CALIFORNIA

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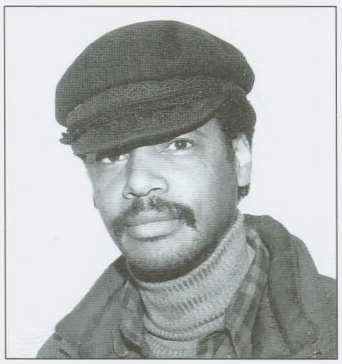
COVER

Rumors of Rain, By Jay Jones

The sight of a lone man with umbrella caught the eye of photographer Jay Jones as he was passing Ocean Beach one winter day last year. A welcome rain had just begun to fall, and as Jones aimed his camera, some drops landed on the lens. He liked the result, made a print, and placed it in the window of the camera shop he operated on Valencia Street. The image captivated a passerby, the editor of this magazine, and she went to look for it recently when it was time to choose a cover. Jones had since sold his business, to concentrate on a new interest in stereophotography and infra-red photography. He has been involved with photography for 20 years, he said, pursuing his art for personal satisfaction rather than as a way to make a living.



Jay Jones

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JAY JONES

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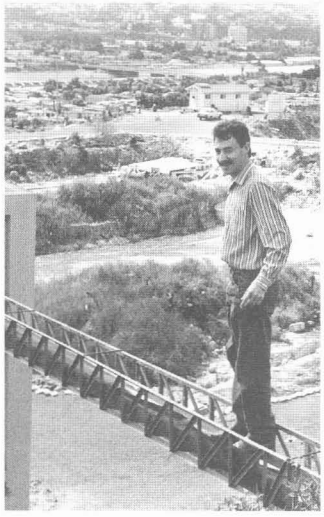


Carlos de la Parra. See p. 7.

IT'S BOTH AN HONOR AND A DELIGHT to be writing this column as executive officer of the State Coastal Conservancy. My deep appreciation goes to the Conservancy board for giving me the opportunity to serve in this position, to Peter Grenell for his inspiration and imaginative, successful leadership of the Conservancy over the past eight and a half years, to Conservancy staff, on whose expertise, patience, and skillful work the agency is absolutely dependent, and to all the elected officials, citizen volunteers, and others whose partnership has helped to build the Conservancy's terrific reputation.

In the years since 1985, when I left the California Coastal Commission as its executive director, my work has often taken me far from home. So it is with a sense of exultation that I return to duties on behalf of our magnificent coast, to work for its protection, restoration, and imaginative development, as well as for greater public access to its many wonders. Future generations must, like ourselves, have the opportunity to stand on a rocky headland and feel it shaken by booming waves; to hunker down behind the rushes in an estuary, watching the flashing birds; to stroll quiet canyons, listening to the musical whisper of the stream at night; to fish from a pier. The job I assumed February 1 involves all that and more.

Virtually every one of the hundreds of projects the Conservancy has undertaken has been in partnership with others; just read Peter Grenell's "Looking Back in Light of the Future" (page 36) to appreciate the number and variety of successful working relationships the Conservancy has fostered. The skill, understanding, and expertise required for such work are hard to come by. The Conservancy should be extremely proud of its ability to fashion and foster "win-win" solutions to sticky issues involving development and resource protection. I look forward to continuing that record of partnership-building success.

Several sister state agencies have responsibilities for coastal protection. At the heart of this group lie the three charged with coastal management: the California Coastal Commission, the San Francisco Bay Conservation and Development Commission, and the Coastal Conservancy. As I enter this new job, I am pledged to continue and revitalize the close, cooperative partnership among staff, commissioners, and board members of our three agencies. There is so much good work to be done among us.

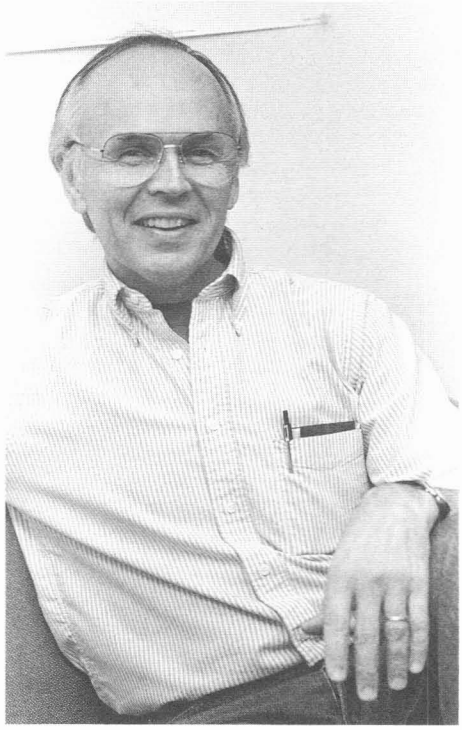
In my view, ecosystem management is at the center of the Coastal Conservancy's future.

Let us consider two major areas in which the Conservancy, in partnership with others, can play a key role: ecosystem management—especially watershed management—and the opportunities presented by base closures along the coast and around San Francisco Bay.

The term "ecosystem management"—currently a buzzword—reflects an emergence of the realization that, as John Muir put it: "When you try to pick anything out by itself, you find that it's hooked to everything else in the universe." In my view, ecosystem management is at the center of the Coastal Conservancy's future.

Let's acknowledge, first off, that no independent ecosystem exists that is larger than an aquarium or smaller than the planet. Units smaller than the planet can nevertheless be managed so that development and human habitation can occur in a manner that natural resources can sustain. Watersheds, both great and small, have increasingly come into focus as such units. Although their borders are not as distinct as those of islands, for instance, they incorporate the habitats of terrestrial, avian, and aquatic species and their interactions. The study, management, and protection of watersheds is essential if we are to accommodate the development necessary to support California's burgeoning population while retaining the environmental quality on which our natural support systems depend.

Watershed management calls out for the Coastal Conservancy's unique approach: Almost all watersheds go well beyond the boundaries of any single human institution, public or private. To study, understand, plan for, manage, and protect watershed ecosystems, we must create new alliances, new networks, new partnerships, new teams. Scientific knowledge, human dreams, legal rights, jurisdictional turf—all wrapped together—are a thicket through which new ecosystem management teams must pass. The Conservancy can help make the needed trails through this thicket. It has the necessary expertise, a commitment to public participation and local stewardship, and the freedom from the immediate interests of property owners and local politics. Ecosystem management is now a



MARTHA STEWART

growth industry, and the Conservancy can help as leader, partner, and catalyst.

A similar opportunity presents itself in the activities surrounding base closures. By statute, the Conservancy is expected to coordinate all other state agencies in decisions relating to surplus federal property in the coastal zone. Around San Francisco Bay and on the central coast, especially, we now have opportunities to reweave facilities that are being relinquished by the armed forces into the fabric of the urban and natural shoreline communities. The potential for wetland restoration, coastal access, urban waterfront improvements, and resource-sensitive economic development is great. Most important, we cannot waste the chance to make environmental protection and sensitive development relevant to, and of service to, the residents of our inner cities. There are job opportunities and recreational facilities to be developed by and for people of color along the California coast for the first time in history—at least at this scale. Because many actors are already crowding around the debate about the future of each base, successful conclusions will also require the collegial, team-building, partnership approach that is the Conservancy's hallmark.

In his article, Peter Grenell reminds us of this agency's proud and rich accomplishments. As we move to the Conservancy's next stage, we'll be building on a firm base of these accomplishments and on an experienced, expert, highly regarded staff that is ready to respond to these and other new opportunities. As my predecessor points out, the agency is at a turning point. We will need your help, advice, and participation to meet the challenges of the next several years, not the least of which is the state's fiscal crisis. But it's interesting to note that those who call for the "reinvention" of government now use words like "flexible," "entrepreneurial," "leverage-seeking," and "networking." Well, I say, welcome to the way of working that the Coastal Conservancy has pioneered—and excelled in—for the past 18 years. We are positioned, with our record of success and our approach, to help lead the state. I, for one, could not be more enthusiastic and optimistic about the Conservancy's future. ■

—Michael L. Fischer

COASTAL CONSERVANCY SELECTS MICHAEL L. FISCHER AS EXECUTIVE OFFICER

At its December 9th meeting, the State Coastal Conservancy Board unanimously selected Michael L. Fischer as executive officer, to succeed Peter Grenell, who resigned as of January 31.

Fischer, who assumed his duties on February 1, is well acquainted with coastal issues in this state and has received national recognition for environmental leadership. He served as executive director of the California Coastal Commission from 1978 to 1985 and as a State of California environmental official for a total of 12 years. He was a senior associate with Sedway Cooke Associates, an urban and environmental planning firm in San Francisco, from 1985 to 1987, then executive director of the Sierra Club from 1987 to 1993. During the first half of last year he was a fellow at Harvard University's John F. Kennedy School of Government, and then a senior consultant with the Natural Resources Defense Council. He holds a master's degree in city and regional planning from the University of California, Berkeley, and a bachelor's degree in political science from Santa Clara University.

The seven-member Conservancy Board chose Fischer, 53, from a field of 300 candidates after an extensive national search. The Board is a part of the Resources Agency, and is comprised of four appointees of Governor Pete Wilson, an appointee of the Assembly Speaker, Willie Brown, an appointee of the Senate Rules Committee, and the chair of the Coastal Commission.

OTHER CONSERVANCY ACTIONS: AUGUST-DECEMBER 1993

New Brighton State Beach Addition

One of the last undeveloped open space areas on the southern **Santa Cruz County** coast will be acquired to expand **New Brighton State Beach,** with the help of $500,000 from the Conservancy approved in December. The 66.4-acre coastal terrace, with deep ravines on its borders, has seasonal streams with riparian vegetation as well as access to 500 linear feet of sandy beach. The Department of Parks and Recreation recently negotiated the purchase of the parcel, known as the Porter-Sesnon property, for $3,580,000. Capital outlay for this park expansion was authorized in the State's FY 1993-1994 budget, with the Conservancy participating in its funding.

El Moro Elfin Forest Acquisition

To help **San Luis Obispo County** acquire 40 acres of coastal bluff and wetland adjacent to Morro Bay State Park, the Conservancy authorized up to $250,000 in December. The property lies on the southeast shore of Morro Bay, south of Morro Bay State Park. It will become county property and will be managed as a natural reserve and passive recreation area.

Beautiful stands of coast live oak, including the rare pygmy variety, grow on this property, which is known as **El Moro Elfin Forest.** Regionally rare plant communities include coastal chaparral, riparian woodlands, and tidal wetlands. Chumash Indian middens have been discovered, most of them relatively undisturbed. Views of Morro Bay and its watershed are expansive.

The county and a local nonprofit organization, Small Wilderness Area Preservation, have assembled a funding package for most of the acquisition costs, estimated at $1.6 million.

Ballona Lagoon Enhancement

Fish habitat, water quality, and public access will be improved on the **Ballona Lagoon,** adjacent to Venice Beach in **Los Angeles,** with up to $550,000 authorized to the Ballona Lagoon Marine Preserve, a local nonprofit organization, in October. The preserve will implement the Phase 1 Ballona Lagoon Enhancement Plan. The

DEWEY SCHWARTZENBURG

A mile-long wheelchair-accessible loop trail north of Jenner, in Sonoma County, now provides easy access to spectacular coastal and ocean vistas. The paved trail just west of Highway 1 was built with $233,000 in funding from the Conservancy to Coastwalk, a statewide nonprofit organization that sponsors treks along the coast. The Conservancy bought 272 acres with two miles of ocean frontage in 1989 with funds from the California Wildlife, Coastal, and Park Land Conservation Bond Act of 1988 (Proposition 70) and transferred it to the Department of Parks and Recreation in March 1992.

plan calls for excavation of a deep pool for fisheries habitat adjacent to the Via Marina tidegate, installation of automatic sensors on the tidegates to improve the tidal range in the lagoon, revegetation of the eastern lagoon bank with native plants, and installation of two pilot sediment traps. The preserve will also build a lagoon overlook and an entrance to the public pathway on the lagoon's east side, and install interpretive displays.

These actions follow six years of planning for the tidal system known as the Venice Canals/Ballona Lagoon, between the Marina del Rey entrance channel and the canals north of Washington Street, in Los Angeles. The Conservancy funded the preparation of a hydrology study of the canals, which enabled the city to resolve issues related to their reconstruction. The canals have since been rebuilt.

The newly funded improvements at Ballona Lagoon will not only help to restore one of Los Angeles' last remaining wetlands, it will make the lagoon more accessible to schools, environmental programs, and the general public who have few nearby locations to visit and observe wildlife in their natural environment.

Garcia River Watershed Enhancement Plan

The **Mendocino County** Resource Conservation District has begun restoration work in the 72,000-acre Garcia River Watershed with $250,000 approved by the Conservancy in September. This work is in keeping with the Conservancy-funded and approved watershed enhancement plan, which has the support of a diverse watershed community.

The Garcia River, an important anadromous fish stream, flows through southwestern Mendocino County, traversing 105 miles of steeply sloped forests and rolling hills. Near the coastal hamlet of Point Arena, 40 miles south of Fort Bragg, it forms a small estuary, which is a nursery for many aquatic species and a feeding and rest area for waterfowl, shorebirds, and wading birds. Although the river still supports critical habitat for fish and wildlife, fish populations have declined severely. These declines are attributed to multiple causes: sediment that washed down the river during major floods in the 1940s and 50s, extended drought periods, logging on steep slopes in the upper watershed, gravel mining in the river, agricultural encroachment on the estuary, and gill-netting at the river mouth.

The enhancement plan was developed after in-depth technical analysis of current and historical conditions, in consultation with the Garcia River Watershed Advisory Group, composed of representatives from upstream timber companies, aggregate miners, commercial and recreational fishing groups, environmental organizations, and adjoining ranchers and farmers. It has the support of the watershed community.

The plan's three phases focus on three river areas: estuary, lower seven miles, and upper watershed. In the estuary, the first step will be to investigate the feasibility of realigning the channel so the river mouth stays open, and to reestablish deep pools. Recommendations for the lower seven miles are intended to provide cover from predation and encourage the scouring of sediment to create deep pools; in the upper watershed, the focus will be on erosion control. The restoration effort in this watershed may serve as a model for restoring other north coast rivers and streams.

Carpinteria Marsh Restoration

The Land Trust for **Santa Barbara County** has begun work on the first phase of the **Carpinteria Salt Marsh** restoration plan, which the Conservancy funded in 1988. This marsh harbors threatened and endangered species including the Belding's savannah sparrow and light-footed clapper rail. It is a nursery for halibut, flounder, sea bass, and other economically important fish. It also provides flood protection for the city of Carpinteria and to Santa Barbara County. In September, the Conservancy approved up to $170,000 to put the first phase of the plan into action.

The land trust will develop final plans, specifications, and engineering for a 15-acre portion of the 230-acre wetland adjacent to Ash Avenue. Five of these 15 acres are in private ownership; ten, in public ownership. The University of California Natural Reserve System, which owns a preserve next to the Ash Avenue site, will develop a plan to coordinate natural resources management of the entire marsh.

Restoration of the 10 publicly-owned acres is contingent upon the city receiving a grant from the Intermodal Surface Transportation Efficiency Act of 1992 (ISTEA). Recently the Conservancy authorized $218,865 to "match" $500,000 in ISTEA funds. Word on whether the Conservancy, the city, and the land trust are successful in securing ISTEA funds for this project should come by the end of March.

New Coast and Marine Education Center in Santa Barbara

The **City of Santa Barbara** had been trying since 1988 to amass sufficient funds to renovate the Chase Palm Park Recreation Center and create an environmental education center within it. The building is located just east of Stearns Wharf, in one of the most intensively visited areas on the central coast. Unable to raise the full amount needed, the city sought the Conservancy's aid. In September, the Conservancy authorized up to $200,000 in grant and loan funds to enable the city to develop the environmental education center. It will focus on the coast and ocean, and will provide a public assembly area for use by schools and organized groups. Construction is expected to begin this year.

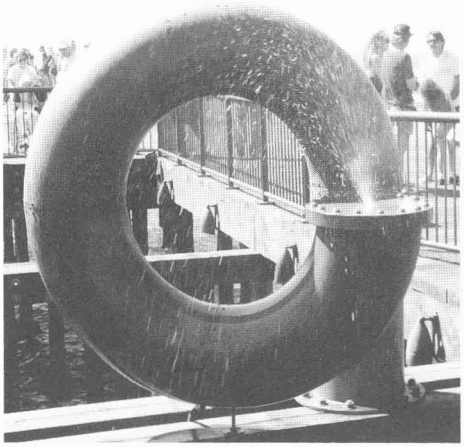
Otay River Valley Acquisitions

As part of an ambitious plan to develop a regional park in the **Otay River Valley** in **San Diego County,** the Conservancy in December gave final approval for the purchase of seven parcels. It had authorized $1,468,000 for the purchase in 1992. These properties, combined with those purchased by the City of San Diego in June 1993, will become the core of the proposed Otay Valley Regional Park. The regional park is a joint project of the cities of Chula Vista and San Diego and San Diego County and will encompass much of the 11-mile-long river valley. Total cost is estimated at $35 million.

The Otay River Valley is in southwestern San Diego County, between South San Diego Bay and the Otay Lakes. Most of the valley is in open space, but its natural resources have been severely degraded by sand and gravel mining, grading for agriculture and road improvements, an upstream dam, refuse dumping, and other impacts. In 1989, the Conservancy provided funds to the City of Chula Vista for an enhancement plan for the valley. The Conservancy's involvement in the property

Ventura Pier Restored

California's longest wooden pier reopened to the public October 2. The $3.5 million restoration of the 1,958-foot Ventura Pier was funded by the Coastal Conservancy, the Wildlife Conservation Board, the State Department of Parks and Recreation, the Special Account for Capital Outlay, and the City of Ventura. Retaining its original style, the pier now sports a wave-powered fountain, multiple interpretive panels about local human and natural history, and a new entrance plaza with palm trees.



PHOTOS: DAYLE BARTLETT

acquisitions will establish the foundation on which the Otay Valley Regional Park will be created.

Pacifica Creeks to be Restored

The **City of Pacifica** is designing a wetland restoration plan for **San Pedro Creek** with the help of $100,000 authorized by the Conservancy in October. The goal is to protect and enhance the creek's riparian corridor, restore 10 acres of historic wetlands, and address the problem of flooding in the nearby residential neighborhood.

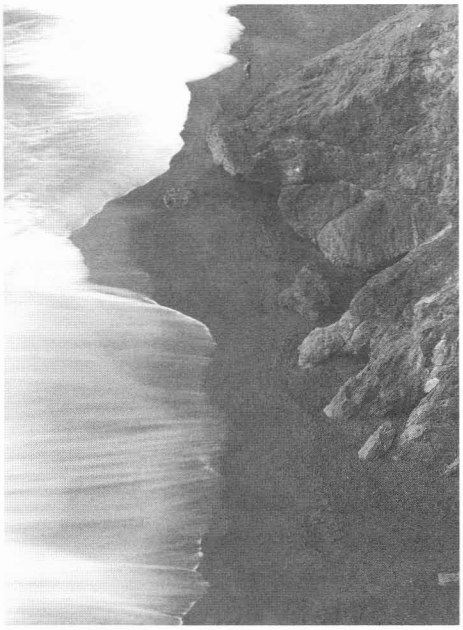
The San Pedro Creek riparian corridor is one of the most important wildlife habitat areas on the San Mateo coast, supporting steelhead trout and a variety of aquatic birds. It also provides habitat for four federally listed and candidate endangered species: the San Francisco garter snake, California red-legged frog, California tiger salamander, and the San Francisco forktail damselfly.

The City of Pacifica's Flood Control Committee has developed a proposal that would divert flood waters from the creek and use these waters to restore a 10-acre freshwater marsh near the creek's mouth. This is expected to provide protection against a 100-year flood for the adjacent community, and would also protect and enhance the creek's riparian corridor and restore valuable historic freshwater marsh habitat.

The Conservancy also authorized up to $60,000 to the City of Pacifica in October for the design of a project to restore 17 acres of historic riparian wetlands on **Calera Creek.** Low-nutrient, tertiary-treated wastewater from the expanded Pacifica municipal treatment plant would be used. This project would be an environmentally beneficial alternative to the city's current practice of releasing effluent into the ocean. The freshwater riparian wetland that would be created is among the most threatened habitat types on the California coast. It would consist of freshwater marshes, grassland, and willow and alder riparian scrub, as well as areas of open water. This variety of regimes would provide habitat for three wildlife species of special concern: the San Francisco garter snake, the California red-legged frog, and the San Francisco forktail damselfly. ■

WHAT'S NEXT IN COASTAL MANAGEMENT?

Almost 18 years have passed since the California Coastal Act and its companion bill, the State Coastal Conservancy Act, set up the state's basic framework for coastal management. Is that framework still sufficient for resolving the increasingly complex controversies that arise over coastal resources? On December 6, 1993, some forty people from a variety of backgrounds met at the Monterey Bay Aquarium to examine that question.



LIZA RIDDLE

This round table discussion was held as part of the preparation of a report for the Packard Foundation, "Coastal Agenda 2000," which will identify major challenges facing California's coast and San Francisco Bay, and will suggest strategies for addressing them. Participants in the Monterey gathering represented public interest groups, public agencies, legislative decision makers, and business, and included legal and scientific experts.

What emerged was a clear recognition that environmental problems such as coastal water pollution, loss of wildlife habitat, loss of fisheries, and the creeping conversion of open land to urban development demand an integrated management system. No longer can one agency or government entity set policy in a vacuum. Overlapping authorities can present a confusing array of rules to both those who work to preserve resources and those who try to secure project approvals. A more comprehensive approach is needed, such as ecosystem and watershed management.

Among efforts to develop such an approach is the Memorandum of Agreement signed by eight federal, state, and regional agencies to address water quality issues in the Monterey Bay National Marine Sanctuary. The Coastal Zone Management Act now requires state coastal management agencies and water management agencies to cooperate in controlling nonpoint source pollution. Another effort, to protect the coastal sage scrub habitat in southern California, is known as the Natural Communities Conservation Planning Program and also involves a host of local, state, and federal entities.

Discussion at the Monterey round table also made it clear that all participants recognize that to continue to achieve the ambitious goals of coastal protection, we must broaden the constituency for sound management by reaching out to communities that traditionally have not been involved in natural resources policy debates.

