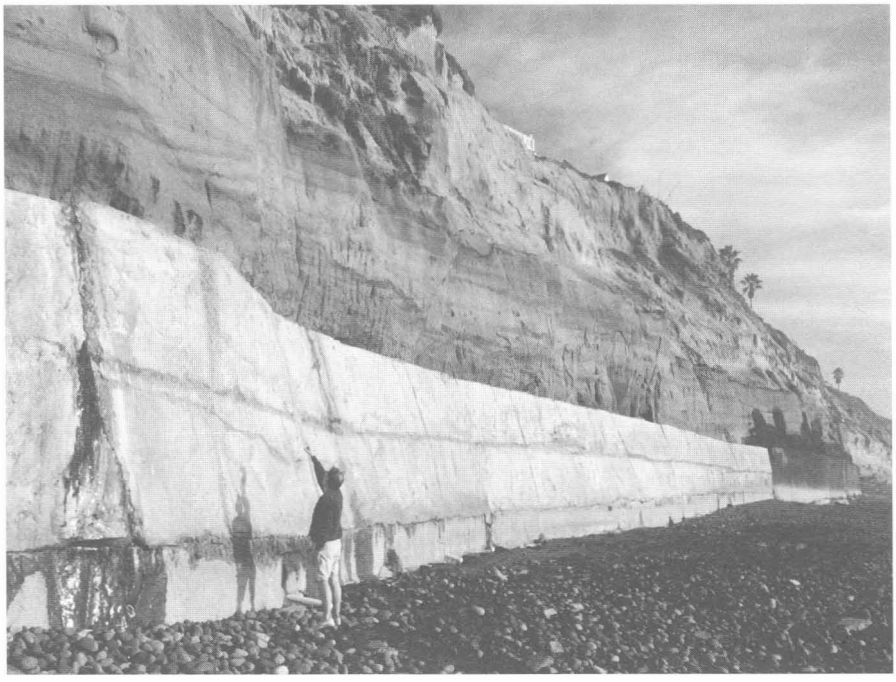
By forming the GHAD, proponents argued, Neptune homeowners would show the Coastal Commission that they were committed to a comprehensive solution to bluff erosion. And eventually, they hoped, the GHAD would be the one group homeowners would petition if they wanted to build a wall. "No going back and forth with the city and the commission—that's the dream situation," said Robert Frickman. Others, however, including Gwen Truax, came to see the GHAD as a tactic to force people to pay for a seawall even if they did not want one.

The process of forming a GHAD is not exactly democratic. Once the geographic boundaries of the district are drawn, property owners' votes on whether to form the district are weighted according to the assessed value of their property. The owner of a home with an assessed value of



"We knew the storms were coming, and we figured riprap was the quickest, easiest solution. . . . But of course there was a problem with aesthetics."
—Robert Frickman

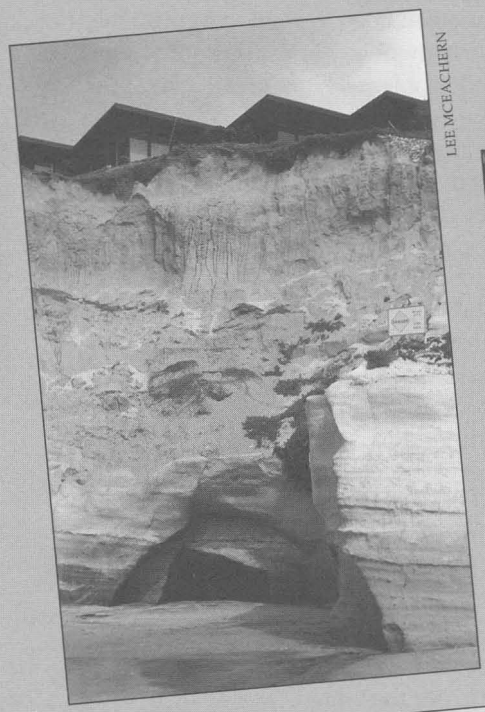
Neptune Avenue homeowners' new seawall



GARY TAYLOR

FROM SEA CAVE TO SEAWALL

A sea cave collapse is a gift to the beach. Waves break down the debris that falls from the bluff and spread the sand along shore. About 20 percent of the California coast's natural sand supply is contributed by seabluffs. Such natural events also create more beach as the cliff moves inland. For a short time the wind-sheltered space at the old cave site was an inviting spot to put down a towel. To the owner of the house atop the bluff here in Solana Beach, however, the collapse meant imminent danger. A seawall sealed the cliff.



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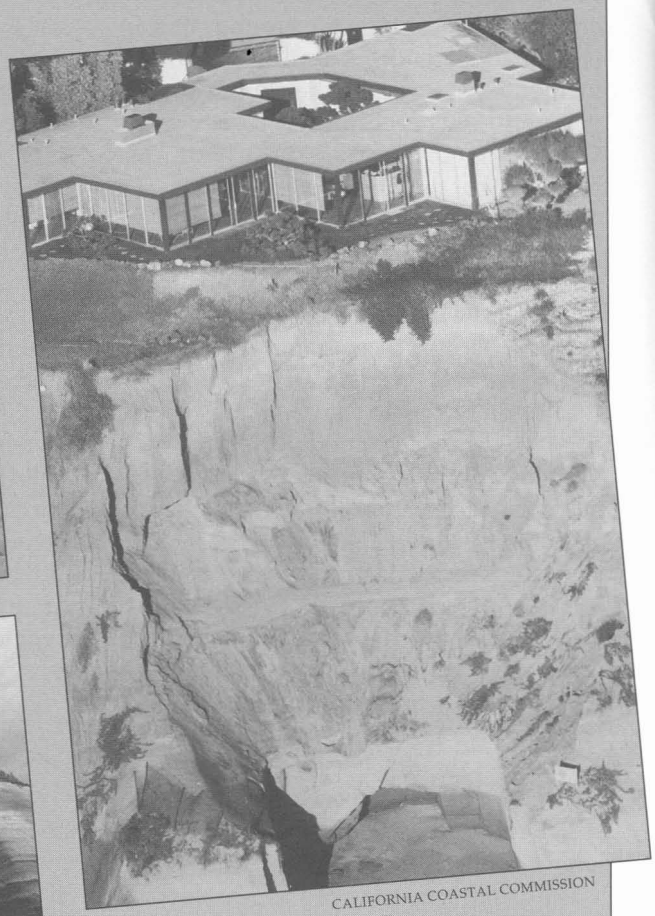
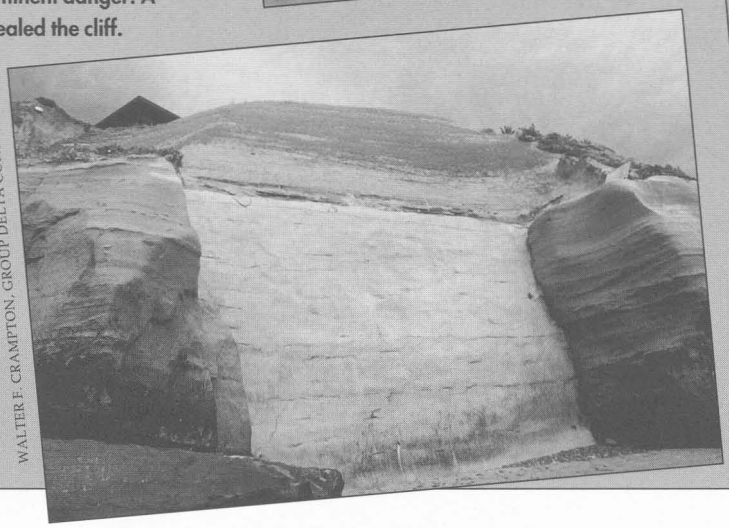


CALIFORNIA COASTAL COMMISSION



WALTER F. CRAMPTON, GROUP DELTA CONSULTANTS

$500,000 has more voting clout than a person owning a home assessed at $100,000.

The boundaries of the Neptune Avenue GHAD were drawn to include everyone who wanted seawalls. The majority of property owners within these boundaries, however, did not want these fortifications and 17 of 30 voted not to form the district. But their votes did not have enough dollar value behind them, and the GHAD was created. The city lent the new legal entity $60,000 to pay for legal fees and a secretary, and everyone between 312 and 560 Neptune was faced with the prospect of having to pay for a common seawall.

"I was sucked into it against my will," said Truax, who serves on the five-member GHAD board of directors to make sure her own interests are covered. "Dave [Oakley] wanted as many people to join as possible, because the more people that join, the less the expenses will be, which I have no problem with. We were told it would cost only $30 to join, but so far we have run up about $2,000 per property just for the attorney fees and operating costs."

Upset over the mounting fees, a few members later decided to opt out of the GHAD, but learned that a clause in the bylaws prohibited members from dropping

out. This led to more strife. A $14,000 feasibility study is now underway to determine exactly how the GHAD will work and how much it will cost each property owner. The study may also determine whether homeowners who don't want a wall will be forced to pay for it anyway.

One more controversy emerged: insurance. Some property owners feared that their homeowner policies would not cover the seawall because it stood on public land. To help them out, the city decided to quitclaim Seaside Gardens Park, a property that includes the vertical section of bluff beneath many of the properties requesting seawalls, and to deed this property to the homeowners. Once more SOS stepped in, citing a state law that prohibits deeding public parkland into private hands.

"This folly is only eclipsed by the civic embarrassment of using yet another Band-Aid measure to make up for the lack of a local coastal plan," wrote SOS spokesman Dennis Stubblefield in a strongly worded editorial published in a local paper. "Perhaps if the [Encinitas] Council, within the parameters of a well-thought-out local coastal plan, was proactive about its municipal resources, instead of constantly just reacting with stop-gap measures upon the closed-door overtures of private interests ... we would be able to accommodate all the parties interested in the beach and the bluff, and create a system of coastal management that works."

City risk management staff are still researching the legal ramifications of the quitclaim proposal.

The Walls Go Up

WITH THE FORMATION of the GHAD, and reassurances from the city of Encinitas that it was committed to a comprehensive solution to the bluff erosion problem, the Coastal Commission granted the permit for the second set of seawalls. It had been ten months since the homeowners first applied. Permit conditions included the requirement that a fund be established to mitigate damages to the coast that would directly result from the seawall. Permit applicants were required to pay an in-lieu fee (in lieu of actually placing sand on the beach themselves), the amount of which depended on a number of factors. The fees ranged from $3,000 to $5,000. The purpose was to pay for such efforts as purchasing and trucking sand to the beach.

Construction of the seawalls began in December 1994 and took a full year. Work was halted at least twice after complaints were filed over beach access problems and noise caused by heavy equipment moving between the beach and a storage lot half a mile inland. During the summer work was restricted to nighttime hours.

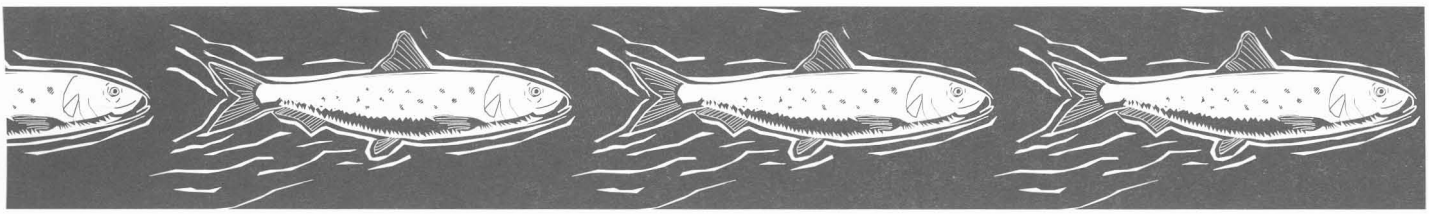
There are gaps in the wall—the same gaps that initially led the Coastal Commission staff to recommend denial of the permit. McEachern said the Commission was assured that "the GHAD, or some form of the GHAD, would be up and running within a couple of years and be able to address filling those gaps long before the adverse effects of erosion occurred on the unprotected properties."

The Neptune homeowners' battle against the ocean and government is far from being resolved, and the future of the GHAD is still uncertain. Local authorities are in the midst of drafting an ambitious comprehensive plan for its coastline, of which a sand replenishment program is a component, but it comes too late to protect some properties on Neptune Avenue. With their seawall, homeowners have bought some time. They know that the ultimate victory will be the sea god's. ■

Gary Taylor is editor of the Beach News, a north San Diego County newspaper published in Encinitas.

Seawalls buy time, but in the long run, concrete and rebar are no match for the ocean.

GARY TAYLOR



SARDINE'S RETURN: DO WE GET A SECOND CHANCE?

WESLEY MARX

IN FISHING PORTS around the world today, vessels stand idle in silent testimony to steep declines in many major fish stocks. Off the California coast, however, vast pulsating schools of silvery Pacific sardines have appeared, almost like ghosts from the past, and they are attracting international attention. They also raise the question of whether we can avoid repeating a mistake made some decades ago.

During the 1930s California's sardine fishery was the largest of all fisheries in the nation. It kept 400 vessels and 69 processing plants busy, catapulted San Pedro and Monterey into civic prosperity in the midst of the Great Depression, and provided the setting for John Steinbeck's *Cannery Row.* Fishermen from Baja California to British Columbia cashed in on the sardine bonanza. Landing revenues contributed substantially to the state treasury. But in the 1940s this lucrative industry had begun a decline that led to a complete collapse in the mid-1960s. Now Cannery Row is a street lined with gift shops, hotels, and restaurants, ending at the Monterey Bay Aquarium, while San Pedro's Fish Harbor area serves as setting for Hollywood films featuring grim urban settings.

As sardines again seem abundant as far south as Baja and are spotted as far north as British Columbia, they have brought the promise of a new economic bonanza—but not for California. They are being landed here, frozen in San Pedro, then shipped across the Pacific to be canned in Thailand, Korea, the Philippines, and other Asian nations; to be thawed and fed to yellowtail raised in pens in Japan and to bluefin tuna in Australia; or to be processed into pellets to be cast on shrimp ponds in China.

The sardine now ranks as the state's second leading fish catch in volume, behind squid. (Sea urchin is first in dollar value.) But there are as yet no signs of a sardine industry renaissance on the California coast. Major canneries have long since moved to bluer pastures and lower wage rates. Two processors are still minimally active in the Monterey area: the Salinas Tallow Company reduces the Pacific sardine to fishmeal, while the Monterey Fish Company, a wholesaler which operates the only cannery remaining on the bay, cans about 3,000 tons a year.

"We pack them in tomato sauce, and export mainly to Latin America and to South Pacific island nations," says Phil Tringali, who operates the company. Is there

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Fishermen haul in a catch in Monterey Bay.

a market for fresh sardines? "Chinese retail markets in San Francisco may order them, but that's about it," he says. "Some are also sold to recreational fishermen for bait."

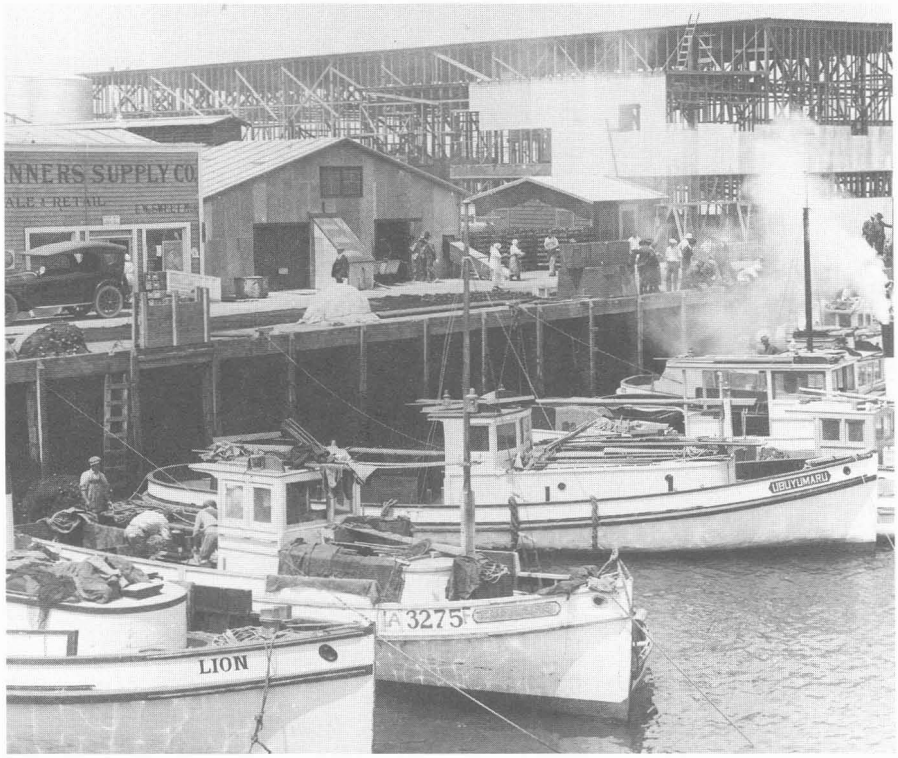
WHO WILL BENEFIT?

IN SAN PEDRO'S Fish Harbor, the one remaining cannery, Pan Pacific, was auctioned off in a bankruptcy proceeding in December 1995. Tri-Marine International, a global tuna trading company with an office in San Pedro, submitted the winning bid, but a reopening of Pan Pacific, which employed 500, remains contingent on negotiations with Local 24, United Industrial Workers of the Seafarers International Union, and the Port of Los Angeles, the leaseholder of the filled land the cannery occupies. Recently, the area has been used for dark-thriller film shoots, including *Men in Black, Strange Days, The Usual Suspects, Murder in Mind, Midnight Man, Dark Breed,* and *Natural Born Killers.* While bad guys duke it out with even worse guys in the cannery ruins, one nearby plant, Heinz Pet Products, still manages to put some sardines into cans—for cats. San Pedro no longer bothers to stage its annual Fishermen's Fiesta.

So who benefits from the sardine comeback? With the state's commercial fishing industry a ghost of its former self, California becomes a source of raw product for other nations with active canneries. As Asian nations industrialize, they shift from grain-based diets to greater reliance on meat, and the demand rises for cheap sources of marine protein to feed livestock and farmed fish. At the same time, they tend to destroy or seriously damage their fisheries by pollution, overfishing, and destruction of wetland and other habitat. One prime Asian source, the Japanese sardine fishery, collapsed in 1990. All this keeps raising the demand for sardines from California.

Meanwhile, scientists and ocean resource managers worry that current levels of sardine exploitation may be depriving other ocean species of nourishment and may also be endangering future sardine stocks. They urge that the recovery be carefully monitored and managed to prevent a repeat of the 1930s disaster. But funds for such activities are scarce, and no agency equipped for the task has volunteered.