"Coastal Agenda 2000" will be based in large part on the productive discussion that took place. The report will suggest possible projects that could be undertaken to address key coastal issues. Groups that could potentially sponsor projects include land trusts, citizen groups, and government institutions. A summary and the recommendations from this round table can be obtained from Ann Notthoff at the Natural Resources Defense Council, 71 Stevenson St., Suite 1825, San Francisco, CA 94105. Tel. (415) 777-0220. ■

—Ann Notthoff and Michael L. Fischer, Coastal Agenda 2000 Coordinators

FROM POLLUTION TO PARK

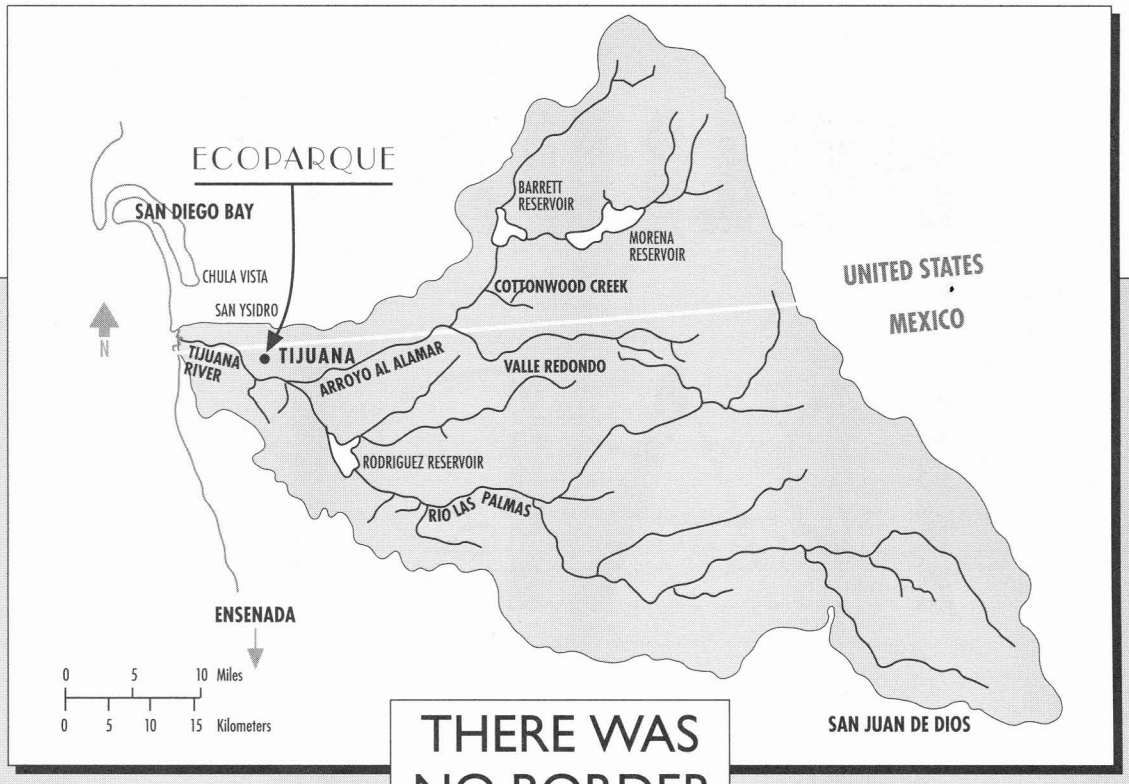
EXPERIMENT IN TIJUANA: A LOW-TECH APPROACH TO WASTEWATER MANAGEMENT

DANIEL F. LUECKE & CARLOS DE LA PARRA

THE ISSUE WAS A FLASH POINT in the debate over the North American Free Trade Agreement (NAFTA): water pollution along the U.S./Mexican border in general, and sewage treatment—or the lack of it—in particular. In California, most of the attention has been on Tijuana, Mexico, and the untreated wastewater that has fouled wetlands and beaches on both sides of the border for decades. The problem has grown along with population on both sides of the border—despite years of effort to find a solution.

The conventional method of dealing with wastewater is treatment followed immediately by disposal. Subsidies for water supply and wastewater treatment, direct and indirect, disguise their true costs. Rarely is wastewater considered as a resource, even more rarely as a potential economic benefit or public asset. Proposals for recycling treated effluent evoke suspicions, even fear. Most of Tijuana's fresh water is imported, used once, then finds its way into the ocean, either through deliberate discharge after treatment or without any treatment at all.

Now, a low-cost wastewater treatment and reuse facility on a Tijuana hillside is demonstrating that the pollution problem can be significantly alleviated by means of an inexpensive alternative system; and that treated effluent can be used for landscape irrigation, creating green space in an otherwise



THERE WAS NO BORDER

WHEN ECOPARQUE WAS DEDICATED in Tijuana, there was no border. People of Mexico and the United States, as well as government, academic, and citizens organizations from both countries, had worked together toward a solution to a common problem. The project's vision encompassed the Tijuana River watershed, without regard to the arbitrary lines of administrative and political convenience.

Geography demands a bi-national water management effort. No wall or fence can prevent the destruction of valuable wildlife habitat and recreational area by pollution, erosion, and sedimentation. More effective use and re-use of resources in Mexico will benefit inhabitants of both countries, and vice versa.

Since 1980, the California State Coastal Conservancy has been a leading source of funding, energy, initiative, and support for protection of the Tijuana River and its estuary. The Conservancy has spent nearly four million dollars to acquire land, research wetland restoration, carry out demonstration projects, assess environmental impacts, provide public access, and educate the public in the Tijuana National River Estuarine Research Reserve. Ecoparque, supported by half a million of these Conservancy dollars, represents the most recent and successful of its efforts to address the problem of negative impacts on the estuary directly. Ecoparque demonstrates what can be done. It is a working model, now ready to be replicated. To be sure, this one small treatment plant can process only a tiny proportion of the city's wastewater. It is not the whole answer to the huge problem it addresses. But it turns a problem (untreated sewage) into a public asset (water and fertilizer) and is a pioneering effort to set a new course.

The edges of things are where the action is: frontiers, cellular walls, modern art and music, the littoral where the sea meets the land. In such places there is opportunity and risk, possibility and uncertainty; there are problems and there are solutions. That is clearly evident in the Tijuana River watershed.

—*Peter Grenell*

barren urban environment. The Environmental Defense Fund (EDF) and El Colegio de la Frontera Norte (COLEF, a Mexican applied research institute specializing in border issues) have teamed up with the California State Coastal Conservancy in this project, launched more than a decade ago at the initiative of the Southwest Wetlands Interpretive Association (SWIA), a citizens organization in the border city of Imperial Beach. Getting the project up and running has taken almost ten years of work by a diverse international alliance of individuals and institutions, both public and private. The new facility finally opened in October, eloquent testimony to their collective patience and persistence in overcoming seemingly endless financial and logistical roadblocks.

THE CITY THAT GREW TOO FAST

Tijuana, the second largest city on the Californias' coast, has a population of more than 1.2 million, expected to double by the year 2010 if present trends continue. For the last two decades the annual growth rate has exceeded five percent, overwhelming the urban infrastructure, including water and sewage systems. Many dwellings are not connected to sewers; treatment facilities cannot cope with the ever-growing volume of waste water.

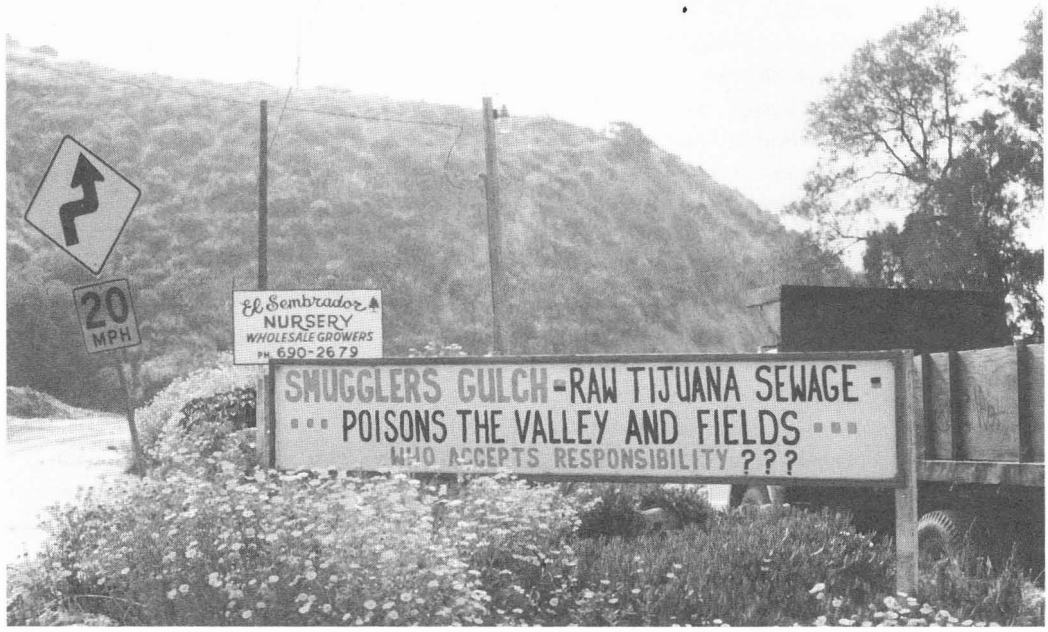
The city's early residents settled along the valley of the Tijuana River, at the base of its bordering hills and steep slopes. Within the last 30 years, however, subdivisions and densely populated squatter settlements spread to the surrounding hilltops and canyons. Water and sewage systems had to be installed in very difficult terrain; in some cases they were never built at all. As the hilltop population grew, interceptors were overloaded and the canyons became wastewater canals draining into the Tijuana River.

In the early 1980s, the problem took on international proportions. The river and "renegade" flows of untreated water in the canyons began to carry as much as four or five million gallons of sewage across the border into the U.S. Tijuana River National Estuarine Reserve, a major wetland preserve, habitat for many migratory and resident bird species, some of them endangered. The spillage across the border prompted strong protests from environmental organizations and individuals in the United States—particularly in the border city of Imperial Beach, where environmental, health, and economic concerns converged as polluted beaches were closed.

Old Slough, in the Tijuana River Estuary, site of a future Coastal Conservancy restoration project

DEWEY SCHWARTZENBURG

After sewage-laden flood waters drenched the Tijuana River Valley in January 1993, causing much misery to residents of the flood plain, signs blaming "environmentalists" appeared in the valley. These are among several posted on private property along Monument Road, which runs along the U.S.-Mexico border.



KARYN GEAR

Tijuana's reliance on an international interceptor, the so-called "emergency connection," added another dimension to the border pollution problem. With the city's pump station and other facilities overloaded, the connection carried some 13 million gallons per day (MGD), about 60 percent of Tijuana's sewage, into the San Diego metropolitan sewage system, to be treated at Point Loma. The system had been built in 1965 by the International Boundary and Water Commission (IBWC) as a 20-year temporary backup to the Mexican system. In 1983, Mexico began to expand Tijuana's disposal system to accommodate all of the city's wastewater. A treatment plant has since been built on the coast, south of the city, but Tijuana's treatment needs have already exceeded its capacity. In addition, the plant discharges into a shallow nearshore area.

Public pressure for urgent action continued to mount in the United States. With the conclusion of the 1983 La Paz Agreement on environmental border issues, the city of San Diego, with the support of the U.S. Environmental Protection Agency, issued a counter-proposal to solve the border sewage problem. The plan called for an ambitious joint international facility that could treat 100 MGD from Tijuana and up to 30 MGD from the South Bay area of San Diego County. Disposal was to be into an ocean outfall. The total cost of the proposal was a staggering $729 million, almost one-third of it for interceptors and treatment facilities for Tijuana. For Mexico, the new system's operating costs alone are expected to exceed the total costs of Tijuana's current water and sewage system.

A NEW CONCEPT TAKES SHAPE

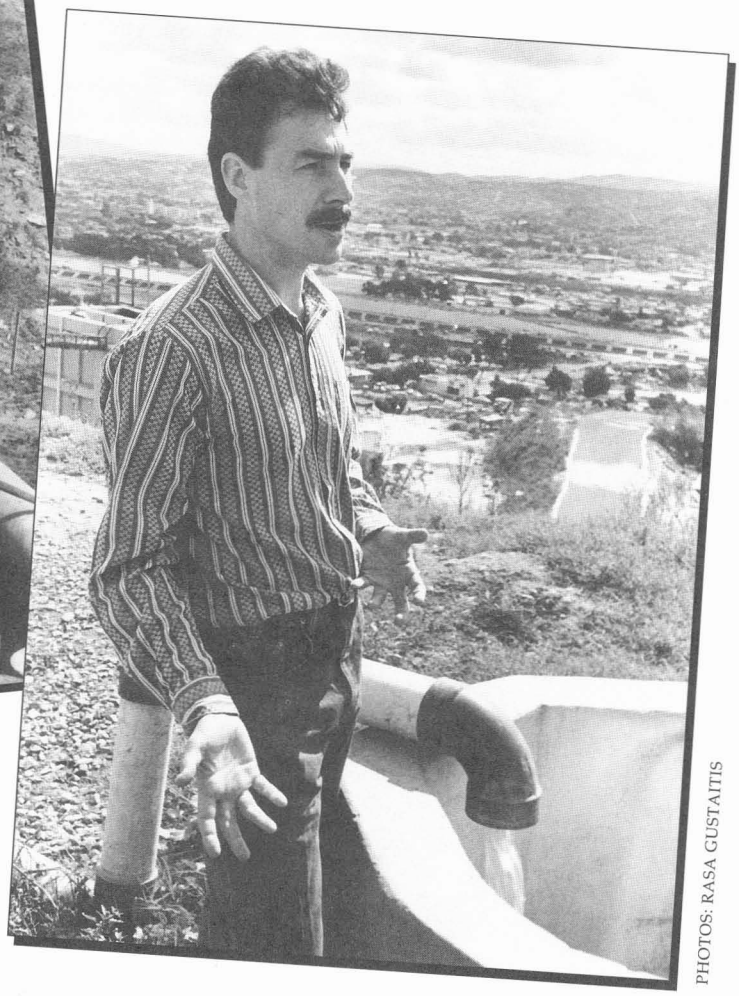
In Imperial Beach, concern was growing over the enormous costs of the border treatment proposal and the prospect of building yet another ocean outfall to dispose of imported water. SWIA, a local nonprofit organization that had played a key role in the successful struggle to establish the Tijuana National Estuarine Research Reserve, sought and obtained funds from the California State Coastal Conservancy to study the problem. The result was an imaginative design for an alternative technology, relatively low in cost and simple to operate, but capable of treating concentrated wastewater efficiently. If successful, it promised to be a model for use elsewhere in Mexico.

The Coastal Conservancy saw enough potential in the plan to provide SWIA with funding for a first phase demonstration project, and

construction began in July 1984. The facility consisted of two easily maintained parts: a fine stainless steel screen, widely used in industry to separate solids, and a plastic biological filter to which bacteria adhere. The bacteria remove dissolved organic matter from wastewater as it trickles through the filter. The plant was built on the U.S. side of the border on land leased by a farmer from the International Boundary Water Commission (IBWC), adjacent to the emergency connection. It used water diverted from the connection. To build and operate the plant, SWIA hired a group of consultants from the U.S. and Mexico that included a staff member from COLEF.

Because wastewater from Tijuana is highly concentrated, some skeptics doubted that the design could perform well. But during a six-month trial period, the two components proved to be very effective in treating wastewater flowing though the emergency connection. In fact, the initial test phase was so successful that SWIA proposed a second phase, with additional treatment components. SWIA again approached the Conservancy for funding, and then asked EDF to help direct the expansion.

In spring 1986, EDF and the Conservancy signed a contract. Shortly after the new construction began, however, U.S. IBWC Commissioner Joseph Friedkin, who supported the project, retired. Acting Commissioner D.C.



Organic solids are separated from the wastewater stream by a screening unit (left) and composted. Carlos de la Parra (right) explains that the Ecoparque system can operate without electricity or any mechanical parts, using gravity and biological processes. All parts of the treatment process are easily visible.

PHOTOS: RASA GUSTAITIS

McNealy refused to extend the lease on the land occupied by the plant. EDF reluctantly dismantled the plant, stored the components, and began to search for another location. Unable to find a suitable site on the U.S. side of the border, EDF and COLEF, with Conservancy approval, decided to seek one in Mexico.

BUILDING THE PLANT IN TIJUANA

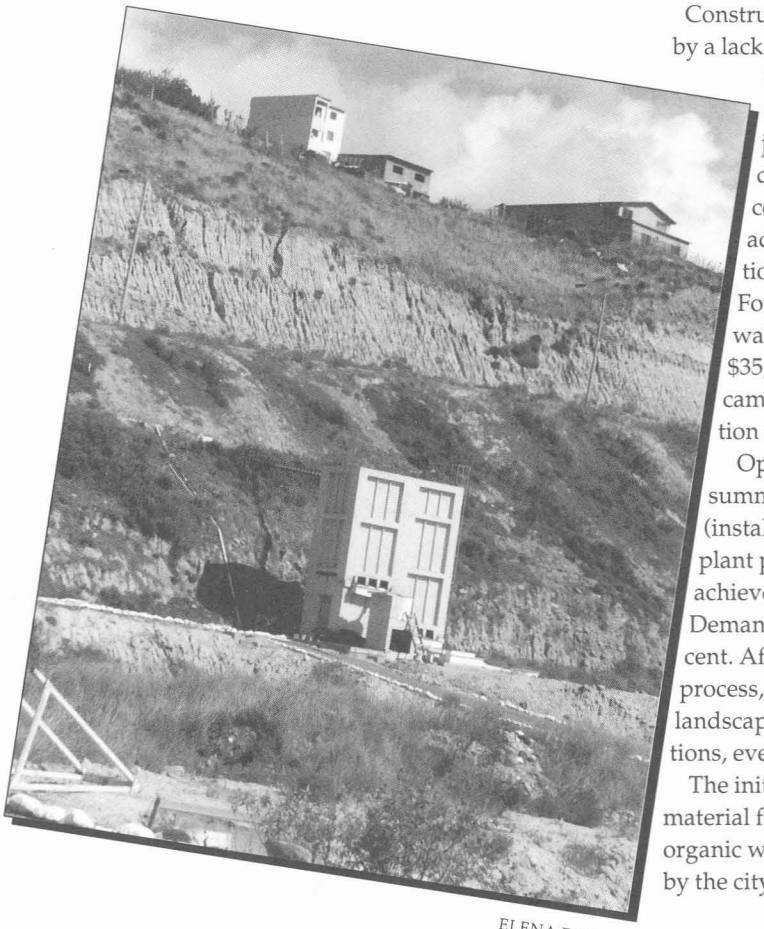
Making the transborder move possible wasn't easy. It required the active participation of both the government of Mexico and the State of California, as well as of San Diego State University. The federal government of Mexico gave COLEF the use of a 23-acre parcel of land for five years, the California Attorney General's office gave the Coastal Conservancy special authorization to fund an out-of-state project, and San Diego State allowed EDF to move the plant equipment and construction materials across the border, duty free, under an existing arrangement between the University and COLEF. The new plant location, on a hillside facing south over the river valley, was in a section of Tijuana known as Colonia Buenavista. The land itself was vacant, little more than a casual dump and community eyesore below a modest neighborhood, the Colonia Buenavista, and directly below a highway. The site overlooks the Tijuana River and the city's downtown.

In early 1987, EDF and COLEF began to design and construct the new treatment plant. Like the original one, it contained a screening unit and a biological filter. These components were followed by a settling basin, where solids collect and are easily removed, and a composting unit. Space was also set aside for an artificial wetland as a final treatment unit, to be built later as funds become available.

Construction was interrupted for two years by a lack of funding. The funds remaining in the contract with the Conservancy were sufficient to complete the project at its original site north of the border. They did not suffice to cover the costs of the move to Mexico and of adapting to a new site and new conditions. Eventually the General Service Foundation, which had supported EDF water projects in the past, offered $35,000, and the Coastal Conservancy came in with another $88,000. Construction was completed in 1991.

Operational testing was completed in summer 1993. With one modification (installation of a recirculation system), the plant performed very efficiently. It achieved reduction in Biochemical Oxygen Demand (BOD) in the range of 80 to 85 percent. After passing through the treatment process, wastewater was suitable for reuse in landscaping and might, under certain conditions, even be acceptable for irrigating crops.

The initial plan also called for mixing solid material from the screening unit with other organic wastes to be delivered to the plant site by the city public works department. The



ELENA EGER

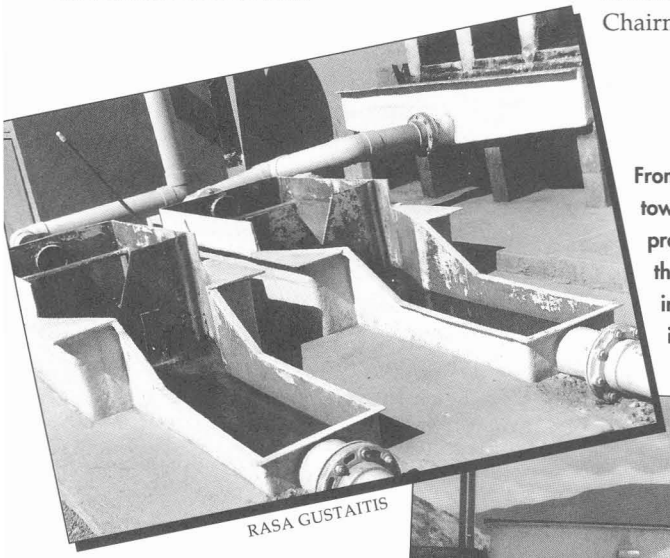
Ecoparque treats water diverted from city sewage pipes serving homes on the steep hillside above it. This tower houses the biofilter, heart of the treatment process. Microorganisms adhere to a plastic filter inside the tower and remove dissolved organic matter from the wastewater as it trickles through.

off-site wastes were not satisfactory, however, because they often contained plastic materials and other litter that would have required off-site separation. Composting was stopped until the Coastal Conservancy, in April 1993, offered to provide additional funding of $9,700 for needed equipment.

Although still in the development stage, the project can now be called a success. The plant is doing the work for which it was designed, and it promises to be self-financing. Treated water is already irrigating several acres at the site, now landscaped with native vegetation, and 15 of the original 23 acres have been ceded permanently to COLEF. A contract for the sale of water to be used for off-site irrigation is being negotiated with the city of Tijuana. The income will be used to expand the plant and add an artificial wetland and several ponds. The ponds will serve as reservoirs for the wetland's effluent and as sites for aquaculture experiments, and, by increasing the effluent's exposure to the sun's ultraviolet light, they will provide a measure of disinfection.