Along with other small fish, sardines are prime forage for marine animals higher on the food chain, including fish we value for food and recreation. As forage fish are removed from the ocean, to be processed in ever greater volumes for factory-farm chickens, hogs, and captive shrimp, will enough be left in the ocean for the brown pelicans, salmon, tuna, seals, and myriad other marine animals? Were sardines the only forage stocks at issue, this question might be less compelling. But many others, including krill, anchovies, menhaden, and herring, are also being heavily exploited. Approximately one-fourth of the world's entire commercial fish catch is used to make fishmeal.



COURTESY OF WESLEY MARX

Japanese-American sardine fleet at Fish Harbor in the 1930s, when San Pedro canneries employed 10,000, mostly women. A large cannery is under construction to the right. The Japanese-American fishermen and their families were confined to detention camps during World War Two. By the time they were released, sardine stocks had declined severely.

HOW STRONG IS THE RECOVERY?

ALTHOUGH THE SARDINE seems abundant in relation to other fish stocks (30 percent of the assessed commercial stocks in the United States are being fished at levels that are not sustainable), the robustness of its population is by no means assured. Tim Baumgartner, marine geologist with the Scripps Institution of Oceanography, considers the current recovery to be weak. Alec McCall, fishery biologist with the National Marine Fisheries Service (NMFS) in Tiburon, agrees, attributing the weakness to overfishing during previous decades. A fishery too efficient for its own good caused the sardine "to decline faster to a lower

COURTESY OF WESLEY MARX

UNITED INDUSTRIAL WORKERS

Top: Cannery workers (wearing no gloves) in the 1920s, at a plant owned by French Sardine Company, which was later acquired by Starkist, which, in turn, was later acquired by Heinz.
Bottom: A parade in San Pedro during World War Two. The Cannery Workers Union later became Local 24, United Industrial Workers.

level [than in the past], making for a retarded recovery," he said.

In 1973—after the sardine had dropped to its lowest population levels ever recorded, and years after the fishing industry had collapsed—the California legislature established a fishing ban, to last until the sardine biomass exceeded 18,144 tons. This level was reached in 1986, and limited fishing resumed.

A MATTER OF DEGREES

EVEN WITHOUT being exploited, sardine populations wax and wane with ocean cycles, according to Baumgartner, who has been studying sardine scales deposited in the Santa Barbara Basin during the last 2,000 years. Anaerobic (oxygen-poor) basin sediments preserve the scales and keep away burrowing animals. By analyzing the volume and number of the fossil sardine scales, Baumgartner found that sardine populations have fluctuated over time in concert with the warming and cooling of ocean waters. In the Santa Barbara Basin record, the fish appear to have peaked during warm-water periods lasting 40 to 60 years. In those periods they expanded their range and reached a total biomass of up to 3.5 million metric tons. When the waters cooled, sardine populations declined and contracted in range. At the same time, anchovy populations—which respond to cooler water—expanded in volume and in range. The mean temperature difference between warm and cool periods—on the order of one degree Celsius—seems slight, but can trigger critical environmental cues for reproduction and range.

The most recent decline of the Pacific sardine and the robust fishery it once sustained began with the onset of a cool period in 1940. The current recovery began with another warm period in 1977. The total biomass now stands at 350,000 tons—far below the normal warm-water peak of 3 million tons. Baumgartner and other scientists believe that the intensive fishery of the 1930s, coupled with the advent of the cool ocean cycle, delivered a devastating one-two punch. The sardine's biomass plunged to 5,000 tons by the mid-1960s, and this was too low to permit a normal recovery during the current warmer period.

Clearly the return of the sardine demands careful management to avoid past mistakes. But good management must be based on adequate knowledge and careful monitoring, both of which have been hard to come by. The California Department of Fish and Game is working with the Pacific Fishery Management Council and the NMFS to develop a fishery management plan for all coastal pelagic species, including the sardine. The draft plan concedes that management of small forage species has "a long history of failure in many regions of the world." California is certainly one of those regions.

In light of these facts, can the sardine comeback sustain the growing global market pressures? California's previous experience stands as a warning. Seventy years

ago, the local harvest was increasing, along with competition from other nations exploiting their forage stocks. California's poultry growers had turned to sardines as a protein-rich feed for their layers and broilers. In a redolent process called reduction, sardines can be squeezed and separated into fish oil and powdery fishmeal. The oil winds up in paint, soap, and linoleum. The meal goes into livestock feed. At first a by-product, meal soon became the main product of the processing plants, which spewed a foul odor into the coastal air.

The stench was only a small part of the price exacted from coastal and ocean ecosystems by the reduction process. To make one ton of meal requires five tons of fish. The stepped-up demand from reduction plants devastated the seemingly limitless sardine population.

As the California canneries closed, buyers came from Peru to acquire the idle machinery. Today Peru and Chile are the world's leading suppliers of fishmeal, cut-rate competitors to would-be meal makers throughout the world. Are they now repeating California's mistake? Peru seems to be trying to avoid it. According to *Sea Business*, a trade magazine, that country is now "steering the fishing industry away from industrial fish to food fish in a big way." The government is limiting the number of fishmeal vessels and plants, while encouraging harvest of higher-value stocks.

Sardine Encounters with the Human Palate

WHEN YOU BUY A CAN of sardines, you probably won't be eating sardines. Scientists and canners disagree sharply on matters sardine. To scientists, sardines and herring are within the herring order but diverge at the genus level. The true sardines are in the genus *Sardinella* and *Sardinops*. (The Pacific sardine is *Sardinops sagax*.) But canners tend to label most small fish simply as sardines—which is why some scientists joke that fish aren't sardines until they are canned. For instance, Beach Cliff sardines, canned by Stinson Seafood Company in Maine, are really Atlantic herring.

The actual taste and quality of the canned product depends less on genus than on care. Norway cares. There, very young herring are caught in fjords and transferred to pens where they expel their stomach contents and cleanse themselves. The fish are then bathed in brine, scaled, and smoked lightly. Heads are removed, and 16 to 24 sardines are packed with olive oil in a flat can, then cooked in a steam retort. Because of this careful attention, Norway can charge 20 to 30 percent more than other canners. These premium herring are, as you might guess, marketed as sardines.

Canning labels can take fanciful twists as well. At the Ranch 99 Market in Irvine, Cal-Island sardines hail from Thailand. Another label features a robust female surfer and the title "*California Girl Sardines* in tomato sauce." The source: Mexico. The ad message: You tell me!

California has its own dollar-rich herring, and it does not even have to be canned. The Pacific herring, ounce for ounce, is ten times more valuable than the Pacific sardine. Japan likes herring ripe with roe (eggs) and will pay $700 per ton—ten times the current value of Pacific sardines—for this taste treat. Why isn't California rolling in herring dollars? The Pacific herring is ten times less fecund than our sardine. Most of the catch occurs in San Francisco Bay.

The wholesale routing of sardines into cans galore obscures the fact that sardines fresh can go down very well, thank you. In Sweden, sardines/herring are respected as gourmet selections suitable for holidays and celebrations. Sicilians decorate their beloved sardines with golden raisins, chopped garlic cloves, and pine nuts to create stuffed sardines, Palermo-style. Grilled sardine sausages and sardine croquettes are two other esteemed dishes. (For further information on this sardine mystique, consult *The Heavenly Food of Sicily* by Clifford A. Wright [Simon & Schuster, 1992].)

Expending culinary attention on the herring order was born of necessity. During the Middle Ages in Europe—long before the days of Spam—herring and sardines preserved in salt were a protein staple Cooks naturally turned to fresh specimens and seasonings to liven up the menu.

During the Napoleonic Wars (1796-1815), Great Britain used these fish to keep its hungry invading army from stealing local food supplies. Britain was the first to use sardines canned in tin-plated iron as army rations.

While other food fish prices have escalated, sardines remain a cheap, if not the cheapest, protein source on the market. One three-ounce portion of sardines will provide you with 40 percent of your daily requirement. It is ironic that this nutritious, economic protein source is reduced to fishmeal so we can continue to enjoy higher-fat chicken, pork, and bacon.

—*WM*

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Cannery Workers See A Ray of Hope

THE ABILITY OF CALIFORNIA canneries to can and market fish, primarily tuna and sardines, helped establish the state as one of the world's leading fish suppliers throughout much of this century. As the canning industry contracted drastically due to declines in local stocks and to low-wage competition from overseas, California commercial fishermen lost a major market for their catch, and workers in Monterey and San Pedro lost a major source of employment. In the 1940s, San Pedro canneries employed 10,000. In December 1995, the state's last major cannery, Pan Pacific Fisheries, on Terminal Island near San Pedro, was sold at a bankruptcy auction. Tri-Marine International (TMI), a global tuna trading company with a San Pedro office, outbid a major tuna packer from Thailand. The winning bid of $6.8 million will be used to pay back wages and pensions for the 500-person workforce. Unsecured creditors, including fishermen and cannery suppliers, are faced with absorbing $7 million in losses. Some of these fishermen may go bankrupt themselves and lose their vessels.

UNITED INDUSTRIAL WORKERS.

As a child, Wadenia Arendain (left) walked with her mother and other cannery workers in the parade seen on p. 22. She and Irma Lerma (right) worked at Pan Pacific most of their lives. Now they work for the United Industrial Workers, and here are seen in front of the union office with UIW national director Steve Edney.