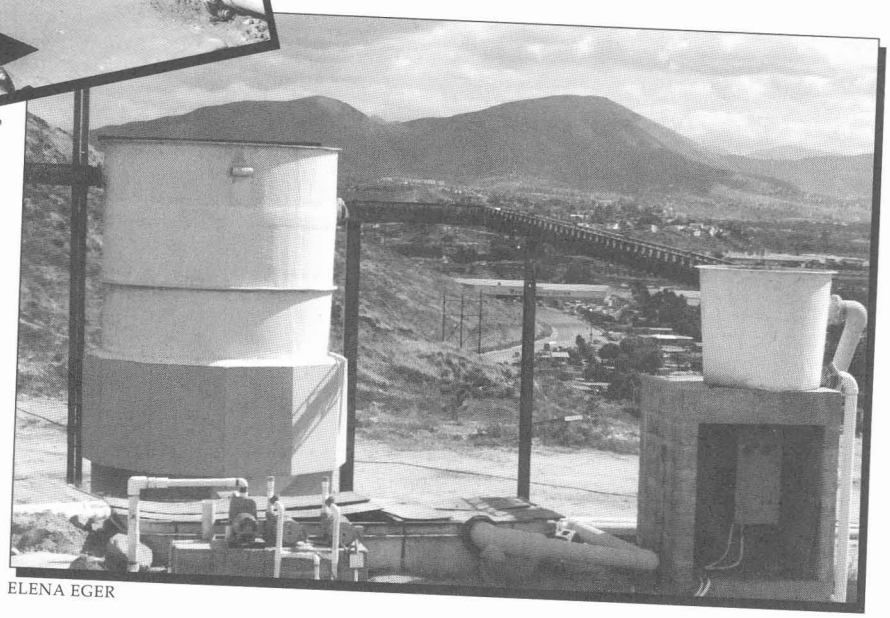
The plant is now surrounded by grass, small trees, shrubs and flowers, a rare and welcome green space in Tijuana. Named Ecoparque, the site is also a laboratory for examining ways to transform the undesirable byproducts of urban growth into useful resources. Above all, the plant is achieving the project's primary goal, to reduce the untreated wastewater reaching sensitive and shallow coastal waters.

When Ecoparque was officially opened in October, among those in attendance were U.S. State Department Counselor Tim Wirth, COLEF President Jorge Bustamante, EDF Executive Director Fred Krupp, the Conservancy's Chairman Penny Allen and Executive Officer



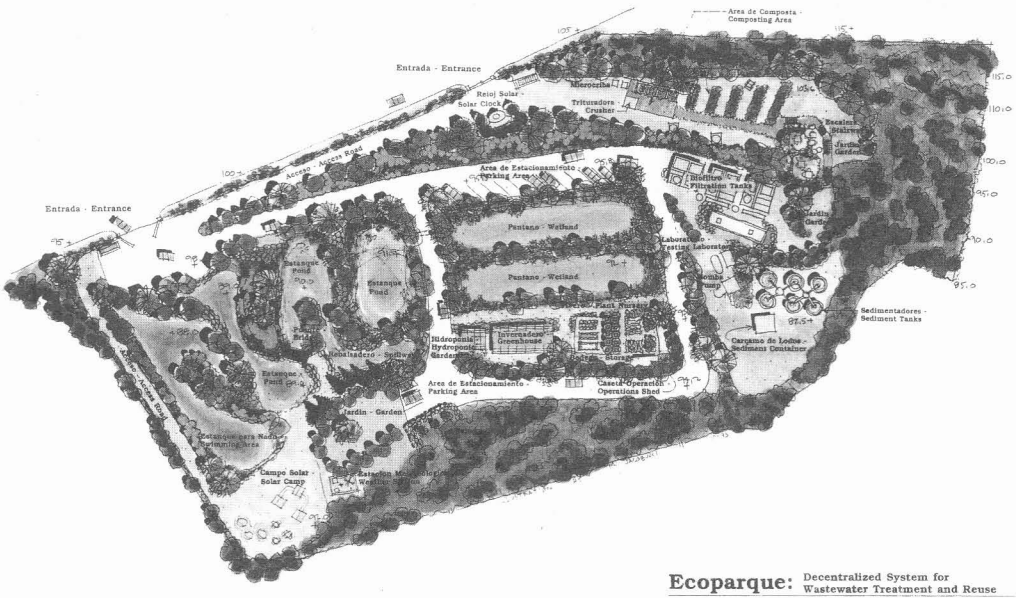
RASA GUSTAITIS

From the biofilter, water moves through weirs toward the clarifier, a large tank in which solids produced during the biofiltering process settle to the bottom. The water is now suitable for reuse in landscaping. It is turning a barren hillside into a green and blossoming park.



ELENA EGER

EL COLEGIO DE LA FRONTERA NORTE
ENVIRONMENTAL DEFENSE FUND



Ecoparque: Decentralized System for Wastewater Treatment and Reuse

Plans call for expanding Ecoparque as a demonstration of development in harmony with nature. They include the addition of a man-made wetland, improvement of the nursery now on the site, an experimental solar field, and educational and training programs that could catalyze more Ecoparques.

Peter Grenell, as well as many other citizens of both countries.

LOOKING AHEAD

In addition to adapting the site to a permanent project (the plant was designed initially as a temporary demonstration plant), long-term planning includes gathering data for the design and implementation of similar systems in other locations, expanding the treatment plant at its present site, completing the park/wetlands/pond complex, and installing solar and wind powered units for water management. A greenhouse, now under construction, will test the potential of reclaimed water for use in growing food in urban areas.

Over the long term, the project can serve as a model for the rest of Tijuana, other cities along the U.S./Mexican border and elsewhere in Mexico, and eventually developing countries around the world. Another valuable outcome of the project, initially unanticipated, is the experience of creating a successful working relationship between a U.S. nonprofit environmental organization and a Mexican research agency. Important in its own right, it is perhaps even more so given the significance of environmental problems along the border and the need for new joint procedures under NAFTA.

The project's prospects for long-term success are greatly enhanced by the direct involvement and support of a number of Mexican governmental agencies. The Secretaria de Desarrollo Social (SEDESOL), Comision Estatal de Servicios Publicos de Tijuana (CESPT), and the governments of the state of Baja California and the city of Tijuana have supplied the expertise, funds, contributions in kind, and political support necessary to make this unprecedented transboundary experiment possible.

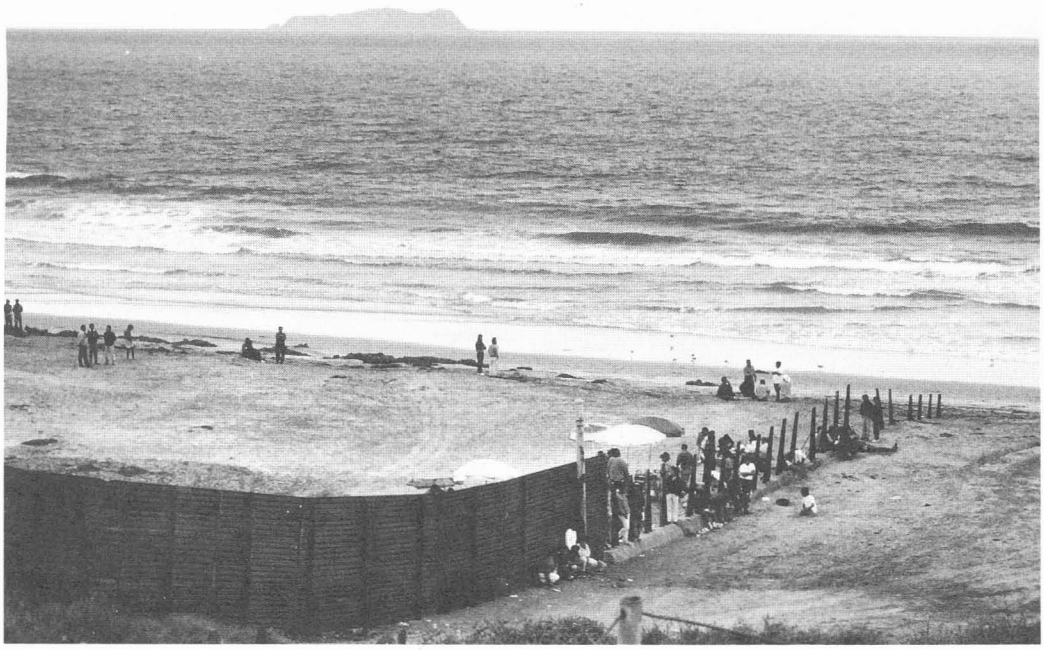
In light of the frustrating history of efforts to solve border pollution problems, this small plant at Colonia Buenavista might appear to be no more than a glimmer of a new possibility. In light of this project's record, however, we believe that this model plant presents an effective option, and a useful model for others. ■

Daniel F. Luecke is senior scientist at the Environmental Defense Fund, director of EDF's Rocky Mountain regional office, and EDF project manager for this demonstration project.

Carlos de La Parra is the director of Ecoparque and a researcher for El Colegio de la Frontera Norte. He holds a degree in civil engineering from the Instituto Politecnico Nacional in Mexico City.

FROM
POLLUTION
TO
PARK

DEWEY SCHWARTZENBURG



La Playa at the new U.S. border fence (now being extended into the ocean). People are waiting for darkness to cross.

REFLECTIONS IN THE REAR VIEW MIRROR

A Border Crossing

JIM KING

FROM A DISTANCE a patch of green appears on the southern slope of a barren ridge. A cloudless blue sky caps the brown and dusty Baja landscape. We're bouncing along on uneven pavement in heavy traffic on the Via Rapida. We're celebrating the opening of Ecoparque, a low-technology decentralized system for wastewater treatment funded by the Coastal Conservancy and constructed by the Environmental Defense Fund and El Colegio de la Frontera Norte (COLEF or College of the Northern Frontier, in Tijuana). An interesting group we are: California Senator Lucy Killea and members of her staff, Coastal Conservancy board members Penny Allen and Margaret Azevedo, Candice Ricks of the Tijuana River Valley Equestrian Association, alternative wastewater gurus Jack Laughlin and Michael Killigrew, environmental educator Pat Flanagan, San Diego State University Professor Emeritus Charles Cooper, and Charles Fisher of the International Boundary and Water Commission, among others.

My eyes are wide open. I've worked on projects just north of the border for five years but this is only my second trip across to Tijuana. Others in our group are on equally foreign ground. First sight in Mexico are the vendors, hawking their wares to the occasional passer-by. Border arcades are empty of tourists today. Then there are the buses, all sizes, ages, and colors. The predominance of the Spanish language on the signs reminds me of San Francisco's Mission District, or East Los Angeles. It's funny, the Spanish signs, the people mak-

ing their way, the stuff in the air. This place does feel like Los Angeles.

The Los Angeles River? No, it's the Rio Tijuana and it's confined in a concrete channel just like the famous ditch to the north. I wonder if it's maligned by the locals like the Los Angeles River; I wonder if it's also undersized for a 100-year flood? (*Coast and Ocean*, Summer 1993, p. 8) The similarities with Los Angeles don't stop with the air and the concrete river. As we ride along, we see an impressive array of high- and low-rise office blocks, hotels, and shopping centers congregated along the Rio Tijuana flood plain. I'm told there are fancy Mexico City franchise restaurants in Tijuana now, and department stores, and esoteric yuppie cafes. Tijuana is no nickel-and-dime donkey town anymore; it's clearly grown up. We notice.

We notice other things too. The hillsides tell another story—one of difference, not similarity. A jumble of fragile little houses jutting out precipitously on a ridgeline; the steep hill slopes and canyons carved by tiny lot subdivisions, dirt paths interconnecting—here and there roadways wet with running sewage. Old tires—hundreds of old tires—provide the bank reinforcement to make a tiny hill plot big enough for a little house. And then there's the garbage, filling the rivulets and spaces open to the sky; there are the trash fires smoldering to a blue haze in the afternoon sun. This isn't El Norte, the United States; this is a Tijuana *colonia*, home to new immigrants from the heartland of Mexico. I'm told the hills and valleys surrounding Tijuana support hundreds of colonias, home to hundreds of thousands of people. We are ten minutes from San Diego's cookie cutter streets and uniform building standards but this looks like the other side of the world—Jakarta, Cairo, or a lot of other distant cities. This we expected. We're U.S. citizens in a foreign land; a world away and just ten minutes from the picture-perfect U.S. dreamland.

The green patch in the desert gradually comes into focus as we leave the highway and make our way through a congested commercial and residential district. Open-air cafes along our route offer tacos and fresh fruit ices, but we don't stop. The green hillside is where we're headed. What a delight it is to arrive and see that there's not only green chaparral but flowers blooming, and fruit trees, and lovely new lawn. Ecoparque is located on a large open tract of land on the south-facing slope of Otay Mesa. Ecoparque is the culmination of many years of hard work made possible by the vision and stamina of the State Coastal Conservancy, the Southwest Wetlands Interpretive Association, the Environmental Defense Fund, and the Colegio de la Frontera Norte. Though I've only watched the project from a distance, I feel pride that something important and productive has happened here. There have been too few instances for celebration along the U.S./Mexican border in recent years.

We get off the bus and find ourselves in a Disney-like center of alternative wastewater technology, complete with bilingual welcoming committee, guides, and brochures. Fresh gravel footpaths lead downslope past various components of the treatment plant and the gardens where reclaimed water from hilltop neighborhoods has been put to work. This water is the life source for native and ornamental plants which stabilize the erodable hillside. At the center of Ecoparque are two large excavated ponds, yet to be filled, and just beyond, overlooking the valley, is a lovely white tent set with dining tables and chairs, a bubbling fountain, bandstand, and podium.

AN AIRY CELEBRATION

It was clear from the beginning that our hosts were incredibly gracious, the site was green and attractive, and that we were to enjoy a memorable and upbeat day. The event was beautifully orchestrated: a press conference, a ribbon-cutting dedication ceremony, speeches, and lunch. A talented translator provided her services throughout the day with hardly a pause to catch her breath.

Surprise, surprise—Ecoparque didn't smell. Maybe its manager, Carlos de la Parra, had an in with the Great One above, maybe it was the lovely sea breeze that blew all afternoon, but Ecoparque didn't smell. Maybe it was the flowery speeches, all expertly translated into

the second language. Timothy Wirth of the U.S. State Department was the highest ranking U.S. government official present. He deftly responded to the rapid-fire queries of the mostly Mexican press corps and asserted that Ecoparque "... is exactly the kind of cooperative program that we believe we will see many more of with the passage of NAFTA."

The message of Ecoparque's manager Carlos de la Parra was short yet eloquent and it captured the spirit of the day: "There's magic on this green hillside. Projects like Ecoparque can bloom all around Tijuana and all around the world." Tijuana Mayor Hector Osuna shared lunch and a glass of wine with Imperial Beach Mayor Mike Bixler. The wine had been produced in Baja California by the Colegio de la Frontera Norte.

It was a wonderful day. Yet this project only represents a fragile beginning. Will there be more Ecoparques in the Tijuana River watershed? In November 1993, Mexican officials announced tentative plans for additional projects. Now it's time for others to follow the Ecoparque example, take the ball, and run with it. We've seen that Mexicans and U.S. citizens can work effectively at solutions.

Soon we were back on our white bus, heading back north. I studied the scene intently. As we wound our way through the San Ysidro Port of Entry, past the hawkers and homeless mothers begging, a U.S. Army helicopter hovered overhead. I thought of how the Spanish term for "border"—*frontera*—captures the feeling of the place. I knew my up-to-date California driver's license and light complexion would see me through the immigration inspection in nothing flat—lucky thing. The whirl of the big green blades overhead reminded me just how far we have to go to turn things around at the border.

Mexico's problems are monumental. Here in the U.S., many infrastructure problems seem to have been solved, but sometimes that's just an illusion. We have some monumental problems of our own. San Diego's own sewage problem is noteworthy. As we approach the 21st century we begin to see, in many spheres, that problems in the United States, in Mexico, and elsewhere—and also their solutions and our destinies—are intertwined more than we ever imagined.

Capable Mexican people are working on the sewage crisis, and we can help in spite of our differences and our history of misunderstandings. Friendship aside, helping Mexico with solutions is clearly in our own interest. We're neighbors sharing finite resources. The communities of southwest San Diego County need relief from continuous sewage contamination. The wildlife at the large, still viable Tijuana River Estuary—located entirely within the United States—depends on it.

DEWEY SCHWARTZENBURG

We celebrated inside white tents, with music, food and good wine.

Once all Ecoparque performance evaluations are completed later this year, the International Boundary and Water Commission, together with U.S. and Mexican environmental agencies, can assess the best role for this alternative technology on the palette of possible solutions. There is no time to waste. As Carlos de la Parra expressed, there is magic at Ecoparque. The world is begging for it. ■

Jim King is the State Coastal Conservancy's project manager for the Tijuana Estuary

Steps Toward Living with the Watershed

YOU HAVE TO BE A VISIONARY to imagine a sustainable community extending across the U.S./Mexican border. A sustainable community is one that lives within the limits of its natural environment. It's a wonderful concept—but *here?*

Michael and Patricia McCoy qualify as visionaries, but they also have a solid foothold in the practicalities of life. Slowly, step by step, they have moved their bold idea forward. The first step was to win federal protection for the Tijuana River Estuary; the second was to build and test out an inexpensive technology for treating sewage as a resource, thereby helping to solve one of the most intractable pollution problems along the border. Next they hope to see a water management plan that comprises the entire Tijuana River drainage basin—not just the one fourth within San Diego County but also the other three fourths, in Mexico. Eventually, they hope to see the watershed designated as a Man in the Biosphere Reserve.

The McCoys settled in the U.S. border town of Imperial Beach in 1971 because they liked the bountiful wildlife in the marshes along the river's mouth, the sandy beaches, and the culture of the border zone. "This is a place where two different life systems interconnect," Michael McCoy, a veterinarian, explained. "It's not like the United States and not like Mexico. It's a special area, created by two cultures coming together." He established his practice in town. Patricia taught English and walked the marsh.

> ....to make human beings compatible with the natural systems they live in.

At the time, the northernmost marshland seemed about to be lost to development. The McCoys joined with other local citizens to found the nonprofit Southwest Wetlands Interpretive Association (SWIA) to campaign for a federal wildlife refuge at the threatened site.

SWIA won that battle. On December 24, 1980, in the last days of President Carter's administration, a deed was signed creating the 505-acre Tijuana Slough National Wildlife Refuge. Shortly after, the National Oceanic and Atmospheric Administration went even further, creating the 2,500-acre Tijuana River National Estuarine Sanctuary, which included the new wildlife refuge and other lands, in both public and private ownership. (The word "Sanctuary" was later replaced with "Research Reserve.")

At this point, McCoy said, "we decided it was time to tackle the sewage problem."

Wastewater pollution had long plagued communities on both sides of the border and was a threat to plants and wildlife in the reserve. Many ideas had been advanced as possible solutions, ranging from the "Back to Sender" proposal, (which would have captured the sewage-laden flow of the Tijuana River and piped it back south across the border) to various proposals for large treatment plants with ocean outfalls. San Diego County accused Tijuana of fouling its beaches, while Tijuana responded that San Diego County's sewage, which received only primary treatment, washed up on Mexico's shores.

The McCoys proposed to demonstrate that wastewater was a resource that could be tapped for the benefit of people and the environment on both sides of the border.

"Our belief was that this had to be a binational effort, and that we had to have a system that could reclaim water, create opportunities for recreation, and provide places for wildlife," McCoy said. "We wanted to develop a technology that would make human beings compatible with biological systems they live in. We wanted to move away from the narrow vision of the traditional treatment plant to one that protects the environment, making man part of the biosphere rather than separating him off. For this we looked at civil engineers and biologists as a team."

In this case, a conventional plant would not suffice to solve the pollution problem, anyway. Tijuana's population growth was outstripping the city's capacity for providing adequate public services. "A good percentage of Tijuana is not plumbed," McCoy pointed out. "It just runs off—into the street, a creek, or a river, or a sump." Many dwellings are not hooked into the city's sewage system but have septic systems, or no plumbing at all. Tijuana's complex problems clearly called for a combination of approaches. As one of them, SWIA proposed a

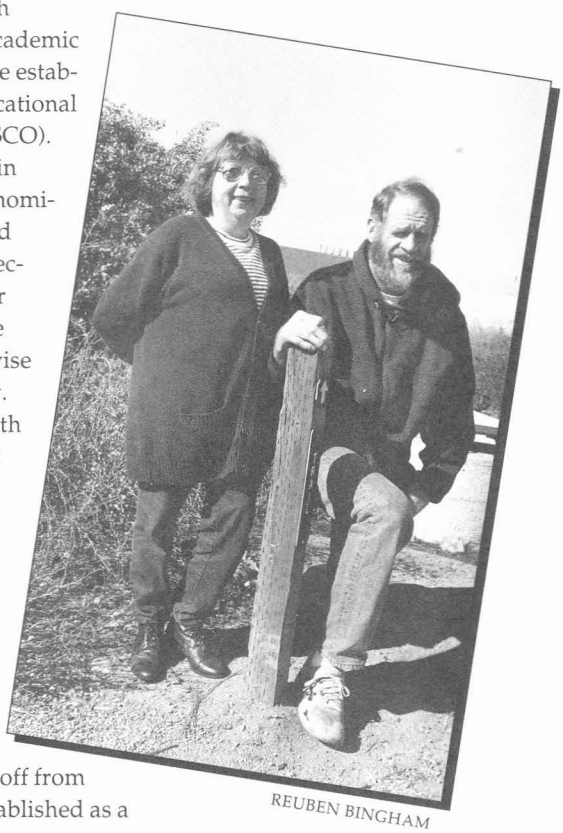
small experimental treatment plant that could capture the renegade sewage before it ran into creeks and rivers. It would have to be small, easy to manage, inexpensive to produce, and buildable in canyons, on hillsides, and in other appropriate areas.

The Coastal Conservancy was interested. It was engaged in a multi-agency effort to protect the biological diversity of the Tijuana River reserve, one of the most important marshes on the Pacific Flyway along the Southen California coast. Impressed by the record of the McCoys and other Imperial Beach citizens in achieving the protection of the estuary, the Conservancy provided initial funding for design and construction of a unique demonstration project. The prototype proved successful with primary treatment. Before tests of the plant's effectiveness for secondary treatment could be completed, however, the Acting U.S. International Boundary and Water Commissioner refused to renew the lease for the site. SWIA tried in vain to find another site in the United States, then decided to look to Mexico. "We turned to the Environmental Defense Fund (EDF), "because SWIA was too small a group to operate outside the U.S." McCoy explained. The Conservancy continued to support the project, through EDF, because it would benefit the estuarine reserve. "If the Conservancy hadn't been there, that plant would never have seen the light of day," McCoy said.

Like everyone else who has been involved with this project, McCoy realizes that Ecoparque is only a tiny piece of the solution to an enormous problem. Many more ecoparques would be required, as well as other decentralized technologies coupled with conventional plumbing and wastewater treatment facilities. A binational commitment to working in equal partnership will be essential. The purpose of this project was to demonstrate an environmentally sensitive technology that now can be replicated, here and elsewhere. In some small communities, on both sides of the border, it could well be *the* alternative to conventional forms of wastewater treatment and disposal.

On October 19, when Ecoparque was officially opened, McCoy was already working on the next step toward the bigger vision. "The plant was one of our first efforts to take an international perspective on watershed management," he said. "It took 23 years to get where we are now. Now we are working to have the entire 1,700-square-mile Tijuana River watershed designated a Man in the Biosphere Reserve. " There are at present 320 such reserves in 83 countries 47 of them in the United States. Unlike many other conservation programs, which exclude human beings from protected areas except as visitors, the Man in the Biosphere program seeks to find a place for local inhabitants as part of the natural resource picture.