TMI has announced its intent to reopen the cannery this spring, depending on negotiations with the union, Local 24 of the United Industrial Workers, and with the Port of Los Angeles, which leases the land occupied by the plant. How does TMI expect to compete against canned fish imported from countries with lower wages and lower—or non-existent—safety standards? "We don't have to pay $160 a ton to ship our product across the ocean to reach U.S. markets," says Stephan Farno, TMI vice president of finance and administration. "Large institutional buyers—the military and the schools—are often required to buy from U.S. sources and we will have the opportunity to sell them our food products." The former management of Pan Pacific relied mainly on canned tuna products. TMI hopes to broaden the product line. "We plan to do more with canned sardines, squid, and mackerel. We also plan to develop a line of frozen fish products," says Farno. TMI may develop canned products for niche markets, such as ethnic food outlets. (In Monterey, a prominent seafood restaurant owner and TV chef, John Pisto, is mulling over the idea of canning sardines in his own special sauce.) "By broadening its product line, TMI expects to increase the workforce from 500 to 700," says Steve Edney, national director of the United Industrial Workers. Edney is optimistic that a labor agreement satisfactory to TMI and the workers will be reached. Local fishermen are also enthusiastic about TMI's plans. A reopened cannery would be "a tremendous help to us," says Theresa Hoinsky of the Fishermen's Union of America in San Pedro, which is affiliated with the AFL-CIO.

TMI still faces a tough economic climate. Over the last five years, the proportion of fish sold canned has been decreasing. The proportion of the world commercial catch that is marketed fresh has grown from 23.9 percent to 29 percent; the frozen portion has remained at about 24 percent; and the canned proportion has dropped from 12.5 percent to 11.6 percent. (Some 8.2 percent is cured and 25.8 percent is processed into fishmeal.) Some 40 nations compete to sell canned sardines and herring in a declining or stagnant market. In Maine, six canneries, employing 1,000 people, can about 35,0000 tons of Atlantic herring annually and market them as sardines. According to Jeffrey Kaelin, the executive director of the Maine Sardine Council, the Maine canners want to increase their market share by exporting more product to Latin America.

—*WM*

Such a policy has both an environmental and an economic payoff. For fishermen, more economic return is possible from food fish, with less effort. At the same time, more forage fish can be left in the ocean to sustain higher-value commercial fish, as well as sea mammals and sea birds. The United States and other developed countries are helping to fund this shift in the Peruvian fishery by buying mahi mahi, shrimp, and scallops from Peru.

Can the livestock and aquaculture industries, in this country and abroad, survive without exploiting forage fish? In Peru, the prime fishmeal source is the anchoveta. Feed firms and their customers have learned to cope with its periodic declines by substituting soybeans, cottonseed oil, and other protein sources. Such alternatives can also be used to substitute for sardines. However, given the overall demand for protein-fortified feed, the pressures on forage fish will continue to rise. In the wake of the Japanese sardine collapse, for example, Japan has doubled its imports of fishmeal.

CRITERIA FOR RECOVERY

LEADING STATE AND FEDERAL scientists involved in sardine management agree that three conditions must be met before the sardine can be considered fully recovered: (1) The biomass should rise threefold, to one million tons. (2) The stock should reoccupy its range northward to British Columbia. (3) The population should contain a significant number of older fish up to age ten. The current top age is 5.

As the sardine population has grown in recent years, annual quotas have been raised, then lowered when they seemed too high. Regulators have been cautious, aware that another cool period could cut short the recovery. A cutoff, or reserve, has been established: no sardine fishing is allowed once the sardine biomass drops to 50,000 tons. In 1996, California fishermen may land 31,000 tons—18,000 tons less than in 1995. Tom Barnes, fishery biologist with the Department of Fish and Game in La Jolla, said the lower limit was set because too high a fraction of the fish population was being taken, "especially of fish two years and older."

The purpose of maintaining at least 50,000 tons of sardines in California waters is twofold: to assure sufficient seed stock, and to leave enough forage fish for the wild marine predators. But as the draft management plan for coastal pelagic stocks concedes, knowledge on how to establish a viable safety net is limited. Feeding interactions between forage fish and their predators "are poorly understood." Predators already endangered or threatened—such as the brown pelican and the coastal run of coho salmon—could be at particular risk. In 1972, when the anchoveta population declined sharply because of overfishing on top of an unfavorable climate change (El Niño), seabird populations dropped dramatically. Both the anchoveta and the seabirds have since rebounded, but not to their former abundance. In California, similarly, as the sardine receded, so did the breeding range of the brown pelican.

Effective monitoring of fluctuations in the sardine population is crucial to this population's health. Traditionally, managers have

WESLEY MARX

Fisherman with purse seine vessel in Port of Los Angeles slip. In the 1930s and '40s, more than 300 such vessels fished for sardines out of San Pedro. The fleet is now down to 23, shifting between sardines, mackerel, and squid. Many of these wooden-hulled vessels were used in the sardine rush of the 1930s.

relied on catch per unit of effort to signal when it's time to cut back or stop fishing. That, however, is not enough, especially now, when fishing vessels scan the ocean with advanced electronic devices, searching out and targeting areas dense with fish. Under these circumstances, catch per unit of effort can be maintained even as a stock declines. Today's managers therefore prefer to couple catch data with fishery-independent data from aerial surveys and sardine egg surveys at sea. But that requires financial resources that are ever more difficult to find. The greater the range, moreover, the more the cost to survey. A 1994 sardine egg survey, which used four ships and covered the area from Baja California to Monterey, cost nearly $500,000. That may be pocket change in the defense industry, but it's mighty big bucks for federal and state resource managers coping with budget cutbacks and hiring freezes.

Don't sardine fishing permit fees and landing taxes cover management costs? Although that money is the California Department of Fish and Game's, it goes into the Department's general fund, for which many department programs compete. As Richard Klingbeil, a fishery biologist with the Department in Long Beach puts it, "We can barely fund adequate dockside monitoring of sardine catches. We certainly can't fund an egg survey."

Is the sardine fishery not also a federal concern, since the fish do not confine themselves within state boundaries? California would like to share management and costs with the Pacific Fishery Management Council, a regional organization representing fishing groups and state fish agencies, and the NMFS, which provides much of the data for federal fishery management plans and enforces those plans. The Council is willing to accept this responsibility. But the NMFS is balking, mindful of current federal cutbacks.

The NMFS is also already overwhelmed with the need to restore higher-valued fish stocks. Among current tasks is working with California to restore diminished salmon habitat.

When the Sardine Lost Its Halo

THE USE OF ONE food system as feedstock to sustain another food system has been debated for some time. In 1927, B. D. Marx Greene, a state fishery official, wrote, "It seems repugnant to every right-thinking citizen to see fresh food fish used for any purpose other than human consumption." Responded one reduction stalwart, "The poultry raiser is as much entitled to feed his chickens, as the Mongolian is entitled to his can of sardines." Huffed another reduction proponent, "There is no halo around a sardine because it happens to be in a can." In 1921, California passed a law requiring shoreside canners to reduce no more than 25 percent of the weight of sardines caught each month. Offshore processing ships materialized to outflank this law and help render it meaningless by 1933.

—*WM*

A PRECARIOUS BALANCE

This is perhaps the ultimate irony in the sardine comeback during these bleak budget times: Its management requirements could siphon off funds sorely needed to restore higher-value stocks beset by overfishing, pollution, and habitat loss. Yet without adequate management, the sardine may succumb to the same pressures that devastated it in the 1930s.

The Pacific Fishery Management Council has submitted a draft management plan to the Secretary of Commerce (whose department would be eliminated if Republicans in Congress have their way). He is to approve, amend, or reject the plan sometime this year. The Fisheries Service will urge him to reject. In the meantime, California retains the responsibility to set the quotas. If the sardine continues to expand northward, Washington and Oregon will be faced with the same dilemma of finding funds to manage this recovering resource while not damaging other fishery conservation efforts.

Meanwhile, the Mexican fishing fleet lands sardines at a rate equal to, and sometimes higher than, that of the U.S. fleet. The combined harvest could reverse the recovery unless the two countries agree on a shared quota. Scientists have been cooperating on studies, but there is yet to be agreement among policymakers on whether even to begin a discussion about a shared quota.

The Pacific sardine has returned to California waters, but the presence of its shimmering schools could turn out to be fleeting. Without informed, careful management they may, indeed, turn out to be little more than ghosts from the past. Our knowledge about the sardine's needs is much greater than it was in the 1930s. So is the world's demand for marine protein, in whatever form. Perhaps no state can, alone, come to terms with economic interests that extend not only across state and national boundaries but also across the ocean. How we succeed in balancing these interests with the needs of this small fish will determine who benefits from the return of the Pacific sardine this time around—and for how long. ■

Wesley Marx, a frequent contributor to Coast & Ocean, *is author of* The Frail Ocean: A Blueprint for Change in the 1990s and Beyond *(1991, The Globe Pequot Press). He served on a National Research Council panel on marine monitoring.*

Mexico's Emerald Coast Counts on Tourists and Turtles

ELENA EGER AND MARC BEYELER

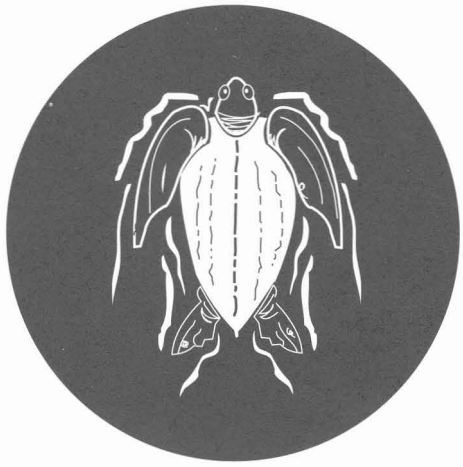
THE HOPES AND WISHES of coastal residents all over the world are represented today in the buzzwords "ecotourism" and "sustainable development." Along the coast of Oaxaca, in southern Mexico, these concepts are being brought to life in some small but significant efforts.