Here, along the embattled border? "The problem may look insurmountable to some people," said McCoy, "but I don't think so, with the experience we have had till now and the contacts we have established." The U.S. Environmental Protection Agency has agreed to fund some binational research on the concept through the Southwest Center for Environmental Research and Policy, which includes both U.S. and Mexican academic institutions. Biosphere reserves are established by the United Nations Educational and Cultural Organization (UNESCO). National committees for the Man in the Biosphere program make the nominations. Both the United States and Mexico would have to make the recommendation in this case. Planner Kaare Kjos, who is working on the project, said "We are trying to devise a binational management strategy. We are seeking to demonstrate with a biosphere reserve approach that by participating, having a voice, each interest group can benefit in the long run."


REUBEN BINGHAM

Despite intense human activity at the international border here, much of the Tijuana River watershed is not urbanized. It includes some pristine natural areas, and also a substantial number of indigenous people, who were cut off from relatives in 1848 by the border established as a result of the U.S.-Mexican War.

To Kjos, Ecoparque is "a prime example of how things can be done within the proposed biosphere reserve. It is a good example of a more sensitive technology, and of binational cooperation. It also shows that there is more than one way to deal with issues." ■

—*Rasa Gustaitis*

Read this lest you do more harm than good.

Rescuing Sea Mammals

JOSEPH MORTENSON

IF YOU FIND AN ILL OR INJURED sea mammal along our coast, sometimes you can help save its life. In the past two decades, a number of marine mammal rescue centers have sprung up in North America, and particularly in California. If there is a center near you, it may be able to send a crew to attempt a rescue.

The most important thing you can do if you find a sick or hurt seal, sea lion, otter—or even a dolphin or whale—is to make a set of accurate observations. The marine mammal center will need to know where the animal is, what it looks like, and how it acts. The animal's location must be pinpointed so that the responding team can readily find it. You may want to note numbers on highway markers, landmarks, and other information before you call the center. Many a rescue crew has spent hours far from home fruitlessly searching the wrong beach or headland because original directions were not clear.

Rescue dispatchers may ask callers a standard series of questions. Below are the queries made by the dispatcher at The Marine Mammal Center near Sausalito, Marin County. Based on the answers, the dispatcher may decide to wait for further information or to send an investigator or crew to the scene. The dispatcher notes his or her instructions to the caller on the data form, along with the results of any investigation or intervention.

You need not be able to identify the species yourself when you call the center. But you should be able to describe the animal for the dispatcher. What are its size, weight, and color? Does it have external ears? Does it stand on its front flippers? True seals cannot stand and have ear holes. Sea lions can stand up or walk on their front flippers and have small outer ears. If the animal is a seal, is its coat spotted? Spotted coats distinguish harbor seals from all others. Does it flip sand on its back?

Distressed Animal Report from the Marine Mammal Center in Fort Cronkhite, near San Francisco. The dispatcher fills in this form while speaking to callers.

Initial Caller Information

Date of call _____
Time of call _____
Call taken by _____
Caller's name _____
Caller affiliation _____
Day phone _____
Night phone _____
Other phone _____
Mailing address _____
_____

Animal Description

Length _____ Weight _____
Fur color _____ Vocalizations _____
Have a spotted coat? No ☐ Yes ☐ Not Sure ☐
Flip sand on its back? No ☐ Yes ☐ Not Sure ☐
Stand on front flippers? No ☐ Yes ☐ Not Sure ☐
Have light-colored crest on top of its head?
No ☐ Yes ☐ Not Sure ☐
Any tags on its flippers? No ☐ Yes ☐ Not Sure ☐
Location _____ *Numbers Left* _____ *Right* _____
Colors Left _____ *Right* _____

Animal Location

_____
_____

Animal is on
Cliff ☐
Rocky Shore ☐
Sandy Beach ☐
Dock ☐
Other ☐
Describe _____
How close to the water? _____
Is there 4WD access? _____

Animal Condition

Does the animal move when you approach? No ☐ Yes ☐ Not Sure ☐
Does the animal appear emaciated? Underweight? No ☐ Yes ☐ Not Sure ☐
Have mucous in eyes/nose/mouth/ears? No ☐ Yes ☐ Not Sure ☐
Color/Description _____
Any visible injuries? _____
Is the animal being harassed by people? animals? No ☐ Yes ☐ Not Sure ☐
How _____
How long observed? _____
How long out of the water? _____

KEN BACH/THE MARINE MAMMAL CENTER

This elephant seal is about four days old. It was born on a Marin County beach in mid-February, weighing about 60 lbs. Because a lone birth, away from the herd, is highly unusual, The Marine Mammal Center cordoned off the area to keep away people and dogs. Local residents also helped in the effort.

Elephant seals flip sand and even dig themselves holes in the sand. If it's a sea lion, does it have a light-colored crest on the top of its head? The prominent crest is an unmistakable field mark of the adult male California sea lion.

It is especially helpful if you can tell the rescue dispatcher whether the animal looks emaciated or underweight. An underweight true seal seems big-headed and shows a definite neck and hips. A starving sea lion has ribs showing. The center may ask if there is mucus in eyes, nose, or ears, because this can help determine if the animal is dehydrated or has an infection.

Often animals reported to centers do not need help. This is especially true for harbor and elephant seals. These two species haul out of the sea and then spend their time asleep on a beach or low rocks. To the unsophisticated observer, the sprawled seals seem lethargic or ill. In fact, a quite common question asked at seal haul-outs is, "Are they all dead?" If the alarmed observer had looked more closely, he or she may even report that the seals aren't breathing. But seals sleep with their nostrils shut and may only take a breath every few minutes. Elephant seals can be especially deceptive: They can fall into a deep sleep and be unresponsive even when groups of people are nearby. Sometimes misguided people have actually rolled small elephant seals over, trying to wake them. This is dangerous, for harbor and elephant seals bite and can carry nasty infectious diseases. One should never touch the animals.

Only rescue centers legally approved by the National Marine Fisheries Service are permitted to carry out rescues. The Service issues permits that cover the centers' staff and any individuals that act as deputies. There are excellent reasons to restrict rescues to the centers, since experience and adequate facilities are needed to save animals. Sometimes, strength and special equipment are also necessary. Trying to coax a 300-pound elephant seal

A sea otter pup was trapped in an old cannery structure at low tide in Monterey Bay. Monterey Bay Aquarium staff netted and released it. The pup rejoined its mother in the bay nearby, off Cannery Row.

MONTEREY BAY AQUARIUM

THE MARINE MAMMAL CENTER © 1989

An injured California sea lion stuck in a mudflat presented a difficult challenge. Herding boards were used to capture it.

yearling onto a litter with wooden shields can be an art. Carrying the struggling seal up a steep bluff to the center's pickup is a test of strength. Getting the seal out of the litter into the special lightweight transport cage on the highway edge takes fine teamwork. Once the seal arrives at the center, it will need testing, diagnosis, medication, and feeding.

Infant harbor seals are a special case. Sometimes people find apparently abandoned harbor seal pups on a beach or accessible rocky area. Often the reason the pup seems alone is that the people have frightened the mother off, and she is waiting unnoticed in the surf near by. In other cases, mother harbor seals have briefly left their babies at haul-outs or rocks to go feed. Thus, you cannot assume that healthy looking pups are abandoned. If you are concerned, however, telephone the center so that the rescue coordinator is alerted and a clock for any potential problem is started. Centers will often dispatch one of their watchkeepers or a trained local volunteer to guard the pup and to keep people out of its area. The length of the watch depends on the pup. For example, if the pup's eyes are moist, that means the mother has fed it within the last 12 hours. Such pups may not be picked up until a day has passed and the dispatcher feels certain the pup is actually abandoned. A dehydrated pup with dry eyes may be picked up right away.

Harbor seal pups require intensive care and special rich diets. Although they are wonderfully cute, no one should take one home. To do so is strictly illegal and typically kills the animal through starvation. Also, very young pups are especially susceptible to infection from humans since their immune system may not be fully functioning. People pick up young seals, hugging and kissing them, and taking them far from their mother. Subsequently rescued by a center, the pup may die weeks later from human pathogens. Sometimes people wrap the pup in a blanket, which can cause it to overheat and lead to brain damage. The infant seal ward of the local marine mammal center is isolated from visitors and is staffed for round-the-clock care by specially trained workers: That's where orphan seals belong.

If you see people holding or carrying a pup, it is best to talk to them, informing them about pups and about rescue centers. Some people may not be cooperative. Do not try to restrain them or enforce animal protection laws yourself. Get a local ranger or deputy, if possible, or telephone the marine mammal center. Make a note of the incident and copy any visible license plate numbers to report to the center. The federal Marine Mammal Protection Act is enforced by personnel from the National Marine Fisheries Service. Officers from the Service heavily fine individuals whom they suspect of knowingly violating the act.

DOLPHIN FIRST AID

Whales and dolphins are only rarely rescued. Since they do not come ashore, they simply are not observed as often as seals and sea lions. But occasionally, ill individuals are sighted, and more rarely mass strandings are reported. Although rescue center personnel do attempt captures or treatment of sea mammals on land,

California Marine Mammal Centers

CENTER	AREA	TELEPHONE
Sea World of San Diego	San Diego County	619/226-3893
Friends of the Sea Lion	Orange County	714/494-3050
Marine Mammal Care Center at Fort MacArthur	Los Angeles County	310/548-5677
Marine Mammal Center, Sausalito	San Luis Obispo County to Del Norte	415/289-SEAL
North Coast Marine Mammal Center	Del Norte County	707/465-6265
American Cetacean Society	Santa Barbara County	805/687-3255

they seldom do so in the water, unless the animal is extremely feeble. In its own element, even a sick animal could endanger well-trained volunteers. The spectacular West Coast exception to the rule about rare whale rescues is Humphrey.

In 1985, this humpback whale swam into San Francisco Bay and up the Sacramento Delta. Rescuers finally coaxed him back to sea by herding him along with a combination of pleasant and unpleasant sounds. In 1989, Humphrey went into Bodega Bay and stranded on a mud flat before freeing himself. A year later, he returned to San Francisco Bay and got stuck in a mud bank near Candlestick Point. In this case, rescuers from The Marine Mammal Center and the U.S. Coast Guard managed to tow him free. If you do find a stranded dolphin, you might take some preliminary steps to help it. If possible, gently turn the animal upright. Do not let the dolphin lie on its side because this will crush or break its pectoral fin. Keep the animal cool and moist. Construct a shelter to shade the dolphin, if you can. Don't let water down its blowhole as the animal may drown. Dig a trench under the front flippers to relieve pressure on these fins. If you find a whale, all of these steps are beneficial, but can be dangerous since a whale can unintentionally crush a rescuer. Don't take risks. Stay away from any parts of the animal's body that are in water. And watch out for those powerful tail flukes. Contact your local marine mammal center. They are the experts and will certainly send out a team for any stranded whales.

WORKING WITH RESCUE CENTERS

Anyone who reports distressed animals helps in rescues. But you can also formally join a rescue organization and regularly work as a caregiver, a trained watchkeeper, or field investigator. Volunteering at the center itself allows you to be in very close contact with sea mammals. Volunteers often make a one-day-a-week commitment as rescuers, medical team members, or docents. The intensity of commitment can be impressive. For instance, 600 volunteers serve The Marine Mammal Center near Sausalito, enabling the center to deal with more than 700 patients a year.

Centers can use reliable observers in the field, especially in remote areas. It is costly to send a crew a great distance, and an accurate advance report can determine whether and what kind of rescue is advisable. Experienced observers can also instigate and keep watches over pups and other potential problem animals far from the center. Sometimes centers offer courses in field evaluation, which are helpful for new observers.

Marine mammal centers treat the effects of problems, not their causes. By accurate field observation we can occasionally detect causes. If we identify a cause, sometimes we can eliminate a problem before its effects turn up at the marine mammal center. Many of the injuries and illnesses seen at centers result from people and their pollution of the world. Anyone who has seen a gunshot wound to the head of a young sea lion or a perforated skull in a harbor seal pup attacked by a dog wants to work on behalf of marine mammals. ■

Joseph Mortenson lives in Bodega, where he is working on a series of field guides for environmental activists.

When brought to The Marine Mammal Center, harbor seal pups are put in quarantine for protection. They are born with incomplete immune systems.

JANE OKA, THE MARINE MAMMAL CENTER © 1990

Pleasures of the Urban Wild

LIZA RIDDLE

THERE IS A WILD FEEDING FRENZY at Lake Merritt today. More than 200 sleek black cormorants are sweeping down the north arm of the lake, herding fish in their path, diving, one after another. Some work together, forming an inverted "V" to funnel the fish before them. Most are too excited to organize; they dive, one after another, frantic birds that must be colliding underwater as they chase down their prey. Fifty chunky, graceless brown pelicans dive bomb the lake, crashing through the surface with their enormous beaks wide open, their lizard-like pink throats fully distended. Hundreds of ring-billed gulls circle, dashing after scraps dropped in the frenzy, their calls piercing the air. Joggers stop their maniacal, drone-like physical mantra; mothers with strollers stop along the path; workers, like me, in office buildings overlooking the lake, stop working, stunned by the spectacle below.

Lake Merritt, in downtown Oakland, offers the kind of restoration challenges the Coastal Conservancy's resource enhancement program strives to achieve. The Conservancy has funded two projects here. One, completed in the early 1980s, improved habitat on the man-made islands on the southern arm of the lake, beyond my view, where black-crowned night herons, egrets, and Canada geese nest each year; the other, a plan completed last year, made recommendations for improving water quality, which are now being considered by the City Council.

Lake Merritt was once an arm of the Oakland estuary, connected to San Francisco Bay and fed with fresh water by two creeks. Salt and freshwater marshes occurred in pockets along its rocky shoreline. It has since been modified, manicured, and transformed to an urban "water feature." To call any of it a wetland now would be "a stretch," says the City of Oakland naturalist for Lake Merritt, Richard Kaufman. Most of the lake is edged with hard, unyielding concrete; the path around it attracts a wide variety of people. The creeks, mostly channelized, bring trash, urban effluent, and sediments after every storm. A bridge at the lake's western edge spans the concrete channel that now provides the only connection to salty San Francisco Bay waters.

Yet, when the tide changes, I have watched water gushing through that narrow connection; I see the water pulled by the moon and sun. According to my tide book, it is now low tide at the Golden Gate Bridge, five miles closer to the ocean. Was this school of fish swept up and then funneled by the tides toward that narrow connection and a cormorant receiving line? Does this feeding frenzy occur throughout the year, or are these fish drawn by ancient forces to their favored feeding grounds only in fall? How important is Lake Merritt as a link in California's chain of coastal wetlands that provide stopover and refueling ports for migratory birds?

Urban wetlands, remnant wetlands, pristine wetlands, a tiny wetland fragment or an entire watershed—the Conservancy has worked on them all. Since 1978, the Conservancy has undertaken more than 147 projects to restore and enhance more than 24,000 acres, spending more than $46 million dollars. Its first efforts were the first wetland enhancement projects undertaken by anyone in California, and perhaps the first in the nation. Long before "wetlands" became a household word, Conservancy staff were working with engineers trained only to fill mucky shoreline habitats, trying to persuade City and County staff that a "stinking bog" could be a community asset. Aided by local activists, biologists, and birders, the Conservancy cajoled, persuaded, and—by some miracle—has now implemented wetland enhancement projects in every coastal county in California.

The agency looked beyond urban grime and recognized that wetland fragments, such as those on Lake Merritt, still provide critical nesting and feeding areas for wintering waterfowl. (Last year, a dozen pairs of Canada geese nested at Lake Merritt; four to five hundred geese are permanent residents. There are usually 100 egret and heron nests on the islands.) The Conservancy pioneered watershed enhancement projects, looking far upstream to discover and control the sediments, pollutants, and nutrients

that eventually deposit in our coastal estuaries. It recognized that, where possible, sediments and pollutants should be trapped at their source, using natural, less costly restoration techniques, so that expensive dredging projects need not be repeated.

Not all projects have been successful. Not all projects were planned as well as they would be today; many were experiments. The first project designs were driven by nebulous, sometimes conflicting goals and did not include monitoring programs. But the Conservancy learned, and is still learning. Others have benefited by these early trials. By now, the Conservancy's resource enhancement program has come of age.

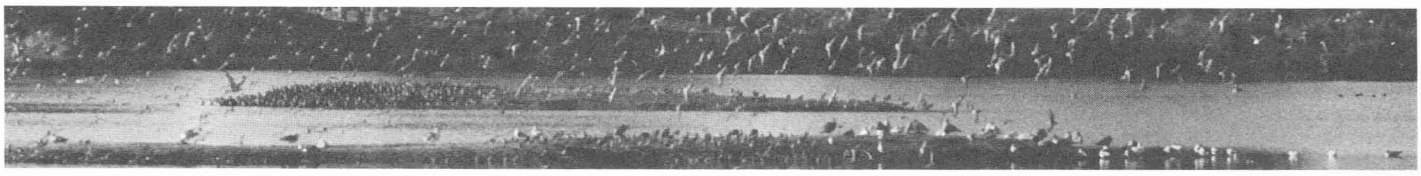
Recognizing that its projects provide valuable lessons for all concerned about our wetland environments, the Conservancy enlisted scientists from San Francisco State University to evaluate a representative sampling of projects. That evaluation points to the need to augment monitoring efforts, to prepare for unforeseen and unpredictable problems, and to disseminate lessons learned from the Conservancy's trials, errors, and many successes, as Michael Josselyn reports in the following article.

An hour has passed and Lake Merritt is again tranquil. Most of the cormorants now rest on the water, flapping their water-logged wings to dry them in the warm afternoon sun. The pelicans float lazily, their bellies full, their necks twisted 90 degrees, beaks tucked under their wings. A line of gulls stands quiet, but vigilant, along the concrete lake edge. All are satiated; refreshed, I return to work. ■

Liza Riddle is assistant director of the University of California Natural Reserve System. She was on the staff of the Coastal Conservancy from 1983 to 1992, and managed the Resource Enhancement Program for five years.

OAKLAND LIBRARY HISTORY ROOM

In the early 1920s, the Pageant of Welcome to Wild Ducks on Lake Merritt was an annual event, produced under the direction of the city's recreation department. This photo montage was widely used to promote Oakland.



Wetland Restoration by the Coastal Conservancy: A Status Report

MICHAEL JOSSELYN

AND

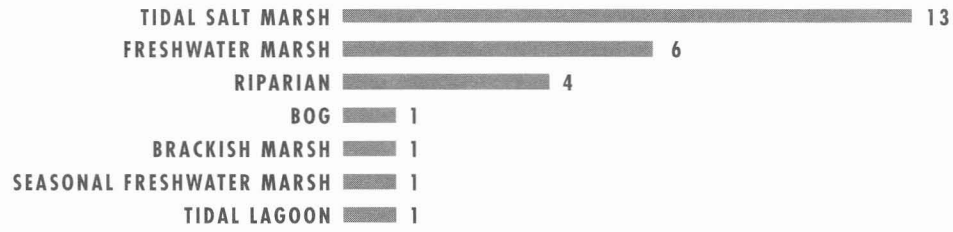
SARAH CHAMBERLAIN

IN THE NATIONAL RESEARCH COUNCIL'S major study, *Restoration of Aquatic Ecosystems* (1992), efforts to restore natural wetland functions and values were given poor marks, especially when projects were undertaken as mitigation for permitted fill activities. The study found that poor planning, lack of clear objectives, limited understanding of hydrologic and biologic factors, and inadequate monitoring and management diminished the effectiveness of many projects. Previous studies by the Environmental Protection Agency also reported mixed results. Although these studies tended to focus on wetland mitigation and the problems inherent in the federal and state permitting systems, they also cast doubt on the practice of wetland restoration as a science.

The State Coastal Conservancy had long recognized that coastal wetland restoration was not easy. As the primary state agency charged with the enhancement and restoration of coastal resources, it has 15 years of experience in this area. Since 1978, the agency has undertaken to restore, enhance, or acquire over 147 sites, totaling 24,000 acres, at a cost exceeding $46 million, leveraging about twice that amount from partners in its projects. Conservancy projects usually required adherence to goals and objectives during planning, a clear understanding of the technical constraints and opportunities, and long-term management and monitoring. Until last year, however, the agency had never taken a comprehensive look back at its projects to determine what led to their successes or failures.

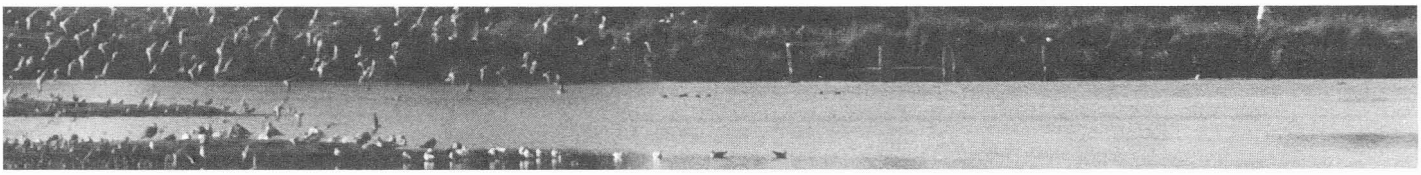
In 1992, the Conservancy undertook such a review, seeking to develop recommendations to improve its planning and implementation

Figure 1: Types of wetland restoration projects evaluated (some projects are of more than one type)



SARAH CHAMBERLAIN

A log placed strategically across Lagunitas Creek creates a plunge pool below and riffle above for salmonids. It helps to encourage diversity in the stream habitat



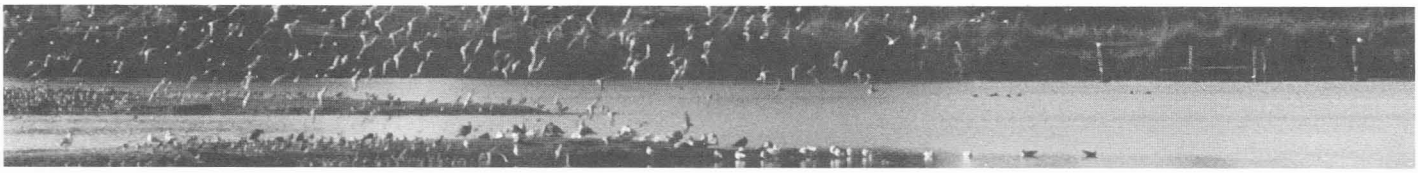
process. After the necessary data base was gathered, San Francisco State University was requested to complete the study with an analysis, field investigation, and evaluation. For this analysis, 22 projects were selected at 20 sites ranging from Arcata, in Humboldt County, to San Diego (see map). These projects represented a cross-section of Conservancy activities in coast-related wetlands and included tidal marsh, freshwater marsh, riparian habitats, and coastal bogs.