Oaxaca is a mystical place of unparalleled beaches and mountains. It is home to many indigenous peoples, creators of a major part of Mexico's impressive folk art, crafts, music, and regional cuisine. The principal nesting grounds of Mexico's sea turtle population—one of the world's largest populations, and one of the most endangered—are here.

The state's coastline—known as the "Costa Esmeralda" (Emerald Coast) and also as the Turtle Coast—extends some 250 miles from west to east in the far south of the country. In economic terms, this region is the poorest in Mexico, but it has a rich natural and cultural endowment. Local communities, with the help of the state and federal governments, are trying to develop a form of tourist economy that will preserve this endowment.

ELENA EGER AND MARC BEYELER

The western Oaxacan coast is serene and unspoiled, from Zacatela Beach with its white sand and world-class surf (the "Mexican Pipeline") to the intimate, calm bays and coves of the Bahías de Huatulco. A series of vast coastal lagoons and wetlands is fed by streams and rivers that pour out of the Sierra Madre del Sur. Two small tourist towns, Puerto Escondido and Puerto Angel, lie east of the lagoons. They are reminiscent of southern California coastal towns three decades ago—small, relaxed, and not encumbered by automobile traffic. (Last year, Puerto Escondido and Huntington Beach formed a sister city partnership.) Farther east, in sharp contrast, an enormous resort is being developed according to a 25-year federal government master plan. The Bahías de Huatulco complex will extend along 20 miles of coast, with destination resorts on many small coves. Already there is a Club Med, a Sheraton, and some other tourist lodgings, serviced by an international airport built especially for the resorts.



LEATHERBACK TURTLE: ILLUSTRATION, LISA CHASE

It is still too early to tell whether the Bahías de Huatulco or community-based tourism will shape coastal Oaxaca's future.

TO PRESERVE THE BEST

IN OAXACA'S LARGE and diverse landscapes, and in its small settlements, a visitor can enjoy fascinating experiences. One can explore jungles, visit colorful crafts villages, sample exotic cuisine, scuba skin dive in sparkling waters, or canoe through coastal lagoons filled with majestic avian and aquatic species—all in the same visit.

In Puerto Escondido, life centers on the small bay and the local fishing economy. Each day at sunrise, weather permitting, the boats moored in the bay head out to sea. On shore, meanwhile, local merchants prepare for the day's

ELENA EGER AND MARC BEYELER

This beach, formerly one of the largest turtle-slaughtering sites, fronts the new home of the National Turtle Center, which works to protect and preserve turtles through public education.

influx of visitors, both Mexican and foreign. Several blocks of the main street are closed to vehicles.

Although both Puerto Escondido and Puerto Angel have attracted international attention for more than two decades, neither has surrendered its charms. "Both local residents and visitors want the character and quality of life of the coast to be preserved and this coalition is necessary to ensure that the best of Puerto Escondido is preserved," explained Gina Machorro Espinosa, who leads walking tours in the village for the Oaxaca state tourist development agency, SEDETUR.

Because it is remote from major urban centers and difficult to reach by car, the western half of the Oaxacan coast has been spared the large-scale tourist resort development—so far. (Only in the past decade has regular air travel become available.) But pressures are increasing, generated in large part by Bahías de Huatulco. Confronting these pressures, coastal villages have organized to preserve and protect their character and way of life. Spurning high-rise hotels, golf courses, nightclubs and discos, and shopping gallerias and boutiques, they have sought instead to develop small-scale overnight accommodations and to encourage ecotourism based on the attractions of the coastal lagoons and the international allure of marine turtles.

A movement to protect, preserve, and even enhance the vast coastal lagoons near Puerto Escondido has gained local support. Seeking to combine environmental protection and community economic development, this movement has already led to the establishment of the Parque Nacionál Lagunas de Chacahua.

This 50-square-mile preserve is one of the largest coastal lagoon parks in Mexico. It has become the center of a bustling tourist economy offering visitors nature tours, refreshment, food, and lodging, provided almost entirely by local residents. The success of this "appropriate-scale" tourism has made the *Parque* a model for further community-based "sustainable" tourist development along the Oaxaca coast.

SEDETUR has developed ecotourism plans for another important coastal lagoon near Puerto Escondido, Laguna de Manialtepec. Instead of developing new tourist facilities, SEDETUR plans to support local efforts to attract both Mexican and foreign visitors by highlighting the number of family restaurants and services already available.

THE TURTLE COAST

THE FUTURE OF MEXICO'S marine turtle population depends on the success of this region's struggle to build an economy that supports, rather than exploits, its natural wealth. For 20 years, from the 1960s through the 1980s, the economy of the Oaxacan coast depended on the "harvest" of sea turtles. One of the world's most notorious turtle slaughterhouses stood at Escobilla Beach near Puerto Angel, the principal nesting beach in Mexico for the endangered Olive Ridley turtle. Now scientists and volunteers gather at Escobilla to ward off egg poachers and protect the turtles as they come ashore to lay their eggs, and again when the eggs hatch and the tiny turtles head out into the ocean (see *California Coast & Ocean*, Fall 1992).

In 1990, President Salinas decreed the killing of marine turtles illegal, thus depriving the region of an important income source. During our visit to the Turtle Coast in September 1995, some poachers were arrested with nearly 50,000 turtle eggs in their possession. Enforcement of legal protections can only be effective if it benefits local people, however. Since 1990, as a result, the state and federal governments, as well as many organizations and individuals, have worked to develop alternative sources of income.

The government's Ecotourism Project for the area centers on Mazunte, a fishing village that formerly depended on the turtle harvest. The village is surrounded by jungle and marshes and faces beautiful pocket beaches. The recently opened Mexican National Turtle Center, a museum and interpretive center, attracts many visitors, including busloads from the nearby Bahías de Huatulco complex. A small restaurant and gift shop are run by a local cooperative. Overnight accommodations and small-scale production cooperatives are also planned. One cooperative already produces plant-based cosmetics.

The local community, led by the non-

profit organization Ecosolar, has its own Sustainable Development Program, which includes a proposed *Reserva Ecológica Campesina* (Agricultural Ecological Reserve). Natural resources are to be protected, agricultural activities preserved, and appropriate tourism developed. The first of several planned *palapas* (beach bungalows) has already been opened for tourists.

Such efforts have drawn support from abroad—perhaps too much. The plant-based cosmetics cooperative has attracted attention and funding from the governments of Canada and Mexico, the U.S. Agency for International Development, Stanford University, the Body Shop, and others. All this attention has led some local people to fear that governments and private interests are trying to co-opt local residents.

DEVELOPMENT DANGERS

MEANWHILE, A 45-minute drive south of Mazunte, a low-rise version of Cancún is being built according to the government's 25-year plan. From the new international airport a four-lane road with a mowed-lawn median strip runs to the Bahías de Huatulco, contrasting sharply with the narrow, winding, and bumpy coastal roads. Although FONATUR, the Mexican tourist development agency, has imposed important building limits, including density and height restrictions, many other negative aspects of traditional resort development remain. Visitors are both physically and socially isolated, and the local population is estranged.

The scale of the master-planned development has already had a serious impact on local communities. People here talk bitterly of the "seizing" of lands 10 years ago for the new airport. Those who were compelled to give up their land can no longer grow corn, beans, and other vegetables. Many now work as waiters and service workers at the big resort and live in the newly constructed workers' village. Whereas a farmer who rents out a *palapa* or has a small restaurant can always survive on what he grows if tourism slumps, the resort workers have lost this option.

The recent devaluation of the peso has widened the gulf between local residents and tourists. It remains to be seen whether the small moves made toward "ecotourism" and "sustainable development" along the Oaxacan coast will actually lead to a new, community-based development that can support both the traditional ways of life and the natural treasures of this unique coast. ■

Elena Eger, Conservancy staff counsel, and Marc Beyeler, Urban Waterfronts Program Manager at the Conservancy, regularly travel to Mexico and write about issues of development.

While a movement to preserve the pristine coastal lagoons has gained local support, an enormous new tourist development looms as a threat.

ELENA EGER AND MARC BEYELER

POINT REYES NATIONAL SEASHORE

THERE'S NO NEED to stay away from the Point Reyes National Seashore this spring because of last October's fire. On the contrary, this season is especially inspiring. Life is returning to scorched terrain, and as you travel along roads and trails toward the ever-magnificent beaches, you have a rare opportunity to observe a part of the natural cycle that is usually thwarted in our carefully managed parks.

My son Caleb and I came out in early February to see how the park's recovery was progressing. We knew that the fire had affected a wide area, but most of what we had read in newspapers and seen on TV focused on the destruction of homes and other property along Inverness Ridge. Before long it became clear to us that what counts as a disaster for us can be a blessing for wildlife.

At the Bear Valley Visitors' Center, rangers provided maps and brochures that described the fire, its effects, and ongoing restoration work. They also recommended routes and sites from which we could best observe the recovery process. We drove along Limantour Road, much of which runs through the heart of the fire zone, stopping at trailheads along the way. The weather was gray and wet, not a good day for hiking, but as soon as we entered the fire zone we could see how thirstily the flora were putting the rain to use. There was green everywhere, even in the most severely burned regions. New life was pushing up through ashes.

The fire had started on the slopes of Mount Vision, one of the park's highest points, and raged across 12,354 acres of fir and pine forest, chaparral-covered hills, and broad dunes, blackening the land in a wedge extending along the shore of Drakes Bay from Estero de Limantour south to Kelham Beach. In the forested areas the flames seemed to have swooped and leapt about, burning great swaths of trees, but leaving others untouched. Many Bishop pines and Douglas firs now stand half black, half green. It was an immense fire, yet only 17.4 percent of the 71,000-acre National Seashore was damaged.

At Bayview Trailhead we encountered ranger Carol Hardy, who described to us how efficiently, and with what camaraderie, the fire-suppression team had worked together. More than 2,000 people were involved at the peak of the effort. Now, she said, cleanup and rehabilitation are under way. Park crews are working with volunteer habitat restoration teams and repairing damage done by bulldozers and other firefighting vehicles. Many slopes have had to be covered with wood mulch or fiber netting to prevent mudslides and erosion that could further endanger soil and watershed integrity.

Fire is part of this ecosystem, Hardy explained. It brings benefits to both plants and animals. "Bishop pine cones

JAN WATSON

BRUCE FARNSWORTH

stay on the trees for years, closed and sealed with resin until the heat of a fire opens them," she said. "Once the seeds have fallen to the ground, they require bare soil and lots of sunlight for the seedlings to develop. If there are no fires, the trees may get weak and diseased." Much of the fire zone had not been burned in the past 50 to 100 years and, in fact, was being considered for controlled burning when the fire broke out.

As we continued down Limantour Road toward the beach, we passed slopes covered with the charred skeletons of coyote bush and madrone. Green shoots were springing up from the base of nearly every bush, and bright stars of new ferns and thistles shone out against fields of charcoal. The rehabilitation teams have found enough viable seeds in samples of burnt soil to assure that the flora will eventually restore itself without human assistance. Many wildflowers will draw on nutrients released by burned vegetation to produce even more spectacular displays than usual.

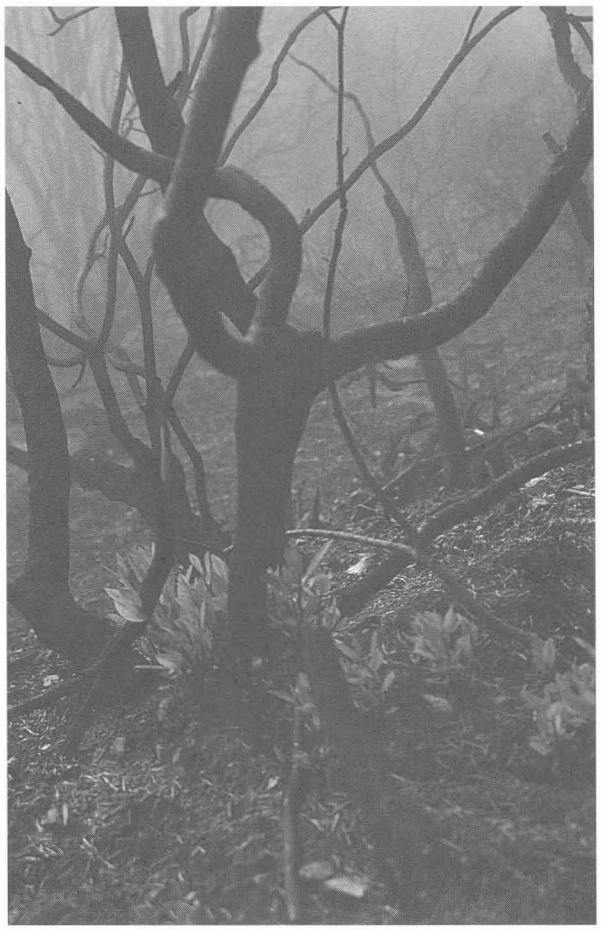
On the dunes and low hills above the beach, where vegetation is lower and sparser, the fire damage is less apparent. The Muddy Hollow and Laguna Creek riparian corridors within the fire zone were mostly unharmed, and served as sanctuaries for fleeing small mammals and birds. The fire's effect on the fauna of Point Reyes is still difficult to assess, though it is assumed that many small mammals, reptiles, and amphibians perished, along with some ground-nesting birds. Most larger fauna are known to have escaped. The greatest loss for wildlife is probably that of nesting habitat for birds such as wrentits and Nuttall's sparrows, which may not be able to multiply next season.

We retraced our path up Limantour Road, headed north through Inverness, then up Mount Vision Road, hoping for a panoramic view of the fire scene. Much of the road near the top marks a clear firebreak, blackened to the south and west, unscorched to the north and east. Unfortunately, by this time we were in the midst of heavy cloud cover and rain began to gust around us, so our vision was limited to the close-at-hand.

Sky Camp, Coast Camp, and several trails will probably remain closed until April, but most of the park remains accessible, including all of Point Reyes Beach from Tomales Point to the Point Reyes Headlands, Point Reyes Lighthouse, and Drakes Estero, plus the Coast Trail and most of the southern region of the park. Virtually all the beaches are open and undamaged. Though not for swimmers, the beaches of Point Reyes National Seashore provide gorgeous vistas, opportunities for walks and picnics, and are ideal for observing shoreline wildlife, including many marine mammals—even elephant seals, which have returned to Point Reyes after many decades of absence. ■

Call (415) 663-1092 for information about volunteer opportunities, or to sign up for a habitat rehabilitation team.

—Hal Hughes



BRUCE FARNSWORTH

CLICK HERE FOR THE NEW SOUTHERN CALIFORNIA WETLANDS INVENTORY

SAY YOU NEED to review the available information related to a specific wetland in southern California; or maybe you want to know the extent of wetlands that once existed along the southern California coast. Where do you look?

As of May, you might start with the Southern California Wetlands Inventory Project on the World Wide Web. The inventory is designed to provide students, scholars, planners, government agencies, and others quick access to recent data on wetlands in southern California. The California Coastal Conservancy is completing the inventory, in conjunction with the U.S. Fish and Wildlife Service and the California Coastal Commission, under a contract with the State Resources Agency. The project is partly funded by the Environmental Protection Agency.

When completed, the inventory will contain profiles of 41 wetlands between Point Conception in Santa Barbara County and the Mexican border. The profiles are based on existing information gathered from many sources.

Each profile includes information on the approximate extent of current and historic wetlands, hydrology (including tidal influence and status of watershed management activities), land use, water quality, habitat types, and plant and animal species present. A list of all special-status species that occur at the wetland is included, as well as a summary of enhancement and restoration activities. Also included is an annotated bibliography of key sources on which the profile is based, and a list of contacts familiar with the site.

Each wetland profile is accompanied by a historic wetland map and a recent wetland habitat map. The California Coastal Commission developed the historic maps, primarily from surveys done in the mid-1800s, and the Fish and Wildlife Service is compiling the habitat maps, which incorporate wetland data from the best available computerized sources, including the National Wetland Inventory. The maps are not intended to be used for precise wetland boundary determination.

As they are completed, the profiles and maps will be posted to the Internet. They will be available for review on the Internet's World Wide Web through

COASTWALK

COASTWALK PLANS a 100–day, 1,100-mile California Coastal Trail Hike for 1996, in addition to its shorter annual Coastwalks. The hike will begin on June 1, 1996—National Trails Day—and will follow the coastline from Oregon to Mexico, giving participants a first glimpse of what a completed California Coastal Trail will be like. A total of 13 hikers, plus guide and driver, will make this trek, and a few openings are still available. Gear will be transported by van between pre-arranged campsites 10-15 miles apart, and meals will be provided. The fee for this hike is $3,000.

Coastwalk's shorter trips continue for the fourteenth year, and most are appropriate for families with children. Each will be four to six days long and will be led by Coastwalk volunteers who know the area. Gear will be transported between campsites and dinners will be provided. A more rugged eight-day backpacking trip will explore the Lost Coast of Humboldt and Mendocino Counties, the last extensive roadless coastal region in California. Basic cost for this trip and the shorter hikes is $35 per day for adults, $20 for students, and $15 for children under 13.

For information and registration write or call: Coastwalk, 1389 Cooper Road, Sebastopol, CA 94572; phone : (707) 829-6689.

SCOTT MINER

A backhoe breached a bayfront levee at the Sonoma Baylands on January 24, opening a 39-acre pilot unit of this major wetland restoration project to the tides of San Francisco Bay. This milestone was toasted by representatives of the Coastal Conservancy, Port of Oakland, U.S. Army Corps of Engineers, and more than 45 other agencies and organizations. The 300-acre main unit of the marsh will be restored to tidal action in September 1996.

CERES, the California Environmental Resources Evaluation System. CERES is an information system developed by the California Resources Agency to facilitate access to a variety of electronic data describing California's resources. The first profiles to be posted, in May, will be for San Dieguito Lagoon, Los Peñasquitos Lagoon, Mission Bay, Famosa Slough, San Diego Bay, and Tijuana Estuary, all in San Diego County. The address is www/ceres.ca.gov/wetland/; select the Geographic and Educational Information link, then the southern California link, then click on the profile name you are interested in. For more information call Patsy Heasly at 510-286-4088.

NEW GRANT PROGRAMS FOR LAND TRUSTS

TWO NEW grant programs have been launched to help land trusts and other nonprofit organizations working to protect habitat and open space.