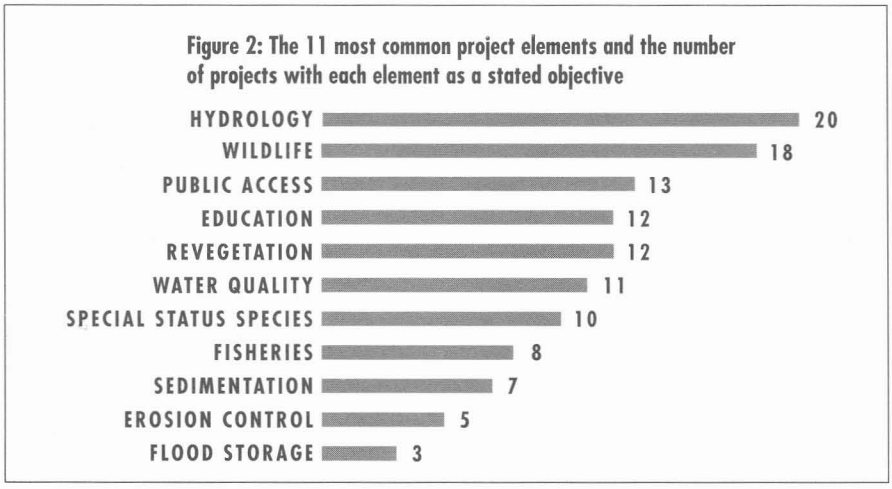
The study conducted by San Francisco State University consisted of two phases: development of a data base for the projects selected for analysis, followed by a field inspection and analysis of all collected data. The first phase involved a review of planning documents, staff reports, and construction specifications to glean information about each project. This information was entered into a consistent format and database. It included project objectives, plans, implementation methods, monitoring results, and costs. The second phase began with a field investigation, visits to each site, and interviews with project managers. A field evaluation assessed wetland functions, including vegetative diversity, nutrient retention, fish and wildlife habitat, and recreational uses. Project effectiveness was measured by two qualitative criteria: evaluation of wetland function based on interviews, observations, and monitoring reports; and an assessment of project success on the basis of criteria recommended by the National Research Council's 1992 report. These criteria include the effectiveness of projects in meeting stated goals, the ability of a site to function as a self-sustaining ecosystem, the restoration of critical wetland functions, provision of habitat, recreational, and water quality benefits, and the usefulness of monitoring toward improving the wetland restoration process.

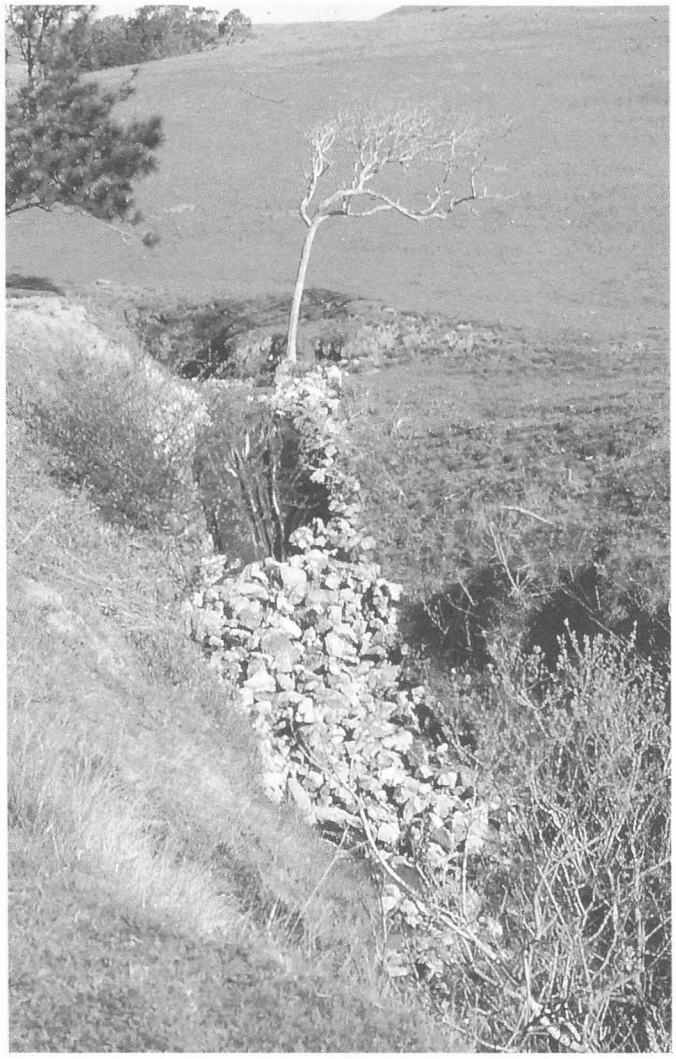
A detailed analysis of both the database and the evaluation is given in the full report prepared for the Conservancy, *Evaluation of Coastal Conservancy Enhancement Projects 1978-1992*. The full database record for each project and the findings from field work are summarized in appendices of the full report.

1. Arcata Marshes (3 projects)
2. Palco Marsh
3. Summerslane Bog
4. Walker Creek
5. Olema and Livermore Marshes
6. Lagunitas Creek
7. Redwood High School Marsh
8. Hudeman Slough
9. San Pablo Marsh
10. HARD Triangle Marsh
11. Hayward Marsh
12. HARD Marsh
13. ITT Marsh
14. Moran Lake
15. Marina Freshwater Marsh
16. Sweet Springs Marsh
17. Huntington Beach Wetlands
18. Upper Newport Bay
19. Los Penasquitos
20. San Dieguito Lagoon

SITE LOCATIONS OF SELECTED WETLANDS







Dumped rock controls the extent of a gully, repairing stream damage.

SARAH CHAMBERLAIN

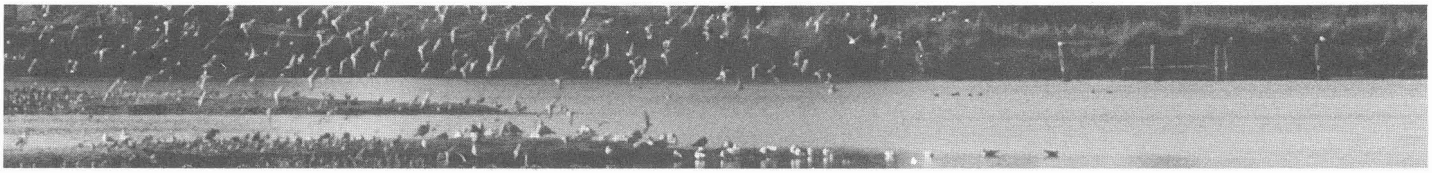
MOST GOALS WERE MET

Tidal salt marshes made up the majority of wetland restoration projects evaluated, followed by freshwater marshes and riparian wetlands (Figure 1). Brackish marsh, seasonal wetland, tidal lagoon, and bog habitats were restored in four of the 22 evaluated projects.

Figure 2 shows the 11 most common goals of the projects evaluated. Improving hydrologic functioning was the primary goal of 21 of the 22 evaluated projects. Habitat enhancement for wildlife was an important stated objective in most projects. Public access was the third most common goal, followed by education, revegetation, and water quality. Thirteen of the 22 projects (59 percent) met project goals evaluated in terms of either wetland functions or National Research Council criteria. Most projects achieved most of the goals set forth by the plan. This level of success is high compared to that found in evaluations of mitigation projects. Success can be attributed to the extensive planning that goes into Conservancy projects, the frequent interaction of Conservancy staff with other agencies involved in resource and regulatory matters, and to project grantees' genuine interest in restoring or enhancing wetland systems.

Fifteen of the 22 projects were found to be self-sustaining, especially those in tidal or freshwater marshes with minimal or no hydrologic controls. Others, however, required human management and energy input to function. This was due, in part, to inclusion of wastewater treatment wetlands, such as the Hayward Treatment Marsh and Arcata Marsh, in the sample. Other projects, such as Upper Newport Bay and Los Peñasquitos Lagoon, require human intervention to remove anthropogenic-derived sediments from the surrounding watershed or to breach outer sand bars to allow tidal circulation.

Critical wetland functions were clearly restored by the projects evaluated. Wildlife habitat benefits were generally achieved, but there is room for improvement and a need for more information on this. Not only are these projects "young" compared to natural systems, but there is a lack of consistent observations to

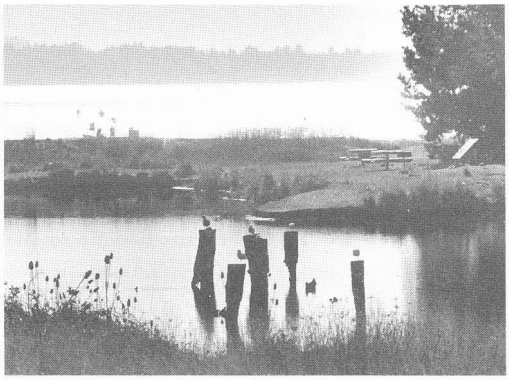


demonstrate fish and wildlife use. In most cases, hydrologic conditions play a significant role in creating suitable habitat. Restoration of tidal action at Huntington Beach and HARD Triangle Marsh in Hayward on San Francisco Bay has been important in the enhancement of these wetlands. In riparian projects such as Lagunitas Creek and Walker Creek, both in Marin County, reestablishment of vegetation has been the most critical measure in restoring critical habitat and sediment retention functions.

As evaluated by assessment of wetland function, many of the projects provide effective recreational and educational benefits. Conservancy projects often include public access components or are operated as parks.

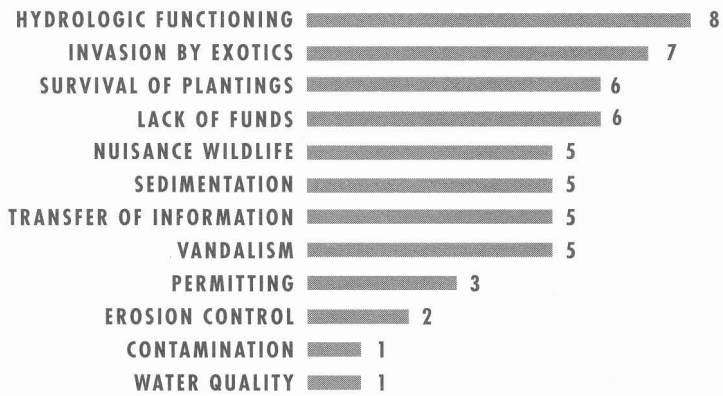
Only one project was found to be totally ineffective. The Moran Lake project (Santa Cruz County) failed after a major storm destroyed most of the plantings a month after installation, and sediment filled the channel and box culvert provided for tidal flows. It is likely that this enhancement project would have failed even without the storm, for the lagoon is small and an extensive sand bar blocks tidal flow.

The most common problem in all the projects evaluated was hydrologic functioning (Figure 3). In projects involving salt marsh restoration, tide gates and weirs must be adjusted several times to obtain the appropriate hydrologic regime. In a number of projects, it has also proved difficult to revegetate sites with native species and to control the invasion of exotics. For example, although the planting of native wildflowers around Marina freshwater marsh was initially successful, without constant vigilance, exotics have reinvaded. Increased sedimentation was a common problem in the projects evaluated. Activities in the surrounding watershed (which in many cases are beyond the control of the projects themselves) likely contribute to increased sediment loads to project areas. Several projects have reported problems with nuisance wildlife and destruction of signs and facilities by vandals. The lack of remediation monies was an expressed concern in many projects. In several cases, lack of funds prevented projects from addressing problems.



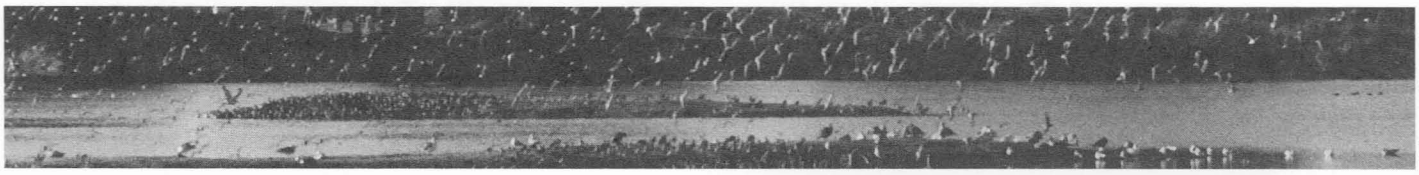
CARL BICE

Figure 3: The 12 most common problems and the number of evaluated projects experiencing each problem.



SARAH CHAMBERLAIN

This checkdam was installed on Walker Creek to repair a gully and stop erosion and sedimentation in Tomales Bay. The fence excludes cattle.



Bringing one Small Marsh Back to Life and Health

IN THE LATE 1980s, HARD Triangle Marsh, in Hayward, Alameda County, was dying. Levees built in the late 1800s had significantly altered hydrology in the marsh, resulting in intense inundation in winter, and extreme drying in summer. Subsequent road construction and an accumulation of trash and other debris added to poor circulation in the marsh. Most of the pickleweed was dead or dying, and stagnant pools were breeding grounds for mosquitoes.

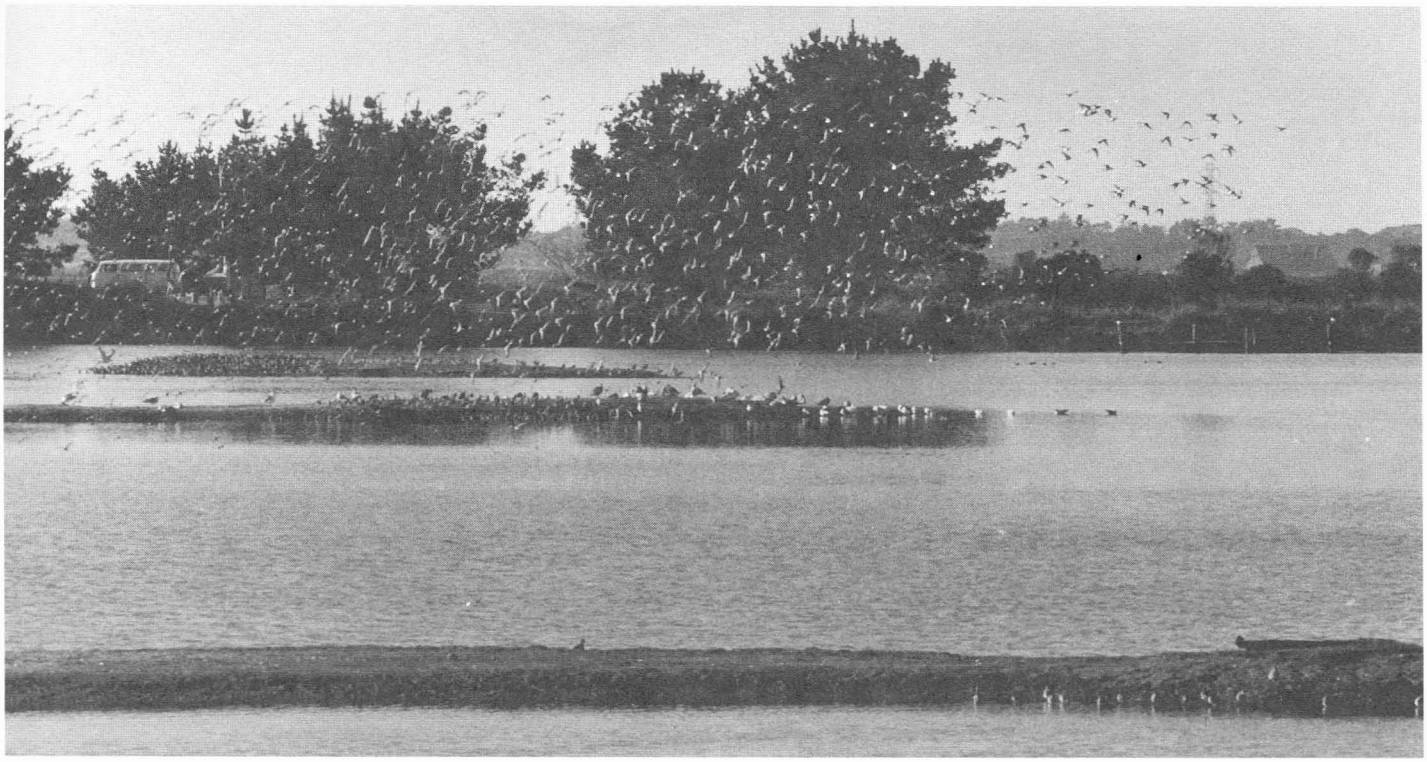
In 1989, plans were developed to restore this seven-acre saltmarsh on San Francisco Bay. The primary objectives of this restoration project were: (1) to improve conditions for pickleweed, thus improving habitat for the endangered salt marsh harvest mouse; (2) to improve water circulation and thus to control mosquito breeding; (3) to improve habitat for invertebrates, fish, and birds by increasing circulation in a buffer pond that was once used to collect leachate from a landfill next to the marsh; and (4) to provide a refuge for fish in the upper marsh during low tide. The Coastal Conservancy authorized $120,000 for planning and construction, of which $40,000 was in mitigation funds from Schnitzer Steel, required by the San Francisco Bay Conservation and Development Commission for a construction project on the bayshore.

In 1990, culverts were installed to improve tidal flow from the bay and channels were excavated to increase circulation within the marsh. A debris screen was positioned over the inlet culvert to prevent trash and other refuse from the bay from entering the marsh.

In their *Evaluation of Coastal Conservancy Enhancement Projects, 1978-1992*, Michael Josselyn, Sarah Chamberlain, *et al.*, report that results of the first year of monitoring indicate that more than half the marsh plain supports a healthy and vigorous growth of pickleweed. Soil salinity has been reduced, and soil aeration and water circulation have improved, all contributing to improved vigor and growth. Improved circulation in the buffer pond has abated mosquito breeding and enhanced pond habitat for invertebrates, fish, and birds.

The study also noted some problems and issues: Sediment is eroding from the surface of the landfill and into the marsh, blocking a channel in two locations. Plans to excavate this deposited sediment are underway. A channel bank below the access road is eroding due to scouring by water flowing into the marsh through the inlet culverts. Pickleweed has recently become established in this area and may curtail erosion. If it does not, however, the bank may need to be riprapped. The flow through a channel has been blocked by riprap placed along this channel's banks. This problem is likely to require constant maintenance.

The restoration project has breathed new life into the once-stagnant and dying marsh, and has enhanced its value to wildlife. Further monitoring and future studies would determine the long-term costs and benefits of the project.



CARL BICE

Arcata Marsh

IMPROVEMENTS SUGGESTED

The evaluation procedure examined the Coastal Conservancy's program structure to develop sound directions for the future. It found that the program's least effective element is transference of experience gained from past projects to new efforts. In many cases, monitoring is being conducted but necessary reports are not filed or provided to the Conservancy. In addition, little data is collected in a uniform manner or reported in the general literature to be of use for other projects.

While generally giving good marks to the Conservancy for its efforts in wetland restoration, the evaluation generated a number of recommendations to improve wetland restoration projects, including:

- A consistent database of Conservancy projects should be developed.
- Reports on Conservancy projects should be catalogued better and be more readily available.
- Cost information should be tracked better.
- Standard protocols for planning and monitoring documents should be developed.
- Conservancy project results should be published.

After a project has been implemented, additional funding should be available for contingencies, maintenance, and replacement costs. Additional funding may also be necessary to support monitoring. ■

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Michael Josselyn is a professor of biology at San Francisco State University and a senior scientist at the Romberg Tiburon Centers He was recently named to a national panel to evaluate restoration effectiveness in preserving the Mississippi Delta.

Sarah Chamberlain is a master's degree candidate at San Francisco State University where she is studying the invasion of a non-native marsh plant in marsh restoration projects.

For a copy of *Evaluation of Coastal Conservancy Enhancement Projects 1978-1992,* contact the State Coastal Conservancy, 1330 Broadway, Suite 1100, Oakland, CA 94612, phone (510) 286-1015. The report is free, but please send $2.90 IN STAMPS to cover postage.

SEA VEGETABLE HARVESTING IN CALIFORNIA

An Industry of Cottage Wildcrafters

JOHN LEWALLEN

FEW KNOW THE PHANTASMAGORIC universe of the intertidal zone in full summer bloom on northern California's rocky coast: emerald-green sea lettuce (*Ulva*), iridescent *Iridea* flashing rainbow colors, *Fucus* tips swollen with oxygen-rich compounds, hundreds of species of marine algae, from feathery reds to olive-green giants, often on a pink carpet of coral-like *Corallina.*

Most people are asleep when the dawn minus tides sigh with the full and new moons of summer, exposing a California north coast marine algae, or "seaweed," habitat unexcelled in beauty, variety, and nutritional productivity anywhere in the world.

Early morning beachcombers may spot a few lonely figures slipping and struggling in this undulating, tide-washed garden, filling sacks with their harvest of edible seaweed, or "sea vegetables." These are the sea vegetable wildcrafters— harvesters of wild plants—plucking some of finest edible marine algae on earth. My family and I are among them. We operate one of the three sea vegetable cottage industries harvesting on the Mendocino Coast. Our products—dried sea vegetables—can be found in natural food stores nationwide and are beginning to delight the palates of gourmet diners in some *haute cuisine* establishments.

Deep-fried *Porphyra* sea vegetable is a delicacy prized by the Pomo people and other aboriginal natives of California. Asian-Americans long have picked California sea palms and other sea vegetables regarded by their cultures as food fit for kings and offerings to the gods. Only in the past decade or so have we Anglo-Americans begun harvesting, drying, and selling quality wildcrafted California sea vegetables to a steadily growing—but persistently queasy—American market.

As a class, California's sea vegetable harvesters tend to be mystically attracted to the seaweed and its ancient, brooding habitat. We have abandoned striving for wealth, and struggle upward toward a middle-class life. Tolerant of—or even relishing—hard labor in cold water and hot drying sun, we are fiercely devoted to protecting our beloved harvesting areas from pollution. Communing with the sea vegetables, we have evolved harvesting methods that keep marine algae alive, thriving, and regenerating year after year in the same locations.

We must market with missionary zeal. Most Americans have viewed seaweed only in its compost phase, washed up and decaying on beaches. Perhaps we are correct in our belief, shared by macrobiotic nutritionists and many natural healers, that sea vegetables, which contain all trace elements necessary for human health, are excellent food for well-being. We are sure that amazing nutritional and healing discoveries are to be made as our culture awakens to the treasures of California's intertidal zone.

Four sea vegetable species now are the basic products of northern California's wild sea vegetable beds: nori (*Porphyra*), wakame (*Alaria*),

Laminaria

Sea Vegetable Harvesters

Mendocino Sea Vegetable Co.
20805 Orr Springs Rd.
Ukiah, CA 95482
(707) 937-2050

Ocean Harvest Sea Vegetables
P.O. Box 1719
Mendocino, CA 95460
(707) 937-1923

Pacific Ocean Produce
105 Pioneer St.
Santa Cruz, CA 95060
(408) 423-2654

Rising Tide Sea Vegetables
P.O. Box 1914
Mendocino, CA 95460
(707) 964-5663

Bull whip kelp

kombu (*Laminaria*), and sea palm fronds (*Postelsia*). (*Lyngbya* is the only poisonous variety of marine algae. It is a blue-green filament finer than a human hair.)

Sea palms grow like miniature, olive-green, two-foot-tall palm trees on wave-lashed headlands from central California to Hope Island, British Columbia, and nowhere else on earth. Only because we commercial wildcrafters harvest just the sea palm frond tips, leaving the plants alive and reproducing, does the California Department of Fish and Game still allow us to cut and sell these exquisite grooved "sea noodles." Noncommercial sea palm harvesting is prohibited in California.

Nori, draping rocks in black, ruffled blades near the mouths of streams, tastes like sweet meat and bleeds red when slightly decayed. It is the world's favorite edible seaweed.

Sever the long, olive-green fronds of *Alaria* a foot or so above the holdfast, and they will keep growing like endless ribbons of life. *Alaria* is a sweet, tender soup vegetable that yields a very tasty broth.

Deeper out are the brown, razor-strap-thick blades of kombu (*Laminaria*). Cutting only the blades, the stipe (stem) lives and grows. Used in cancer-prevention macrobiotic diets, kombu is the basis of Japanese soup stock and cooks well with beans or rice.

We gather the entire year's crop during the minus tides from May through August, backpacking wet seaweed up steep cliff trails and drying it on screens and lines in the sun. Packaged by hand with no heat sealing, our dried sea vegetables are shipped nationwide by UPS. Every month we personally deliver to natural food stores in the San Francisco Bay area. Our whole family of five works in this venture, and somehow we support ourselves on the low income we earn.

We prefer the flexibility, low capital requirement, and minimal regulatory snarl of harvesting wild growth compared with aquaculture. The seaweed wildcrafter contends with shifting sands, huge storm waves, and changing water temperatures, seeking sea vegetables when and where they appear.

I have watched people insensitive to the vital, generous spirit of seaweed attack California sea vegetables, only to see their schemes come to doom. I hope the California sea vegetable wildcrafting industry forever will be attuned to harvesting within the natural flow, taking sparingly for people who need and value the finest sea vegetables. ■

John and Eleanor Lewallen have owned and operated the Mendocino Sea Vegetable Co., Mendocino County, since 1980.

SEAN SPRAGUE, COURTESY REAL ESTATE MAGAZINE

Seaweed can be decorative as well as nutritious.

DRAWINGS: VALERIE WINEMILLER

Life Along the Fast Lanes

Article and photographs by MARK J. RAUZON

CORMORANTS ADAPT TO URBAN LIFE

MOST EASTBOUND COMMUTERS driving across San Francisco Bay on the Richmond/San Rafael Bridge are unaware of the thriving colony of double-crested cormorants in the girders some nine feet below. Between March and mid-September, hundreds of these long-necked seabirds build their nests, mate, and raise their young in the steel lattice-work of the bridge. They commute around the Bay for food, starting earlier in the day than most humans.

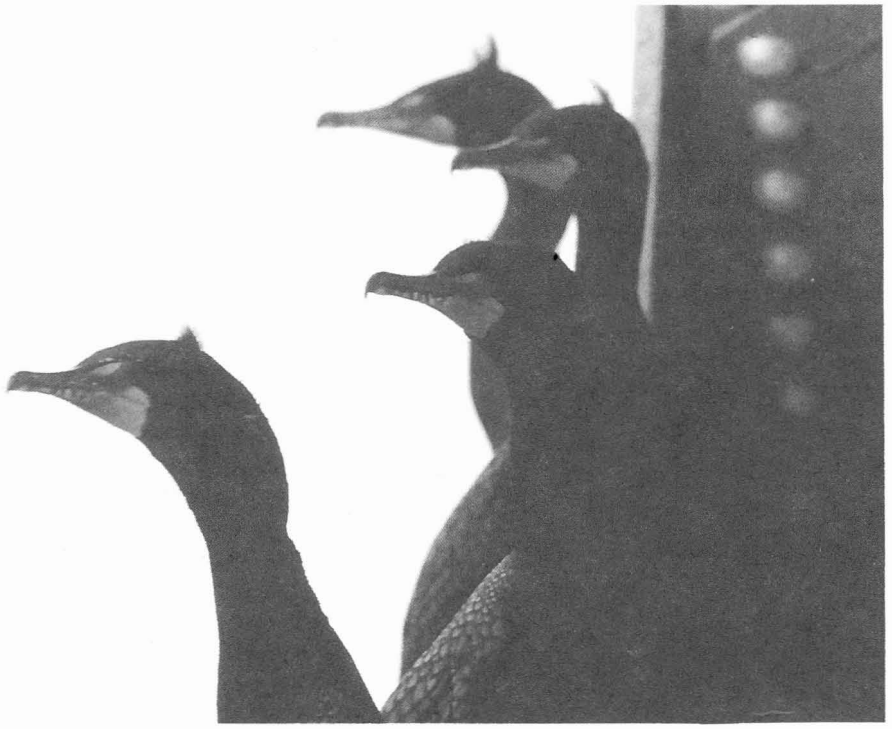
The double-crested cormorant is an indigenous species that has adapted to drastic changes in its environment. It nests on man-made structures around the bay: the Richmond Bridge, the Bay Bridge, the high voltage towers beside the San Mateo Bridge, and towers and duck blinds on Suisun Bay. A few birds still nest on dead trees in Marin County, as cormorants normally do throughout their range, and a few hundred nest on the Farallon Islands.

To construct their nests, the Richmond Bridge cormorants use traditional materials, such as sticks, marsh plants, seaweed, feathers, and guano. But they also include available modern items such as plastic rope, packing tape, paper, cigarette butts, and rags. One pair nested in a hubcap.

The birds begin to arrive at the bridge in mid-March, occupying the oldest nest sites first. To human observers, the early arrivals are the most beautiful. They are crested like musketeers, with filamentous plumes—some white, some black, some mixed—fluttering in the bay breezes. Their emerald eyes glare from vivid orange-yellow faces through the grey bridge grating, contrasting with the royal blue of mouths opened in threat displays. Sable-colored body feathers are edged with light gray, creating a velvet effect. By May, when birds are still arriving from various places around the bay and farther south, the plumes are falling, the colors fading, and the crests are gone.

In the 1880s, several thousand cormorants nested on the Farallon Islands and unknown numbers nested in trees along the bay. Egg collection and other human disturbance decimated the islands' population: by the early 1900s, not even 50 pairs remained. Recovery began in

These cormorants have nested successfully in the structure of the Richmond Bridge on San Francisco Bay.



PHOTOS: MARK RAUZON

the 1970s, after the islands were protected. By 1988 there were 230 active nests; in 1990 there were more than 300. The presence of nests on the Richmond Bridge was known to Caltrans workers for at least 20 years.

The Point Reyes Bird Observatory, under contract to Chevron Corp., began a three-year study in 1988 to compare population size and breeding success of the cormorants on the Farallons and those on the Richmond/San Rafael Bridge. Biologists climbing the bridge structure to do the field work wore Caltrans worker helmets, suspension belts, and orange vests for safety. Traffic was diverted from the passing lane to allow them to reach the north side of the bridge, where most of the cormorants nest. They worked next to fast-moving trucks and cars on the cold, vibrating bridge high above the bay—not a task for the faint of heart.

The first year biologists counted 296 nests on the bridge and 280 on the Farallon Islands. Only 290 chicks fledged on the bridge, 310 on the island. In 1989 the colony grew considerably, with 690 fledging from the bridge and 357 on the island. In 1990, 425 nested on the bridge and fledging success was almost as high as in 1989, while the Farallones colony dropped to 1988 levels and had the lowest nesting success of all three years of the study. The relative abundance of food may be a factor in nesting and fledging success. No later counts were made after the three-year study's completion, as there has been no further funding.

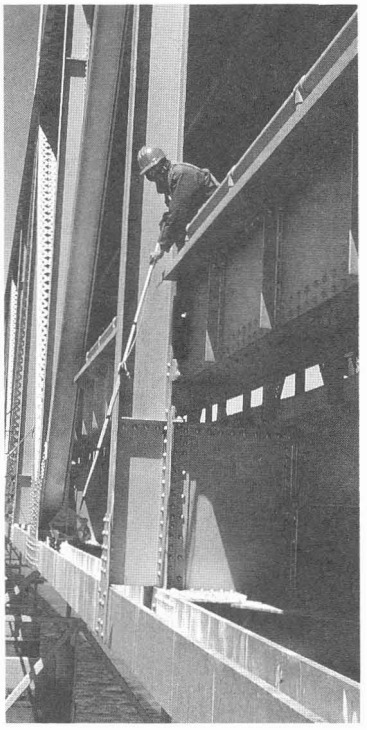
On the Richmond/San Rafael Bridge, the birds are protected from nonavian predators and find more shelter from wind and rain than the colonies on the Farallones. Life along the fast lanes has its own hazards, of course. We saw two chicks fall into the bay while they were still downy. They became waterlogged and perished.

That the double-crested cormorant colonies continue to expand in the highly urbanized Bay is testimony to these birds' adaptive nature. The species has expanded throughout North America in the last 50 years, thanks in part to the outlawing of DDT and the decline of organochloride pesticides in farming in this country. Chemical poisoning continues to be a problem, however, as indicated by reports of gross deformities, such as crossed beaks, in cormorants on the Great Lakes. These are attributed to PCBs, especially dioxin. No crossed beak chicks were seen in San Francisco Bay.

The double-crested cormorants' success, however, has led to a new problem: a concern that they may be competing with fishermen. In Canada, 10,000 double-crested cormorant eggs are destroyed annually in the St. Lawrence Seaway in the name of fishery conservation. Around San Francisco Bay, fishermen have complained to the California Department of Fish and Game that cormorants are taking game fish in the Marin watershed lakes. Fish and Game has come up with a possible solution: It is considering stocking the lakes with two-pound (instead of one-pound) trout. These should be too big for cormorants to swallow and could make fishermen happy.

That cormorants continue to flourish within such a heavily urbanized and industrial area as San Francisco Bay suggest that some progress has been made in restoring the bay ecosystem. ■

Mark J. Rauzon is a biogeographer specializing in seabirds, as well as a photographer and writer. His latest book, Water, Water Everywhere, *is being published by Sierra Club Junior Books this March.*



After the young had fledged and the nests were abandoned, biologists collected egg shells for further studies.

RICHARD RETECKI

This stairway to the beach in Carlsbad is one of many accessways the Conservancy has built on the coast.

Looking Back in Light of the Future

THE COASTAL CONSERVANCY'S FIRST 18 YEARS

PETER GRENELL

IN THIS, MY LAST CONTRIBUTION to *California Coast & Ocean* as the Coastal Conservancy's executive officer, I will reflect upon our accomplishments and the special characteristics that have made the Conservancy a success. I will also consider what changing circumstances may portend for this agency's future.

It has been an exciting, productive, frustrating ride from the time, back in 1978, when people hardly knew we existed—let alone what we were supposed to do—to the present. The uniquely unconventional creature that is the Conservancy would probably not be created today. We are at the end of an era in the life of this agency; any student of organizations will recognize that. So it's a good time to take stock.

The State Coastal Conservancy was spawned at a happier time for California. In 1976, when the legislature established it (in a companion measure to the California Coastal Act), the state had a fiscal surplus and a more expansive outlook; education, crime, and unemployment were not the troubling issues they are today. Public concern for the environment, and the coast in particular, was very high. Four years earlier, citizens had established the California Coastal Commission by ballot initiative (Proposition 20). Since then, the Commission's experience had demonstrated that if the coast was to be "saved," more than regulatory means were needed. The legislature therefore created the Coastal Conservancy with broad and flexible powers that would enable it to resolve difficult land use conflicts, seize opportunities, and respond to local needs in projects that would provide public access to the coast and protect, restore, and enhance coastal resources. The Conservancy's non-regulatory approaches would complement the Commission's regulatory development controls.

Now, looking back, we can see that the Coastal Conservancy evolved characteristics that have made it a model for what government can and must be to deal with contemporary social, environmental, and economic issues—especially those that cross jurisdictional boundaries. This model has proved so suitable to the needs of our time that it has been emulated in many places and for many public purposes. In California alone we now also have the Santa Monica Mountains Conservancy and the Tahoe Conservancy, both created according to the model developed by the Coastal Conservancy, and most recently the Coachella Valley Conservancy and the San Joaquin Conservancy, which was created to manage a 22-mile

stretch of the San Joaquin River that flows through three jurisdictions.

That our major resource and economic issues require transboundary, cooperative approaches has become increasingly obvious. New mechanisms are needed and are gradually beginning to appear, enabling government, in cooperation with others, to respond creatively to rapid change. Though some of the most interesting among these mechanisms may not have "conservancy" as part of their name, they draw on the same principles as guide the Coastal Conservancy. Among them are joint powers authorities, such as one formed on the Central California Coast to manage littoral sand flow, and varied joint ventures. The Pacific Flyway Joint Venture Project, for instance, brings public agencies, landowners, and conservation organizations from varied jurisdictions together to undertake projects that will help to assure that our future includes long distance bird migrations along the Pacific Flyway. The Coastal Conservancy was a pioneer in what has grown into one of the most significant positive trends now reshaping our systems of government.

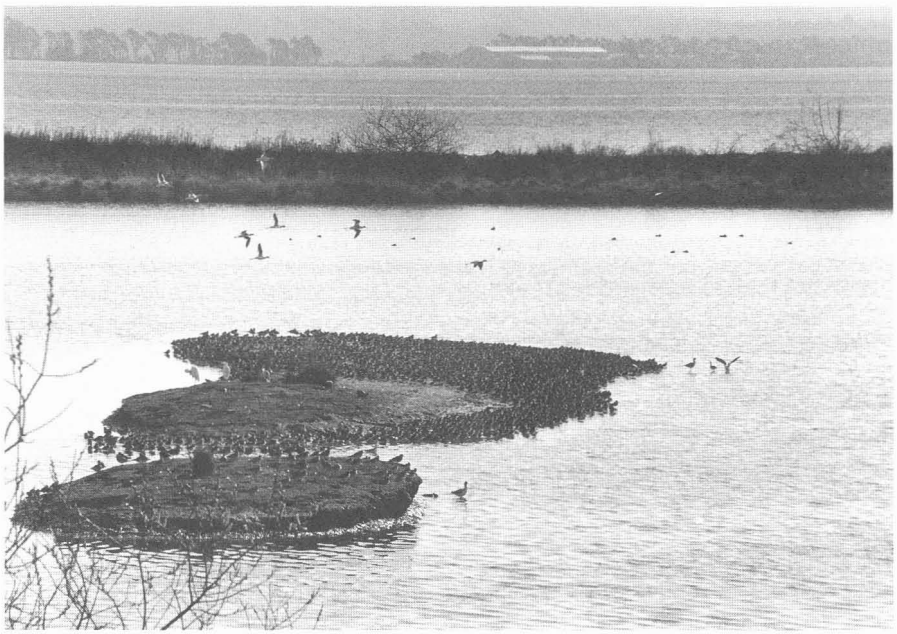
A RECORD OF ACHIEVEMENT

The fledgling agency started out with $10 million from a 1976 bond act to serve the entire 1,100-mile-long coastal zone (San Francisco Bay was added to its responsibilities later, in 1980). It began with a staff of less than a dozen, which included several graduate students. An agency with the novel mandate the Conservancy had been given required a particular kind of government servant. Staff had to have the capacity for initiative, patience, endurance, a willingness to listen, inventiveness, a taste for the unorthodox, tolerance, toughness, flexibility, ability to develop trust, and a desire to get things done. Most of the original staff had a preference for hands-on action and a strong concern for what was at stake—the California coast, its resources, and its people. The Conservancy found staff who were, as one Board member put it, "Conservancy people." They continue to be the agency's principal asset.

Since its beginning, more than 500 Coastal Conservancy projects have been successfully completed or are well on the way. Some took many years—as long as a dozen—but as Margaret Azevedo, Conservancy board member and soul of the agency has said: "Conservancy projects never die." The ability to stay with a project until opportunity ripens has led to significant gains for the California coast. The Point Cabrillo acquisition in Mendocino County is one example. It took 14 years.

In its lifetime thus far, the Conservancy has spent or committed nearly $200 million to protect, restore, and enhance many thousands of acres of wetlands, scenic open space, and valuable coastal farmland, and hundreds of square miles of watersheds and stream corridors; to open up scores of miles of the coast for new public access and use; to restore deteriorated waterfront areas and rebuild most of the major coastal piers as well as providing many other public facilities to enhance our many urban waterfront communities.

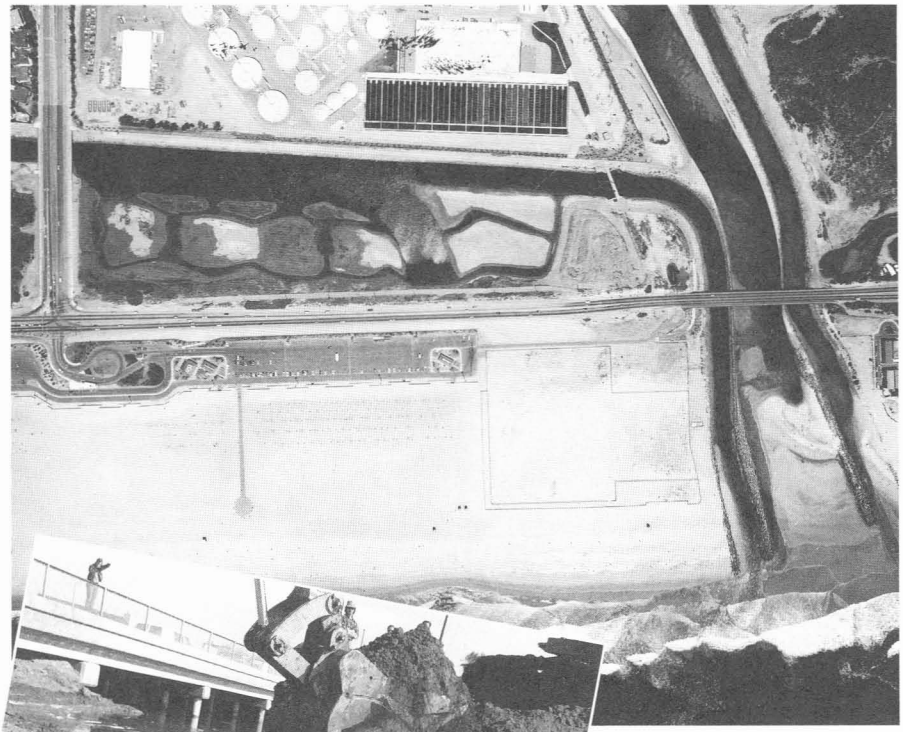
Lists and statistics don't tell the most significant story, however. In funding increasingly diverse projects, the Conservancy has again and again broken new ground. It has not, as yet, deteriorated into just another grant-giving bureaucracy but, instead, has stayed creative. Its projects have knitted together separate aspects of many different issues. To protect a marsh that adjoins the Elkhorn Slough National Estuarine Research Reserve, the Conservancy helped strawberry farmers in the hills above the slough to control erosion. Both the farmers and the marsh benefited. To protect wetlands and beaches at the mouth of the Russian River, the Conservancy is working with landowners along the entire river, helping them to understand and plan to control the erosion that has been eating away at the river and its banks, damaging their property. Increasingly, the focus has encompassed entire watersheds, in once case even crossing the border



CARL BICE

Habitat islands on Arcata Marsh were built as part of a wetland restoration effort that now serves a model for many others, nationwide and abroad.

HUNTINGTON BEACH WETLANDS CONSERVANCY



REED HOLDERMAN

In Huntington Beach, a degraded marsh was restored behind one of California's most popular beaches. The project was also part of a flood control project on the Santa Ana River. Above, restoration in process.

between this country and Mexico (see pages 7–19).

To demonstrate a new non-regulatory role for government was part of the Conservancy's purpose from the very beginning. Looking back, here are some of the principles that years of experience have tried and matured:

- In land use conflicts, the best solutions acknowledge the validity of all concerns and resolve them through a creative project that benefits everyone engaged in the conflict.
- Creative solutions always involve an element of risk, which it is proper for the agency to assume.
- Resource protection makes economic sense. There must be a place for local inhabitants and visitors in coastal resource protection projects.
- Projects must be congruent with natural systems rather than be bounded by jurisdictional lines only. Usually, the entire watershed needs to be considered if resources are to be protected for the long term.
- Local governments often lack time and resources to see the potential of their coastal resources, but will respond enthusiastically if offered some assistance toward developing this potential.
- Local citizens concerned about local coastal issues can be excellent stewards of resources that have a regional or state-wide value. To help such citizens organize into local nonprofits that will assume a stewardship role is to help the democratic process.
- Public access, if well-designed, enhances coastal conservation.

THE CONSERVANCY AS CATALYST

The Conservancy was not expected to "do it all" through massive conventional public sector methods; it was supposed to devise and test innovative approaches to problem solving through its projects, both technically and organizationally, and show the way for others in government, in the private sector, and in coastal communities, to address the tremendous overall need. Sometimes the agency initiated new ways of doing things; in other situations it provided the support, in human terms as well as financial, that was essential at particular moments to resolve issues and get things done. Conservancy staff were initially viewed with suspicion by many people on various sides of coastal controversies and elsewhere in government. They were seen as unknown quantities who could not be categorized either as environmental purists or as friends of development. Eventually, the agency's record of success spoke for itself. Today "conflict resolution" and "environmental mediation" are a booming industry. The Conservancy was a pioneer in this field, although it didn't design the labels.

The Conservancy's nurturing of local nonprofit groups has blossomed into strong and effective partnerships for resource conservation. This collaboration is the largest of its kind in the nation—the agency has worked with over 75 nonprofit organizations—thus fanning the "prairie fire" of nonprofit (more specifically, but not exclusively, land trust) activity that has spread throughout the United States during the past decade.

Other Conservancy-supported efforts to build local capacity focused on local governments and, more recently, resource conservation districts, some of which have developed into capable partners in coastal project design, implementation, and management, and have greatly increased public participation in coastal problem solving.

These partnerships have mobilized local energy in the service of greater than local goals.

When endangered species and their habitats are protected and public access to the shore is provided, the beneficiaries include not only local coastal communities, but also other California residents and visitors. Successful projects that involve local partners have been of great value in strengthening the ability and willingness of local governments to address coastal issues within their jurisdictions, to the degree that their finances will allow. Conservancy assistance helped, if not enabled, numerous communities to resolve outstanding local coastal planning (LCP) issues, as completed projects and LCPs in Oceanside, Santa Barbara, Santa Monica, Sonoma County, and dozens of other jurisdictions can attest.