The Coastal Conservancy's new Nonprofit Grants Program will disburse $250,000 over a two-year period in four grant cycles, in amounts up to $10,000. All projects must have as a primary goal the protection of significant natural habitat. Such grants might, for instance, provide seed money for a campaign to acquire and restore wetlands property; "closing the gap" funds to finish a long-running project; funds for training and involving the public in habitat protection; cost estimates and preliminary designs for trails on natural lands; or support for starting a new land trust.

The new program supplements, rather than replaces, the Conservancy's program in partnership with nonprofits, which has distributed more than $45 million to more than 80 organizations in the past 16 years. The Conservancy's budget is continuing to shrink, however. This new program will enable the agency to spread its support among a larger number of nonprofits, in smaller amounts.

Deadline for the first round of the new grants is June 1, with funds to be available in August. Contact Janet Diehl at (510) 286-0749, or at jdiehl@igc.apc.org by e-mail.

The Trust for Public Land also has a new grant program, designed for land protection organizations in California and Hawaii. It will disburse $20,000 in three grant cycles over a two-year period. April 1 is the deadline for the first cycle. Awards of up to $7,500 will be made for projects related to building organizational capacity, public education, innovative approaches to land conservation, and land stewardship. For guidelines and application packet, call or fax Herbert Grench, at (415) 321-7995, or leave a message at (415) 495-5660. ■

GRAY WHALE: ILLUSTRATION, LISA CHASE

WHALE WATCH

NOW IS THE TIME to observe the northward migration of the gray whales as they return with their newborn calves from the breeding lagoons of Baja California to their arctic feeding grounds. They have been swimming along the California coastline since January, often only a few hundred yards offshore, and will continue to be in view through April. The gray whale population is now over 20,000, perhaps exceeding historic pre-whaling levels, so whale watching has never been better.

Boat excursions offer excellent opportunities for close-up sightings. They are offered by the Oceanic Society in San Diego and San Francisco, the Scripps Institution of Oceanography in San Diego, the San Diego Natural History Museum, the Cetacean Society, the Cabrillo Marine Aquarium in San Pedro, the Monterey Bay Aquarium, the Monterey National Marine Sanctuary, and others.

On their northward journey whales tend to stay farther from shore than on their southern journey, so shoreline viewing may be less rewarding. Still, seeing a whale, even if only its spouting, is an unforgettable experience. Good onshore viewing sites, south to north, include: in Orange County, Dana Point; in Los Angeles County, Redondo Beach; in Santa Barbara County, Point Conception; in Monterey County, Big Sur, Point Lobos State Reserve, Cypress Point near Pebble Beach, and Point Pinos; in Santa Cruz County, Davenport Bluffs; in Marin County, Point Reyes Lighthouse; in Sonoma County, Bodega Head and Salt Point; and, in Mendocino County, Point Cabrillo.

The Whale Festival at Point Cabrillo, sponsored by the Coastal Conservancy and the North Coast Interpretive Association, included history and nature tours of the preserve and the Light Station. It took place on March 2–3 and 16–17. Whale festivals at nearby Mendocino and Fort Bragg on the same weekends offered whale-watch activities, tastings from local wineries and breweries, chowder tastings, concerts, and other activities.

ARE WE LOVING OUR WILDLIFE TO DEATH?

Wildlife and Recreationists: Coexistence Through Management and Research, edited by Richard L. Knight and Kevin J. Gutzwiller. Island Press, Washington, DC, and Covelo, CA, 1995, (paper) $34.95 , 368 pp.

WILDLIFE-ORIENTED recreation is one of the fastest-growing activities in the nation, involving over 30 million people and contributing $15 billion to the economy annually. Cities and towns are jumping on the ecotourism bandwagon to bring in new business and offer new recreational opportunities to locals and tourists. State and federal resource agencies are responding to this growing interest in wildlife by building more trails and viewing platforms and promoting existing viewing opportunities. But at what cost to our wildlife resources? Do we risk killing the proverbial goose that laid the golden egg by loving our wildlife to death?

Wildlife and Recreationists: Coexistence Through Management and Research offers natural resource managers a series of research essays and case studies on how recreational activities affect wildlife and ecosystems. Research on wildlife responses to noise, to people, and to various types of recreational activities provides insight into the complex interrelationship between humans and wildlife. This area of research is in its infancy, and the book's contributors identify more areas that need study than they provide answers. Although the book leaves one with the desire to know more—and frustrated because so few hard facts exist—it is a good work of reference to help land managers at least ask the right questions about recreational use and development as they affect sensitive wildlife and wildlife habitats.

If you are a natural resource manager, recreation planner, or interpreter, buy the book. Wade through the studies, and pull out the nuggets that will help you make informed public-use decisions at your site. If there is one clear message in this book, it is that resource stewardship must take precedence over human use and enjoyment. This may be a hard pill for wildlife viewers and local chambers of commerce to swallow, but cautious planning today will ensure sustainable wildlife viewing tomorrow.

Bob Garrison is the coordinator of Interpretive Services for the California Department of Fish and Game. He serves on the California Watchable Wildlife Steering Committee and is chairman of the 1996 National Watchable Wildlife Conference to be held in Huntington Beach on November 12-17, 1996.

IN SEARCH OF L.A.'S WILD SIDE

Sagebrush and Cappuccino: Confessions of an L.A. Naturalist, by David Wicinas. Sierra Club Books, San Francisco, 1995, $13 (paper), 218 pp.

ABOUT ten years ago, Dick Roraback, a writer for the Los Angeles Times, made a walking tour of the Los Angeles River. He seemed overwhelmed by the massive wrongs done to the river. Channelized and concreted for most of its 58-mile length, it had all but disappeared from public consciousness. Maps referred to the river—if at all—as a flood control channel or a storm drain. Even its estuary in Long Beach had been redefined by the U.S. Army Corps of Engineers as a tidal prism.

Dazed and benumbed, Roraback seemed to accept the river's destruction as the logical consequence of urbanization. Yet all around the Los Angeles River "message-shed," it turns out, readers were following Roraback's series of articles attentively. When destiny happened to bring several of those readers together, they started talking about Roraback's lament. Out of those conversations, Friends of the Los Angeles River was born.

Nearly a decade later, with Friends of the Los Angeles River and its watershed allies Heal the Bay and Tree People all looking toward their tenth anniversaries, Sierra Club Books has published *Sagebrush and Cappuccino: Confessions of an L.A. Naturalist,* by David Wicinas. This wry collection of I-do-this-I-do-that essays recounts a series of day walks around the wilder fringes of what the author calls the "100-mile-wide city."

Whether scrambling along a ridge above Sepulveda Pass and the I-405 freeway, sneaking through people's backyards in Topanga Canyon, hiking gingerly through mountain lion country in the Santa Ana foothills of Orange County, or stumbling onto the Flintstones movie set while climbing around Vasquez Rocks on the edge of Antelope Valley, Wicinas presents himself as a lonesome traveler, a thoughtful, well-read dreamer, a lode of interesting information.

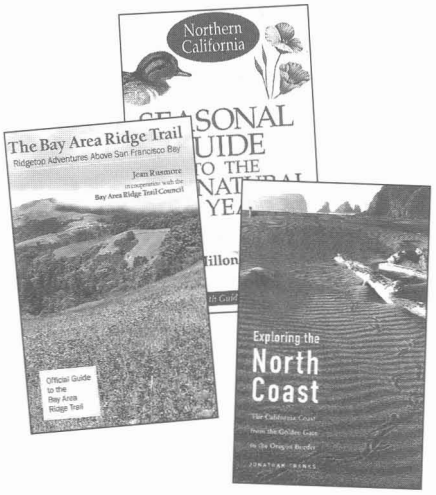
As he climbs into the teeth of a Santa Ana wind on his way to the top of Mt. Lukens—at 5,074 feet, the highest point in the city of Los Angeles—he lectures us on the meteorology of the devil-wind. Turning up his collar to—he explains—ward off elves as he strolls amid the Engelmann oaks in their Santa Rosa Plateau redoubt, he muses at length on the intertwined history of the mighty oaks and the little people. I found his nervous reflections on mountain lions while hiking through Orange County's Caspers Park, site of several recent attacks on humans, particularly fascinating. Did you know, for instance, that mountain lions have been known to leap 15 feet in the air from a standstill?

Yet there is something annoying about these essays, a kind of jaunty wistfulness that grates, a sense of constantly being overwhelmed by the massive machine of humanity that is Los Angeles. For Wicinas, going out into nature is a solitary experience, a retreat. Unfortunately, there really is no escape. There's the distant rumble of bombing runs from Camp Pendleton as he looks for mountain lion tracks, the thunder of rush-hour traffic as he bushwhacks through Sepulveda Pass chaparral, the roar of jets taking off overhead as, sweating, he pulls non-native plants out of the sand dune habitat of the El Segundo blue butterfly at the tip of an LAX runway.

What, then, are Wicinas's "Confessions"? That he wants to enjoy a decent cappuccino before heading off on one of his jaunts? Is that why he feels guilty? Or is he simply uncomfortable acknowledging that he is as much of the city as the basest developer in the Santa Clarita Valley, or the crassest slob who jettisons his school bus in Topanga Creek? It would be enlightening, I think, to see Wicinas focus his stamina and quirky intelligence on built nature—on the Los Angeles River, for instance; or Broadway in downtown L.A.; or even, heaven forbid, the Universal Citywalk. To me, the richest territory for exploration these days is the territory where the environment and the infrastructure are learning to coexist. There, maybe, Wicinas would find more pleasure joining with his neighbors instead of fleeing from them.