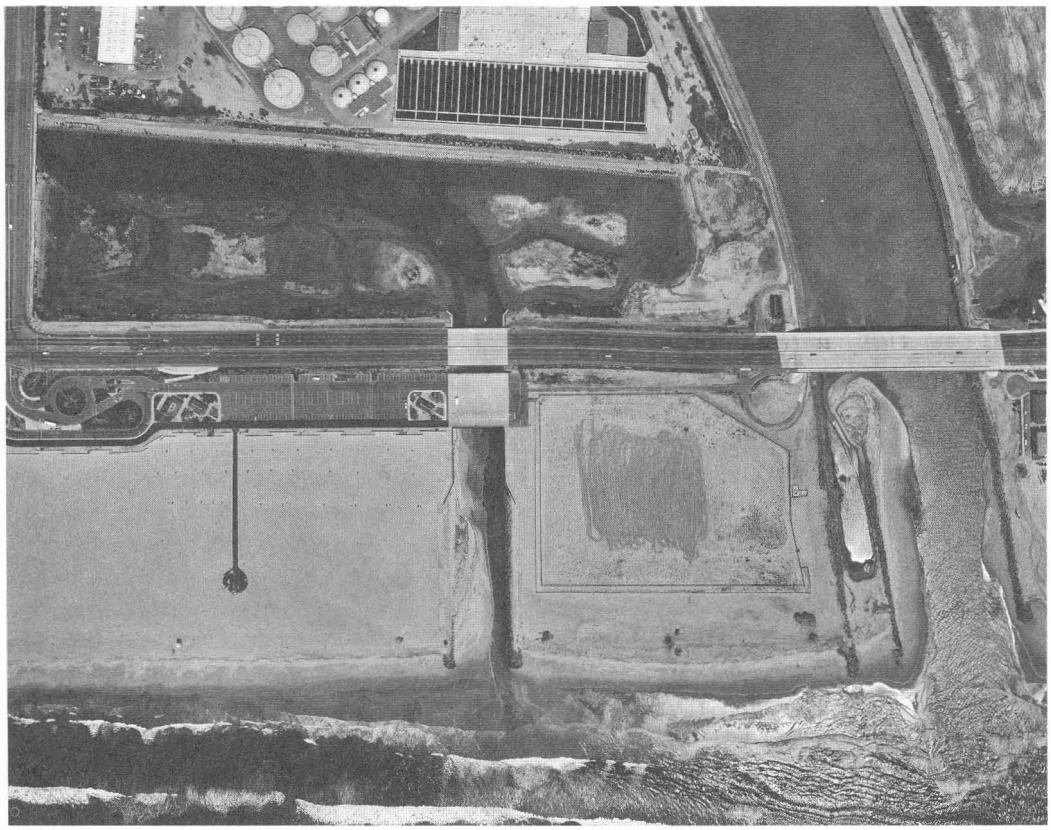
The Conservancy has also worked with local resource conservation districts to generate a stronger citizen group base in the agriculture community. Joint Conservancy/RCD projects in several coastal watersheds, including Morro Bay on the central coast and the Garcia River in Mendocino County, exemplify the effectiveness of this partnership.

Also part of the Conservancy's efforts to build public/private partnerships has been work with coastal landowners and developers to protect sensitive natural resources, facilitate environmentally sound development, resolve long-standing land use conflicts, and enable private sector resources to be freed up for more productive use. The Conservancy's successful cooperation with the Mobil Foundation to preserve a major segment of San Luis Obispo County's extraordinary Nipomo Dunes illustrates this special Conservancy role, as does its numerous successful lot consolidations of rural subdivisions in Sonoma, San Luis Obispo, and Los Angeles Counties.

New approaches and techniques for land disposition and resource protection and restoration have been demonstrated through the Conservancy's use of transferable development credits, small lot subdivision consolidation methods, wetland restoration, enhancement, and mitigation projects. Conservancy projects in these areas have stimulated activities beyond the Conservancy's own efforts.

MORE OPPORTUNITIES, LESS MONEY

In carrying out its varied projects, the Conservancy usually attempts to reach consensus among multiple interests. In the agency's experience, accommodation has not meant compromise, in which something must be given up for the sake of agreement. The Conservancy's way has been to find a creative alternative that does not betray the goals of any of the interests involved, but is acceptable to all. This approach has required a degree of administrative flexibility and intellectual imagination and nimble-



HUNTINGTON BEACH WETLANDS CONSERVANCY

The completed project. Note new channel to restore tidal flow, passing under two new bridges (center of photo). This channel also adds extra protection from intruders to the fenced least tern nesting area (between this channel and the river).

ness that is unheard of in conventional government operations. A recent example is the Conservancy's path-breaking attempt to use uncontaminated harbor dredged material to restore historic tidal marsh in northern San Francisco Bay, thus providing a partial solution to the very controversial problem of where to dispose of dredged material without harming the bay's fragile and priceless ecosystem, and thereby sustaining a multi-billion dollar regional maritime industry and its urgently needed employment while also helping to restore and add to a priceless bay resource, its vanishing wetlands.

STATE COASTAL CONSERVANCY

The Conservancy provided assistance to improve commercial fishing facilities at the Point Arena pier, in Mendocino County.

Of course, placed in the broader context of chronic shortage of funds relative to the needs at hand and increasing population and development pressures on declining resources, the Conservancy's productive output looks modest at best. Available funding has steadily shrunk from a 1984 peak. Coupled with increasing uncertainty about future agency financing, this has naturally meant a tightening of control over how much can be spent, and for what. Priority-setting has become increasingly rigorous. The agency's own project contributions have decreased apace, thereby reducing the scope of the agency's impact. This occurs even as demands and expectations of project proponents regarding assurance and amounts of Conservancy funding have become more urgent and subject to frustration. The Conservancy has thus had to rely more heavily on, and exert greater efforts to obtain other sources of money, which are more fiercely competitive, more narrowly earmarked, and far more bureaucratically encumbered (involving ever more staff time to process), than its "traditional," but vanishing, bond funds.

Even as the money dries up, the Conservancy has nonetheless found itself engaged in more intensive and more complex situations, with greater economic and environmental interests at stake. A natural consequence of continuing population growth and development pressure on increasingly scarce coastal and other natural resources has been the expansion of efforts to deal with problems on a wider basis. Wildlife corridors, regional ecosystems, biodiversity, and watershed-based efforts are rapidly becoming the norm, even as they generate more conferences and journal articles. The Conservancy is now actively involved in large-scale projects in most of California's coastal watersheds, from the Tijuana and Otay rivers in southern San Diego County, through the Santa Clara River valley in Ventura and Los Angeles Counties, San Luis Obispo County's Morro Bay watershed, the Petaluma River, and Napa County's Huichica Creek watershed in the San Francisco Bay area, and on up the coast to the rivers and watersheds of Marin, Sonoma, Mendocino, and Humboldt counties. These projects call forth the need for greater landowner participation with government. The Conservancy's support of stewardship efforts like those of the Napa Resource Conservation District and its landowner part-

ners in the Huichica Creek Watershed are helping to chart a new, more constructive path to economic and environmentally congruent solutions that, once again, involve immediate and long term changes in the way things are done.

The main financial need just now for a great many, if not most, of these large projects is for planning money, an item that the Conservancy, with its historic emphasis on the nuts and bolts of implementation—acquisition, restoration, and enhancement—has tended to minimize in the past. Ironically, the agency's funding shortage, with its imperative to allocate generally smaller amounts to each project, has not clashed with the needs for planning money, which are much smaller than funds required for implementation. Thus, even as it continues to try to "finish what it has started" by implementing existing projects as best it can, the Conservancy has shifted a good deal of its attention to meeting this critical new need, and has joined it with staff and consultant experience in complex, multi-interest projects. The result has been continued responsiveness to new needs in the forefront of contemporary resource management. On the "down" side, of course, the backlog of projects approaching the implementation stage, for which larger sums will be required, has grown as funding has shrunk. The day of financial reckoning for these efforts is coming, although with jobs, education, and crime still uppermost in the public mind these days, the outcome may indeed already be foreseen.

Another major factor affecting the Conservancy has been the recent change in its funding sources. Historically, the agency has been funded predominantly from voter-approved bond acts. Since 1988, however, no such funding has been provided. This, together with the state's continuing deficit, has resulted in a severe shrinkage of available funding to the Conservancy (and other agencies too, of course). Moreover, since 1988 new Conservancy funds have been designated for specific purposes and projects for the most part, either by the voters (in 1988's Proposition 70 and again in Proposition 117, the "Mountain Lion Initiative," which provided no new funding), or by the Legislature and governor, through the budget process. This saps the Conservancy's power to seize opportunities, thereby using funds and staff time to maximum public advantage. Many valuable coastal properties have been acquired or protected only because the Conservancy had the power to act quickly when the opportunity arose, thus securing a property until other agencies or nonprofit agencies could act. Several key Conservancy program areas, such as urban waterfronts and lot consolidations, have been effectively defunded. This unfortunate result has occurred just as the need to integrate enlightened economic development and recovery with environmental protection is becoming even more urgent. A significant effect has been to constrain, and in some cases to reduce, the Conservancy's flexibility of action, one of the agency's most vital characteristics. Continued governmental inability to support major new programmatic action, and consequent reliance upon narrowly construed ballot initiatives, does not augur well for the Conservancy's future ability to exercise its capacities fully.

STATE COASTAL CONSERVANCY

The Oceanside Pier was one of several piers reconstructed with the help of financial assistance from the Conservancy.

STATE COASTAL CONSERVANCY

The Conservancy's first major watershed project, on Tomales Bay in Marin County, also provided public access.

CHALLENGES AHEAD

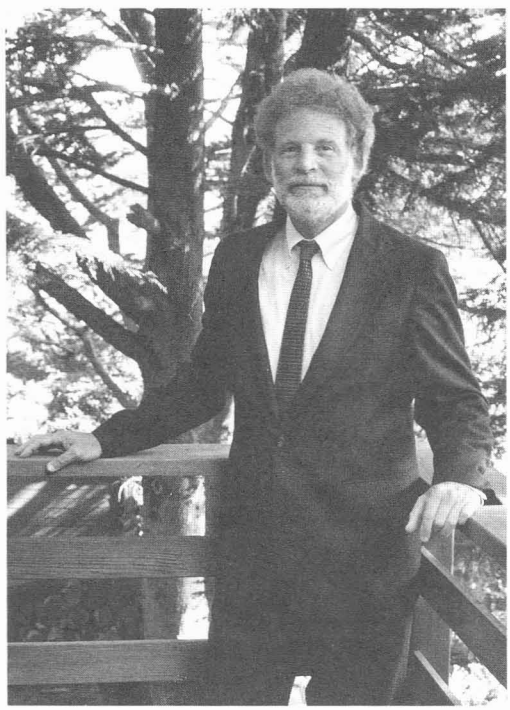
Throughout California and the nation, the role of government is changing, in large part because economic and social pressures have forced it to abandon many traditional functions and thus mandated improvisation. Profoundly important new initiatives are being taken, or at least explored, by diverse interests. They include watershed-based conservation, sustainable development in forestry and agriculture, as well as efforts to address nonpoint source pollution, energy conservation, and, most recently, military base reuse. At the same time, however, the forces of divisiveness have in certain ways been invigorated and issues have become more polarized. What implications has this for the future?

California mirrors a growing nationwide skepticism about governmental effectiveness (a deep-rooted feeling in this country in any case), and a resulting inclination to view government as synonymous with ineffective bureaucracy. Pressures increase to find ways to generate revenue, revolve project investments, and emphasize activities that join economic recovery with environmental conservation. All this is quite sensible and urgently needed. It is especially important to abolish the dichotomy between economic development and environmental protection. That, in any event, should be a fundamental ingredient of public policy. But these efforts are at odds with the "preservation first" outlook held by many environmentally concerned people.

Environmental interests have placed a $2 billion bond initiative on the June 1994 ballot. This initiative, like Proposition 70 of 1988, emphasizes land acquisition of sensitive habitat and open space throughout the state, including the coastal zone. It is in direct response to the lack of a bond act on the 1992 ballot. Like Proposition 70, the "California Safe Neighborhood Parks, Gang Prevention, Tree Planting, Wildlife, Coastal, Senior Center, Park, Wetlands, Rivers, Forest and Agricultural Land Conservation Act of 1994," known (for obvious reasons!) as "CALPAW 94," authorizes sorely needed funding for many critical environmental resource needs. It would provide $357 million to the Conservancy—but only for habitat and open space; no money for most of the Conservancy's other coastal resource activities.

The Coastal Conservancy looks ahead to fiscal feast if CALPAW passes—or famine, if it

BARRIE GRENELL



Peter Grenell

fails. In either case, there will be continuing, if not increasing, constraints on the agency's ability to carry out its statutory mandate, and even to respond in its special way to the very situations now viewed as of the most urgent and critical importance. This raises an obvious question: Should the Conservancy alter its basic purpose and mode of operating? Are new kinds of "Conservancy people" needed? And, as a corollary, when is the job done?

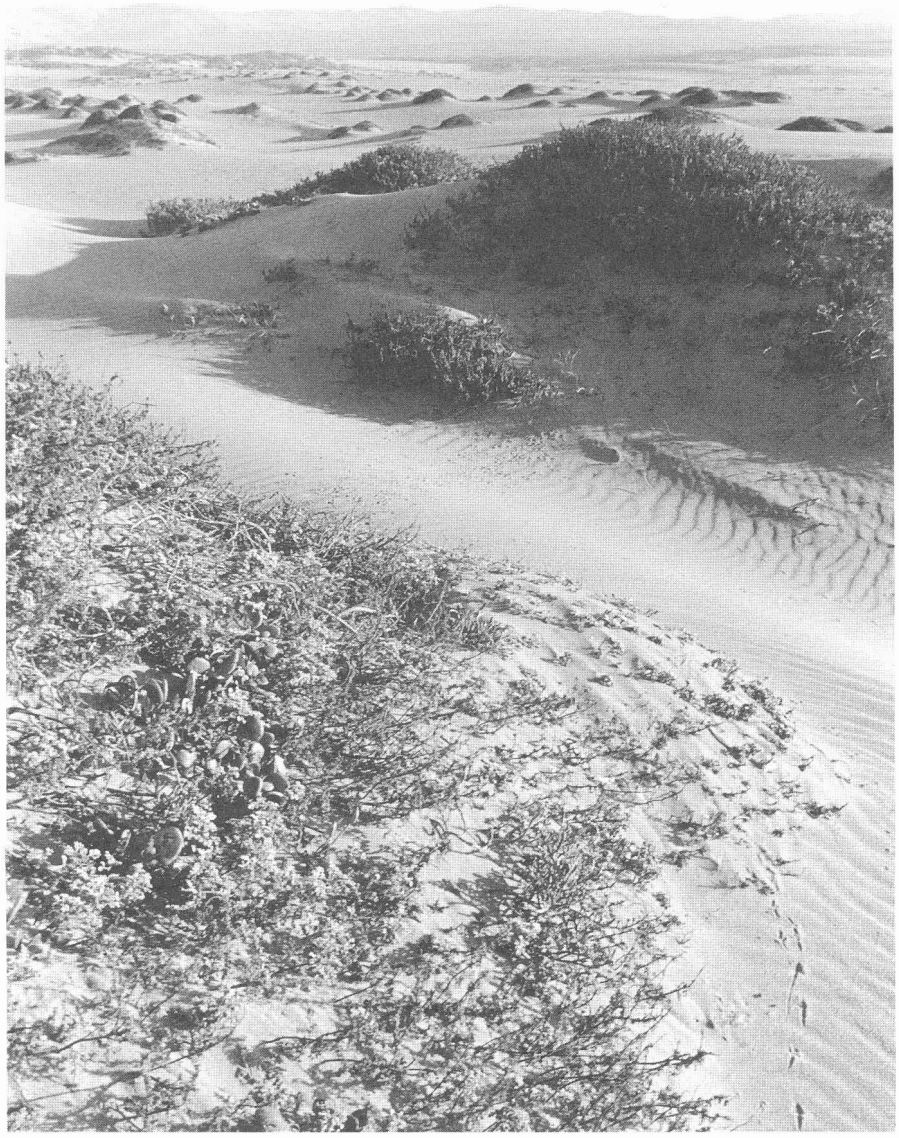
I suggest that now, even more, perhaps, than at its inception, the Conservancy's essential role as problem-solver, facilitator, interested mediator, stimulator—and funder—is absolutely necessary, and in fact is in the vanguard of new, more responsive and productive roles for government. Economic and environmental concerns can no longer remain separate and at odds with each other. Similarly, governmental and non-governmental actions must be more closely linked. The extremes of the spectrum may have center stage for the moment, and they have their legitimate place in the continuing dialogue that is the democratic process. Yet the actual solution of complex problems that affect people's lives and livelihoods requires skills and attitudes different from those of advocacy (although both need the same dedication, energy, and endurance); skills and attitudes that characterize the Conservancy at its best.

Most of the major coastal issues that either remain, or which have emerged more recently, are amenable to the Conservancy approach—and in fact the Conservancy is involved with most of them, to a greater or lesser extent. Sustainable development, coastal wetlands, watersheds and fisheries, San Francisco Bay habitat and water quality, bay and coastal area military base re-use, larger scale, area-wide habitat integration, non-point source pollution, port development and harbor dredging and related habitat protection, and land use impacts on inshore coastal waters are all of critical importance and require greater attention than they have been given up to now. In addition, the changing demographic composition of the state is already beginning to generate new recognition of the need to link environmental concerns directly with those of social equity; the basic question of "environmental protection for whom?" must be answered by positive action now, or many of the environmental gains of the past two decades may be lost.

In the end, as Tolstoy so eloquently described it in *War and Peace*, while the heroes contested in great battles with flags flying, the people each day lit the home fires, kept the samovars hot on the hearth, and generally took care of the business of getting on with life. Transposed to our time and place, it means that, after the posturing and positioning are done, decisions still have to be made based on both an affirmative vision for the future and the practical realities of today. It remains to be seen whether the Coastal Conservancy will figure prominently in this vital decision-making process; it is by no means clear as of this writing. I hope so. ■

Peter Grenell, Coastal Conservancy executive officer from September 1985 to January 1994, was associated with the Conservancy almost from its inception. He helped create several Conservancy programs and managed a number of its projects between 1978 and 1983. He is now an independent consultant on coastal and economic development issues.

When the Conservancy bought 2,550 acres in the heart of the Nipomo Dunes, San Luis Obispo County, it secured protection for much of California's largest and most scenic dune and wetland area.



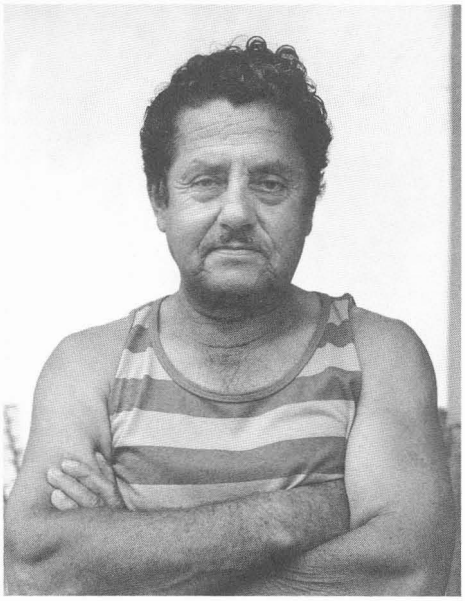
CAROL ARNOLD

GALÁPAGOS: Evolution of another kind

JERRY EMORY
with photos by
STACY GEIKEN

Considering the small size of these islands, we feel the more astonished at the number of their aboriginal beings, and at their confined range. Seeing every height crowned with its crater, and the boundaries of most of the lava-streams still distinct, we are led to believe that within a period, geologically recent, the unbroken ocean was here spread out. Hence, both in space and time, we seem to be brought somewhat near to that great fact—that mystery of mysteries—the first appearance of new beings on this earth.

Charles Darwin,
The Voyage Of the Beagle



Victor Hugo Castro (Puerto Ayora, Santa Cruz Island): "If a wallet fell onto the street with a million sucres, it used to be, 'Who does this belong to?' You would carry it around, asking. Not now." He came from Quenca, Ecuador, some 50 years ago.

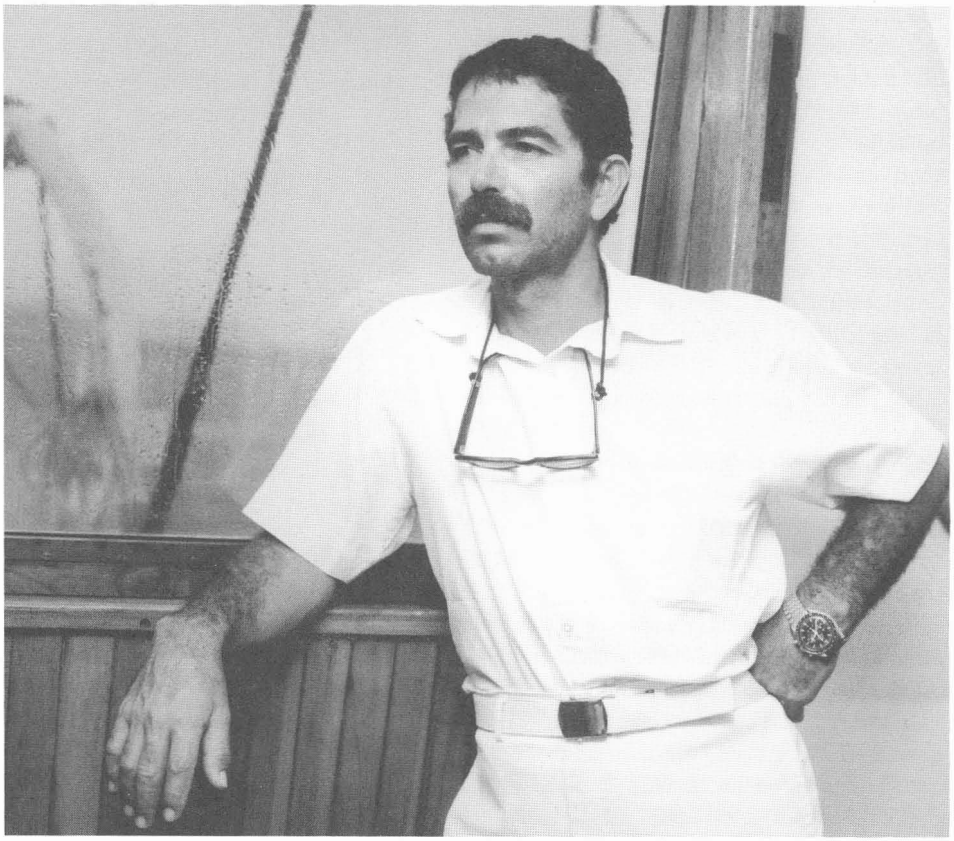
Captain Lenin Cruz (Puerto Ayora): "For the time we've been running tourism, I think we're doing great. All we have to do is take a little more care, and have a little more control." He was born on Floreana Island.

ON PAPER, THE GALÁPAGOS ISLANDS, 600 miles off the coast of Ecuador, are perhaps the world's best protected wilderness. They have been the crown jewel of Ecuador's national parks since 1959, with 96 percent of their landmass protected within the park designation. The entire archipelago, with its 19 major islands and countless islets and rocks, is an internationally recognized World Heritage Site and Biosphere Reserve. The islands' National Park Service and Charles Darwin Research Station are a model for cooperative management and research. In 1986, the Galápagos Marine Resources Reserve was established, creating a zone of 15 nautical miles around the islands, within which commercial exploitation of marine resources is prohibited, while tourism with a licensed guide and local fishing are allowed.

Until recently, the Galápagos have been a showcase for enlightened management of a highly significant natural resource area. Now, however, they have become a case study for dealing with human population and economic pressures that threaten parks, protected areas, and marine reserves worldwide. These pressures are especially acute in developing nations, though they are also strong in the United States and elsewhere.

"The principal protection of these environments is their remoteness and inaccessibility," commented James Broadus, director of the Marine Policy Center at the Woods Hole Oceanographic Institution in Massachusetts and former adviser to the E
ation of the marine reserve. "Once that is overcome, typically there isn't strong institutional protection provided for them."

Tourism has grown steadily from some 4,000 visitors in 1970 to 41,000 a year today. Entrepreneurs have proliferated along with these visitors' numbers, and the population of island residents has swollen as desperate



migrants from mainland Ecuador continued to arrive, lured by rumors of tourist dollars hanging from cactus like so many Darwin finches. The arrival of so many migrants has created problems previously unknown in the islands. Unemployment, crime, and drug use are on the rise.

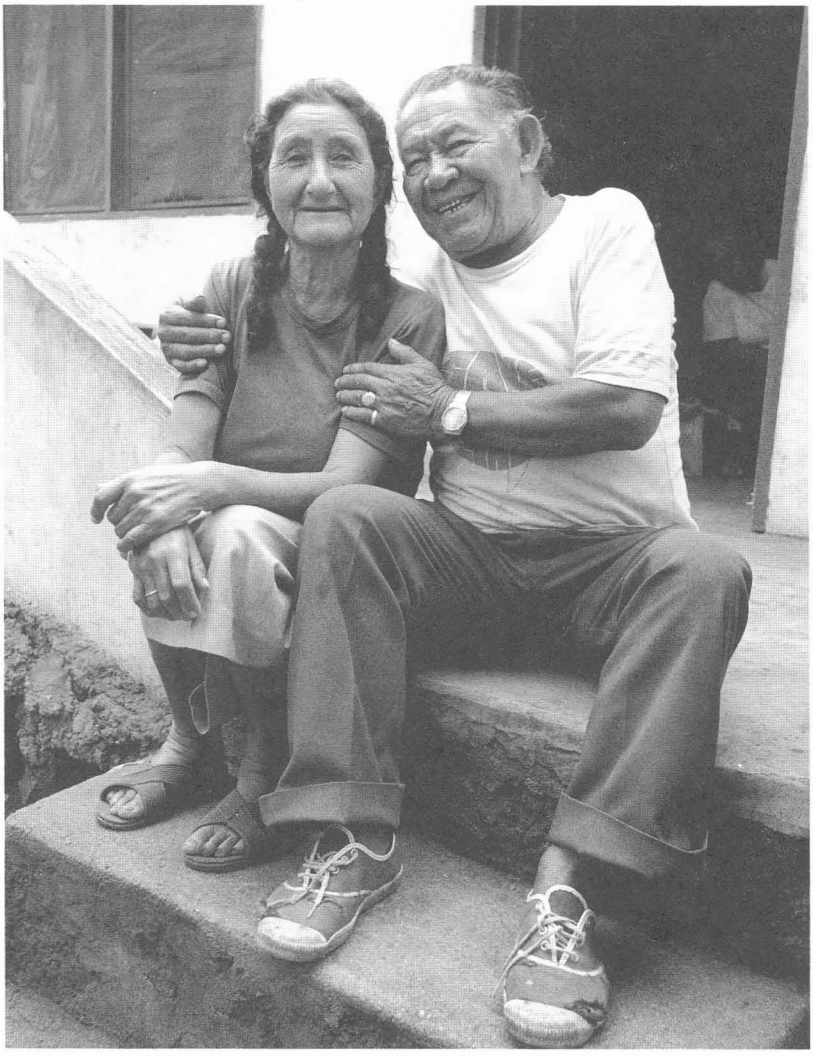
The park service and research station are woefully underfunded, and political pressures in Ecuador discourage moves to limit the migrations. In addition, blatant violations of laws and regulations governing the Galápagos Marine Reserve have added to the islands' problems. Tourist boats and staff from the research station have documented the killing of sharks for their fins. Tuna fishing by large ships is becoming common and, most recently, workers have been dropped off on isolated shores within the national park to collect sea cucumbers. The perpetrators of these illegal acts are both foreign boats and their crews, and Ecuadorians from the mainland with rumored backing of Asian companies. (Shark fin and sea cucumber are not consumed in Ecuador.)

HOW MANY PEOPLE?

Although most people assume that the Galápagos are uninhabited, and that they are populated only by native species, such has not been the case for a long time. Humans, introduced species, and native species have been inextricately linked on the islands for over four centuries. Pirates, whalers, and fur seal hunters sailed here seeking fresh water as early as the 1680s and captured giant tortoises to keep below deck for lean times between distant shores. The first human colonists came in the early 1800s, bringing animals that proved deadly to the insular and predator-free environment.

When the English naturalist Charles Darwin set anchor here in 1835, some 250 people—mostly political exiles and convicts—lived on Floreana Island. By the 1930s human residents exceeded 800. Tens of thousands of introduced horses, burros, cattle, pigs, burrows, goats, dogs, cats, rats, and mice flourished on at least four islands, destroying native and endemic species as they spread. Today the human population has soared to 14,000 across four islands. Introduced species continue as a serious problem.

Carmen Angermeyer (Puerto Ayora): "It's putting a lot of pressure on the place, people coming in so quickly. Not enough housing, water. Ya, too fast." She was born in Spain, arrived in 1934 with her parents.



Guillermo Flores Jaya and his wife, Zoila (Puerto Ayora) are accepted as "Galápagueños" although they only came from the mainland in 1970—that fact, in itself, is an indication of how fast this town has changed. "When we arrived there wasn't a dock or streets, only the main street along the edge of the ocean. Now here is a big city. Sometimes I have ideas that I will go back to my land to die. But my life is here. I am a Galápagueño.

Organized tourism started in the late 1960s and grew steadily. It is now the largest and most economically important activity on the islands. Brochures invite visitors to snorkel with sea lions in the "Enchanted Island," marvel at marine iguanas, and scale smoking calderas to contemplate 600-pound tortoises in "Darwin's showcase of evolution." Tourism limits are established yearly in Galápagos, only to be broken. And, limits on boat permits are considered laughable by locals. If you have enough money, they say, you can get a permit. The number of tour boats has increased from 10 in 1980 to some 90 today.

And yet, tourism in Galápagos is still considered a model of "ecotourism." Visitors must be accompanied by licensed guides at all times when inside the national park, and visits are restricted to specific sites with well-marked trails. Although garbage can occasionally be seen on the waters and beaches, and erosion is evident at some of the most popular visitor sites, until recently the impact of tourists has been kept under control.

One way to address the problems of human impact now facing the islands is to listen to Galápagos' old-timers—true Galápagueños. No indigenous people are known to have lived on these islands, so today's senior *colonos*, or settlers, know more about the rhythms, moods, natural history, and needs of these islands than anyone else. Many of the features that attracted them here—few people, ample land, freedom of movement—are dreams of the past, memories pushed aside by new visions, ideas, and management needs. But the Galápagueños' knowledge of how to live with the islands' finite resources is valuable information. It is a management resource that has not yet been tapped.

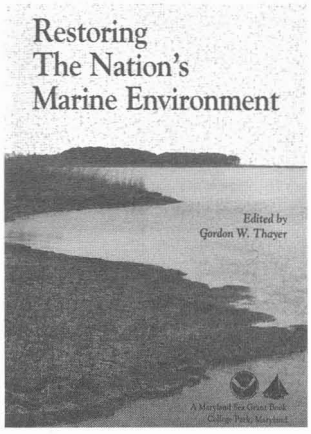
If limits can be set on migration and tourist numbers, if the international community can step forward with financial assistance, and if the Galápagueños are heard, perhaps this unique place can again serve as a model for managing park lands and wilderness areas worldwide. ■

Jerry Emory was chief of public relations for the Charles Darwin Research Station 1985-1986. He is working on a book about Galápagueños with photographer Stacy Geiken.

NO QUICK FIX

***Restoring the Nation's Marine Environment**, edited by Gordon W. Thayer, Maryland Sea Grant, College Park, MD: 1992, $45.00, 716 pp.*

ECOSYSTEM RESTORATION is an important ingredient in the environmental agenda of the 1990s. Environmental groups, government agencies, industries, consultants, and scientists are debating or involved in restoring damaged environments and creating artificial ecosystems on a small scale. Gordon Thayer's volume is a much needed addition to the restoration discussion. It is an assemblage of papers by experienced researchers from the proceedings of a symposium on habitat restoration sponsored by the National Oceanic and Atmospheric Administration and held in Washington, D.C., on September 25-26, 1990. It is relatively complete in its coverage of an array of estuarine-marine ecosystems. Most important, the book captures the essence of a significant debate about restoration projects.



About half the chapters enthusiastically describe the engineering technology of restoration. Building prefabricated reefs and restoring disused docks, damaged mangrove forests, coral reefs, or tidal wetlands are considered. Two chapters concern the role of governments in restoration and preservation of ecosystems. A panel discussion on that issue was made up of a variety of agency representatives. The enthusiasm of the most ardent protagonists of restoration technologies is balanced by chapters that discuss the limits of what restoration can accomplish. Joy Zedler, of San Diego State University's Pacific Estuarine Research Laboratory, reminds the reader of the hard choices and the challenges in trying to restore marsh environments. Success in engineering projects may be defined by immediate accomplishment of a simplistic goal (revegetation of a marsh, for example). However, Zedler shows that artificial and natural marshes are rarely ecologically equivalent. Compared with undisturbed ecosystems, artificial marshes have fewer species, simple food webs, and altered nutrient chemistry. She summarizes the symposium proceedings: "No one who listened to the talks could conclude that habitats are easy or quick to restore."

The book points out that the difficult challenges in restoring ecological function involve errors or inconsistencies in human management, failure to anticipate environmental change, physical simplification, and unanticipated chemical problems or biological events. An important theme of many of the papers is that inadequate appreciation of nature's complexities ultimately limits the accomplishments of many ecological engineering projects. Zedler, Mark Fonseca (NOAA, Beaufort, N.C.), David Schiel (Department of Zoology, University of Canterbury, New Zealand) and Michael Foster (Moss Landing Marine Laboratories), and K.V. Koski (Alaska Fisheries Science Center, National Marine Fisheries Service), emphasize that it is economically and ecologically better policy to avoid habitat destruction in the first place than it is to rely upon technology to restore and re-create ecological function.

In another interesting paper, S.J. Hawkins (Port Erin Marin Laboratory, Liverpool University, G.B.) and A.J. Southward (Marine Biological Association, Plymouth, G.B.) discuss a 25-year study of the recovery of rocky shore communities after the 1967 Torrey Canyon oil spill. Dispersants were widely applied on that spill where it reached shore, and the immediate damage from this response exceeded the damage

caused by the oil itself. The dominant plant and invertebrate species returned to normal levels of spatial and temporal variation in abundance only after 15 years. In contrast, shore communities that were covered with oil but not "cleaned up" recovered in as little as three years. Hawkins and Southward present a number of thoughtful suggestions to managers. One is that doing nothing may be an ecologically sound option for restoring rocky shores covered with oil. Such a solution does not bring the instant gratification that the public demands in highly publicized disasters, however. Schiel and Foster remind us in their paper that some types of ecological disturbance can occur on a much larger scale than oil spills. Kelp beds, for example, have been lost over hundreds of kilometers. If the source of a disturbance can be removed, natural recovery can occur rapidly. Preservation of some undisturbed ecosystem is a critical condition for natural recovery. If not enough undisturbed habitat is preserved nearby, recovery of a kelp bed is slow and highly variable. Thus, if the scale of disturbance grows too large, nature's ability to fix itself is impeded.

The papers in this volume are substantive although they are written simply. The book will be of interest to policy makers, planners, regulators, consultants, scientists, and other ecotechnocrats. It will be a valuable reference for those interested in the engineering technologies available to restore marine ecosystems. A wider audience should read the book less for the details than for the general message. Most of the experts emphasize the importance of ecosystem preservation and a policy choice. Less ecosystem protection is a danger if policy makers become undeservedly polyannaish about the technologies of restoration. While showing an appreciation of the technologies, this book makes it clear that it is not so easy to restore full function once we disrupt an ecosystem. It may not be uplifting to realize that we cannot always fix what we break, but it is an important lesson for the future.

Order from: Maryland Sea Grant College, Skinner Hall Room 0112, University of Maryland, College Park, MD 20742. Phone: (301) 405-6371.

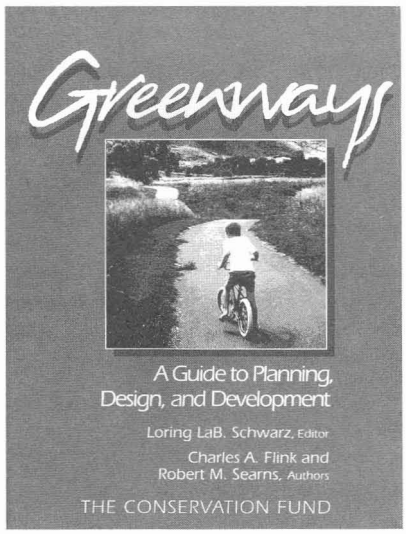
Reviewed by Sam Luoma, project chief at the U.S. Geological Survey. He has many years of experience in water quality issues.

GREENING OUR WAYS

Greenways: A Guide to Planning, Design, and Development, *Charles A. Flink and Robert M. Searns, edited by Loring LaB. Schwarz. Island Press, Washington, DC and Covello, CA: 1993, hardcover $45.00, paperback $29.95, 351 pp.*

Trails for the Twenty-First Century: Planning, Design, and Management Manual for Multi-Use Trails, *edited by Karen-Lee Ryan of the Rails-to-Trails Conservancy, Island Press, Washington, DC: 1993, cloth $49.95, paper $24.95, 213 pp.*

MOTIVATED BY THE BELIEF that open space areas must be incorporated into the built environment for the sake of both humans and wildlife, Charles Flink and Robert Searns have written a comprehensive guide that should be useful to a wide audience. *Greenways: A Guide to Planning, Design, and Development* covers virtually all aspects of greenway creation, from setting up a nonprofit organization to designing the necessary support facilities. The book includes thorough discussion of various techniques and tools available for planning and implementing greenways. The authors use case studies and specific examples from a wide variety of greenway organizations to illustrate points. They provide generous numbers of photographs and graphics in their discussions of conceptual project designs and basic landscaping techniques.



Well researched and well written, this volume will be valuable to anyone interested in developing or maintaining a greenway. Incipient organizations can learn how to get started and how to work with more established organizations, while more experienced groups can find guidance on the finer points of recreational use statutes, landowner liability, and other issues. The authors strike the right balance between providing relevant detail and referring the reader to other sources.

Both authors have extensive experience with greenway projects. Flink is president of Greenways, Inc., in Cary, North Carolina, and has worked as landscape architect on many greenway projects throughout the United States. Searns is president of Urban Edges, Inc., an urban design and planning firm in Denver, Colorado. He headed Denver's Platte River Greenway project, and developed the award-winning Arapahoe Greenway.

Order from: Urban Edges, Inc., 1401 Blake Street, Suite 301, Denver, CO 80202, telephone (303) 623-8107. Add $4.25 for shipping.

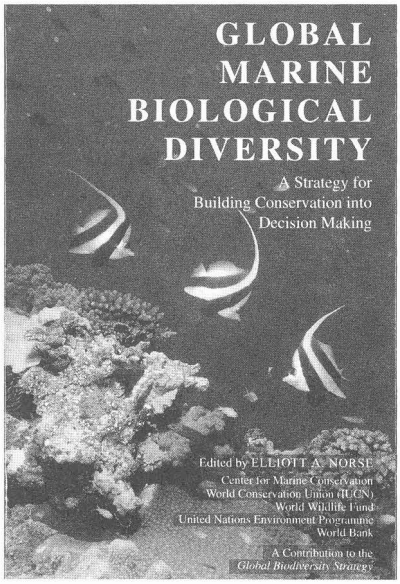
Reviewed by Joan Cardellino, manager of the Coastal Conservancy's Access Program.

TRAILS FOR THE TWENTY-FIRST CENTURY is a handbook for those planning, designing, and managing trails at the local, regional, or statewide level. It includes guidelines on planning, design, and the cultivation of partnerships for trail projects. Many useful details are provided.

PROTECTING THE DIVERSITY OF MARINE LIFE

Global Marine Biological Diversity: A Strategy for Building Conservation into Decision Making, *edited by Elliott Norse, Island Press, Washington, DC: 1993, cloth $50.00, paper $27.50, 382 pp.*

THIS BOOK, designed as a companion volume to the *Global Biodiversity Strategy* (World Resources Institute, 1992), is co-sponsored by the Center for Marine Conservation, the World Conservation Union, the World Wildlife Fund, the U.N. Environmental Programme, and the World Bank. It describes the nature of marine biodiversity, threats to its integrity, and tools for its conservation. Integrated



management that transcends fragmented jurisdictions is stressed. Australia's Great Barrier Reef Marine Park and the Sian Ka'an Biosphere Reserve in Mexico/Belize are cited among examples of such management. The final chapter makes policy recommendations at the global, national, and local levels. One key recommendation: that before marine resources are exploited, those who propose to exploit them prove that their actions will not undercut sustainable use, in keeping with the "precautionary principle," also known as "Do No Harm."

The book's sheer scope runs the risk of short-changing some issues. The final chapter recommends that sewage receive at least primary treatment but does not discuss what this level of treatment may—or may not—protect.

For resource managers, decision makers, and marine educators, this volume is a useful reference to the ambitious goals and base of knowledge of four influential environmental organizations. It should also serve as a useful baseline in evaluating how the World Bank practices the precautionary principle and other concepts it here recommends. ■

Reviewed by Wesley Marx, author of The Frail Ocean *(Globe Pequot Press, 1992).*

LETTERS

Editor:
After reading the latest edition of *Coast & Ocean* with the Los Angeles River featured I found myself having a strong emotional reaction to the pieces, notwithstanding that the issues are extremely political and technical.

I grew up in Montebello near the Rio Hondo—a major tributary of the Los Angeles River—in the late 1940s and 1950s, and have strong memories about the river. The street of older tract homes my friend lived on dead-ended on the edge of a cliff, the north side of the Rio Hondo overlooking Pico. To look over that bluff down into the river was to look into a place of mystery. I was attracted by the unknown with its green thickets, sandy bed, and pools of water. I didn't know it was a "habitat" at the time, can't remember a plant or animal that was there except for the "trap door spider," and both banks were developed housing areas. I think there was some riprap, but it was a wild place. It was an adventure to go into the river. At some point, I'm not sure when, it was turned into a big concrete ditch and the magic disappeared.

I wonder if the advocates for modest restoration of the system were like myself as children and appreciated the rivers before they were totally destroyed.

Richard Nichols
Sebastopol, CA

Editor:
Congratulations to Prentiss Williams on her well-written and insightful cover story article in the Summer 1993 issue entitled *The Los Angeles River: Overflowing with Controversy* and for getting the word out about the plight of the Los Angeles River as well as the many missed opportunities that the river provides as a natural resource in southern California.

If there is constructive criticism to be made, it would be that the article could have given more attention to the receiving waters of the L.A. River: San Pedro Bay. Long overshadowed by its higher profile neighbor to the north, Santa Monica Bay, San Pedro Bay has insurmountable water quality problems to overcome. Also, as a graduate student doing my master's thesis on nonpoint source water pollution as it pertains to marine debris, I have often been at a loss (even at times at some of my own colleagues) to understand how any intelligent discussion of the river's water quality problems can be made separate from that of the water quality problems of San Pedro Bay.

In a very real sense, the problems of marine debris in the river pale in comparison to the problems that marine debris presents to the coastal environment in San Pedro Bay. There, year after year, debris accumulates *en masse*, turning the beaches in Long Beach and other coastal communities into pollution sink-holes of unimaginable proportions. In fact, the problem was so severe from the 1993 rains that an estimated 7,000 tons of debris were removed along the shore in Long Beach alone. As an avid reader of *Coast & Ocean*, I was hoping to see more discussion on the coastal side of the marine debris dilemma. After all, the title of your publication is *Coast & Ocean* . . . right?

Richard S. Doucé, Friends of the Los Angeles River Technical Advisory Board

Dear Reader,
Are you a talented and underappreciated photographer? If so, you might be interested to know that* California Coast & Ocean *is always looking for good black and white images on subjects related to the California coast and San Francisco Bay. Perhaps you would like to offer some of your work to us? Or to try shooting something on subjects coming up in the magazine, for us to consider? If you are interested, call or write to me at the California State Coastal Conservancy, 1330 Broadway, Suite 1100, Oakland, CA 94612, (510)286-1015. In return, we offer a free subscription to the magazine!

Rasa Gustaitis, Editor

Pigeon Point Lighthouse

LIGHTHOUSE SEARCH

ON A LONELY POINT OF LAND where angry waves crash against rugged rocks, the beam of a lighthouse sweeps out over the dark sea repeatedly, guiding mariners to a safe course.

This romantic vision is fast becoming an anachronism, however, as traditional lighthouses have been largely replaced by electronic beacons emanating from skinny steel towers.

Lighthouses did not appear on the California coast until Gold Rush days, despite a history of hazardous navigation and numerous wrecks. Over the next century, nearly 50 lighthouses were constructed, from Saint George Reef north of Crescent City to Point Loma at the entrance of San Diego Bay.

Automation and modernization began replacing the traditional lighthouse with its solitary keeper in the 1960s, and many lighthouses were demolished. But the historical significance of the original lighthouses, together with the beauty of their coastal sites and their unique architecture, led many to seek their preservation.

Our mystery questions for this issue are: How many lighthouses still stand along the California coast? And, what are some of their current uses?

Extra credit if you can also name the very first lighthouse built in California!

Correct answers to one or both questions earn a free subscription to *California Coast & Ocean*.

P.S. If you are already a subscriber, you may name an organization or person who would appreciate the magazine.

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