Still, just as Dick Roraback's long-ago series on the Los Angeles River had repercussions far beyond the writer's intent, who knows what will come out of Wicinas's essays? Someone reading this book even as we speak may be vowing to spend the rest of his or her life fighting to protect the mouth of Topanga Creek where it opens into Santa Monica Bay. When you skip a stone across the water, there are ripples.

—*Lewis MacAdams*



THREE NEW NORTHERN CALIFORNIA GUIDEBOOKS

The Bay Area Ridge Trail, by Jean Rusmore in cooperation with the Bay Area Ridge Trail Council. Wilderness Press, Berkeley, CA: 1995, $13.95 (paper), 236 pp.

Exploring the North Coast, by Jonathan Franks. Chronicle Books, San Francisco: 1996, $11.95 (paper), 272 pp.

Seasonal Guide to the Natural Year (Northern California), by Bill McMillon. Fulcrum Publishing, Golden, CO: 1995, $15.95 (paper), 342 pp.

THESE THREE NEW guidebooks offer not only a wealth of information but also distinctive approaches to northern California's natural wonders.

In *The Bay Area Ridge Trail,* Jean Rusmore describes 33 hikes in nine counties along completed segments of the Bay Ridge Trail. The trips, covering a total of 188 miles, are wonderfully varied. They range from hikes over the San Francisco hills, to treks across rolling grasslands and through redwood forests to seacliffs, to walks on Mount Tamalpais, Bald Mountain, Dinosaur Ridge, and Skyline Ridge.

The Ridge Trail is a visionary work in progress, connecting the peaks around San Francisco Bay in the outer of two connected round-the-bay trail systems. Both the Ridge Trail and the shoreline Bay Trail will eventually be 400 miles long; at present both are about 40 percent complete. This book and the Conservancy's *San Francisco Bay Shoreline Guide* (University of California Press, 1995) complement each other, and together provide inspiration for a multitude of adventures along these two great trails.

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Access and resource information is clearly provided, along with fairly detailed descriptions of each hike, including notes on both natural and human history. I wanted to see more photographs of the places described, but this is perhaps less a shortcoming of the book than an additional stimulus to explore the trails.

Exploring the North Coast, by Jonathan Franks, presents the coast from the Golden Gate to the Oregon border. Again, the practical information—access, camping, lodging, and dining options—is well presented. Franks's writing is considerably more personal and opinionated than that of most guidebooks, but his approach also provides insight into the character of a region and its inhabitants. If you enjoy his style, the book is much more than just a guidebook; if not, it's still valuable for detailed information.

I'm not sure how well Bill McMillon's book, *Seasonal Guide to the Natural Year (Northern California),* works as a guide. Covering the California coast from Monterey County north, it's organized according to season, rather than geographically. This makes for a slightly bewildering format, and limits the material to what sometimes seems like a haphazard collection of anecdotes and notes. The reader who lives with the book for a while, however, exploring some of the natural seasonal events described, may well find this guide useful and illuminating. It certainly contains plenty of fascinating information.

All three books include photographs, maps, appendices, and bibliographies.

—*Hal Hughes*

COUNTING IN THE FUTURE

Investing in Natural Capital: The Ecological Economics Approach to Sustainability, edited by Ann/Mari Jansson, Monica Hammer, Carl Folke, and Robert Costanza. Island Press, Washington, DC and Covelo, CA: 1994, $35, 504 pp.

THIS BOOK is an excellent primer for anyone who wants to take seriously the admonition: "The Environmental Problem is an economic problem," a phrase heard often in the ranks of economists dealing with environmental and natural resource issues. The result of a workshop held in Sweden in 1992, at a gathering of the International Society of Ecological Economics, this trail-blazing volume develops the theme that investment in natural capital is a prerequisite to sustainability. According to the editors, the book is "intended to serve as an academic text primarily for researchers in the interface of the social and natural sciences." I believe, however, that it will also be invaluable to natural resource managers, regulators, policy makers, and organizations focusing on environmental issues.

The future is arriving overshadowed by our global environmental problems. These problems are outgrowths of overexploitation, overpopulation, overdevelopment, and overconsumption of the planet's finite natural resources. Most of our society's major decisions in recent times have been grounded in economic models that do not take into account the fragility and nonrenewability of crucial portions of our natural endowment.

The harbingers of our contemporary economic theories, a group of economists that taught and studied at the University of Chicago and who were aptly referred to as the "Chicago School," spent much of the first half of this century perfecting the models which drive our modern economy. The most crucial tools developed were the net present value (NPV) theory and the capital asset pricing model (CapM). The NPV theory allows an income stream received in the future to be valued in today's dollars, and the CapM helps the economist choose which discount rate to use in the revaluation of the income stream.

Indeed it will probably be the two most renowned members of the Chicago School, professors Mogdigliani and Miller, who go down in history as the great creators of the post-industrial economy. However, their models fail to account for the inherent value of future production and consumption, and fail to accord value, much less sanctity, to those yet unborn.

Using NPV theory and CapM, we progressively devalue the future. We make decisions on maximizing the value of our choices today, progressively devaluing income streams which will come in the future. Using these models, income streams which come 50 or 60 years in the future are virtually worthless. The result: we are delivering to our children's children an increasingly worthless future. We have developed a valuation system that has become a self-fulfilling prophecy.

That is why I joyfully read *Investing in Natural Capital;* it is the first big step in the right direction. Anyone who is charged with managing natural resources for sustainability should read this book with highlighter and notebook in hand, and anybody who is not managing resources for sustainability should get a new line of work, because the concepts presented in this book will revolutionize the ways we design and plan for our future. ■

Jane Williams is an environmental economist who works on sustainability issues, the economics of waste, and environmental justice.

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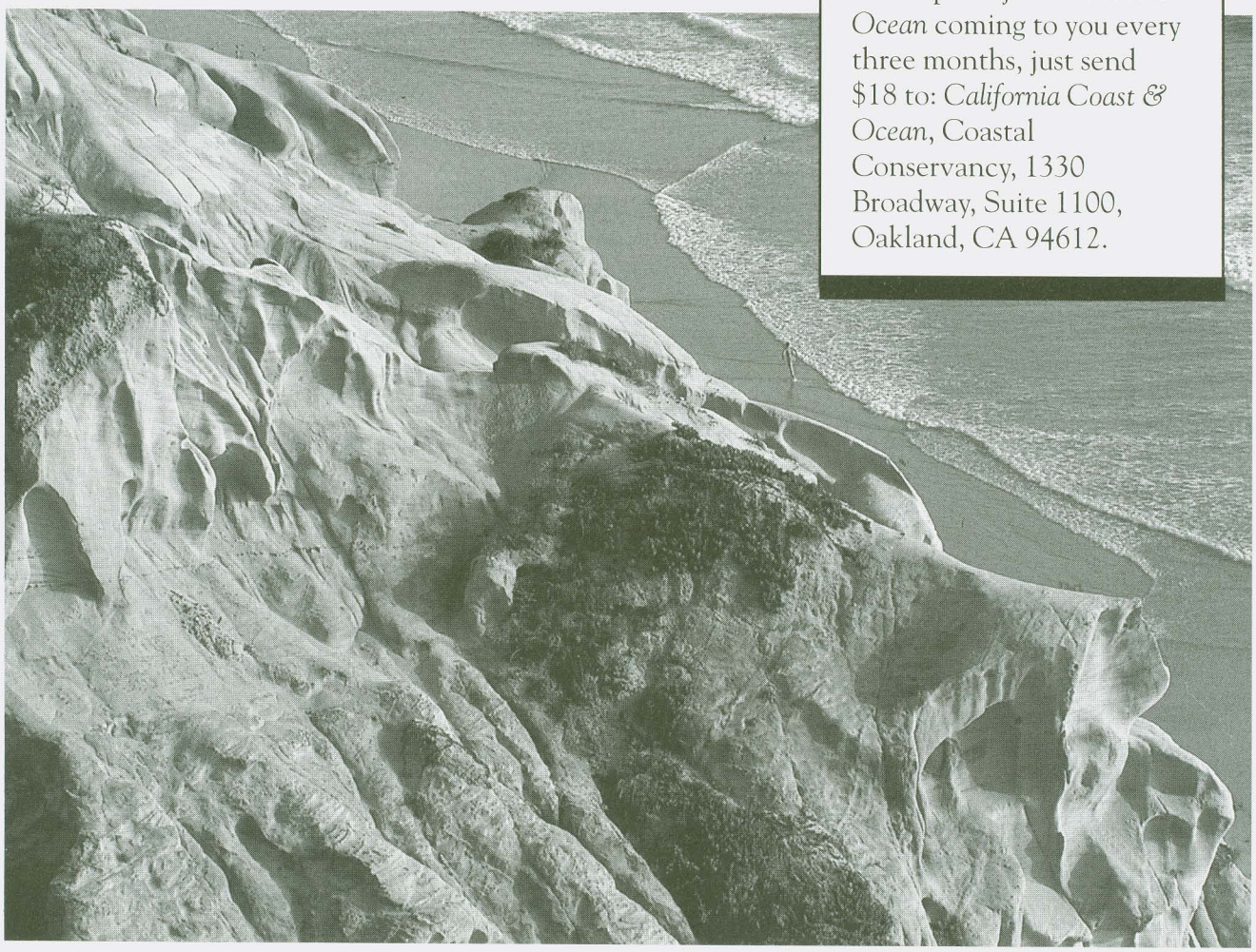

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