

MARINE NOTES

SPOTLIGHT ON THE ENVIRONMENT

LAND TRUSTS *Partners in Protecting the Chesapeake*

BY JACK GREER

In the next 25 years, at projected rates of development, Marylanders will clear as much land as they have since the first colonists arrived — a potential loss of some 500,000 acres, or 780 square miles of farms and forests. This statistic comes from the Maryland Office of Planning, which estimates that in the last six months alone, the state lost nearly 10,000 acres of farm and forested land.

While these losses will impact the wildlife that depends on these lands, especially the forests, they will also impact water quality in the Chesapeake Bay and make it difficult to sustain the Bay Program's key restoration goal for improving water quality, the slashing of nutrients by 40 percent (from 1985 levels). The reason — forests serve as natural filters of nutrients and sediments, and thus buffer streams and rivers from land runoff. In effect, forests provide a natural stormwater deterrent — the conservation group American Forests has gone so far as to calculate a \$1.08 billion loss of such services because of trees cleared in the Baltimore-Washington corridor alone.

In the past quarter century (from 1973 to 1997), according to American Forests, land use changes resulting from development, accounted for a 51-percent decline in average tree cover in areas closest to the Bay, from Norfolk to near the Pennsylvania line.

Richard Cooksey, liaison between the U.S. Forest Service and the multi-state Chesapeake Bay Program, says that the figures generated by American Forests may tell a more revealing story than aggregated statewide statistics. For example, while Pennsylvania's statewide forest loss for 1985-1995 appears to be nil, the key watershed counties of Adams, Lancaster

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Land Trusts, continued

and York saw a loss of nearly 5 percent of their forests. Likewise, says Cooksey, while Maryland's forest loss for that same period measures some 4.2 percent, the loss in Baltimore and Harford counties was 8.5 percent — more than double. And while the loss posted for Virginia during that decade was around 4 percent, areas near the Bay lost 7 percent.

Much of this loss is “permanent,” Cooksey points out, since those trees were often replaced by houses, roads, parking lots, shopping centers, and other built structures. The question Maryland faces along with most other coastal states is whether it can reconcile the need to develop land to accommodate a growing population with its — and the Bay's — need for forests.

Location, Location, Location

Steve Seagle, a scientist at the University of Maryland Center for Environmental Science Appalachian Laboratory, studies the ecological functions of forests. The diminishment of our forests, he says, is compounded by breaking them up into smaller and smaller fragments, fragments too small to function like forests should. As we enter the next century, says Seagle, the question will be not only how many forests we have, but where we have them.

“Fragmentation has clear ecological effects,” he says. “It makes forests more vulnerable to invasion by exotic species, and it can change soil temperatures, and the quality of the light at the edge.” Fragmentation, he adds, can change “microclimates” that flourish deep inside a forest, where the effects of shade, shelter from wind and other factors create conditions favorable for a number of plants and animals. Those species are often called “interior forest” species — they range from certain insects to well-known neotropical birds, like the colorful scarlet tanager and the ovenbird.

Forests also help retain nutrients by taking them up from the soil and from the air. Many people, Seagle says, may think of old growth forests



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as inefficient in comparison with young, rapidly growing forests, both in their uptake of nutrients and in their economic role of producing “board feet” for harvest. But older forests, he says, do have large standing stocks of carbon and nutrients, both in the trees and in the forest floor. “We don’t know as much as we should about the important ecological role of the forest floor,” Seagle says, where large amounts of organic material, living and dead, accumulate and recycle over time.

In an effort to keep forests functioning as complete ecosystems, a number of groups and organizations — as well as the State of Maryland and the Chesapeake Bay Program — have mounted programs to encourage forested buffers along streams and forested corridors that could connect larger tracks of wooded lands. The most visible goal may be the Chesapeake Bay Program’s target of planting 2,010 miles of riparian forested buffer by the year 2010.

These programs, says Seagle, will undoubtedly have positive results, es-

pecially in terms of slowing runoff at the water’s edge and therefore helping to improve water quality. “Even if these buffers are planted in a willy-nilly fashion,” he says, “they will still have some positive effects — though they won’t fix the entire problem of forest fragmentation.”

According to Cooksey, while riparian forest buffers may not act like large segments of forest, they will provide important “corridors” which will improve habitat for the wildlife that live there — and there are estimates that over half of the Bay species spend time in those riparian forests. But “corridors” will not function if they lead to dead ends. How can we ensure that enough

contiguous areas can be held together to form such corridors? Are there ways to link riparian buffers with larger forests? Who owns most of that forest — whether by the river’s edge or upland — and how can those forest “landlords” help conserve the trees that remain?

A Patchwork Dilemma

From the air, Maryland’s bayshore forests look like continuous masses; in the plat books of county seats, though, they are divided into a mosaic of ownership — including many small plots of privately-owned land.

In short, Maryland’s forests are like a jigsaw puzzle that doesn’t easily fit together.

Of the state’s more than 2.7 million acres of forest land, only 10 percent is publicly owned — 90 percent is in private hands according to Gary Allen, chair of the Governor of Maryland’s Forestry Task Force. Further, Allen says, more than 65 percent of Maryland’s estimated 130,600 private (non-industrial) forest land owners hold parcels of land that are 10 acres

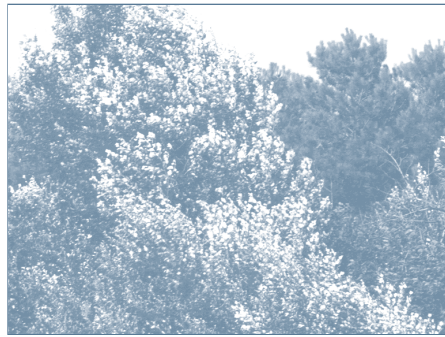
or fewer. This means that the fate of the state's woodlands rests primarily with thousands of private landowners who may not even realize that they hold the key to the future of the region's forests.

"This is not only 'fragmentation' but 'parcelization,'" says Cooksey. Fragmentation, he says, refers to the breaking apart of an ecological unit. Parcelization refers to the segmenting of forested land in terms of ownership and management. Land that is "parcelized," he says, is difficult to manage, and vulnerable to development.

According to American Forests — and Seagle agrees — this trend toward fragmented or parcelized forest ownership will persist, as large land holdings continue to break up. "Forested lands have increased in some areas because farmers have retired, or simply aren't actively farming the land," Seagle says. But as farmers sell off land to support their retirement, or as inherited farms are broken up and sold for development, lands that may have been on one deed will now most likely be on many. Says Seagle, "We obviously can't expect retiring farmers alone to preserve our forests."

Cooksey notes that the effects of agricultural change on forest lands will differ from one locality to another. For instance, some farming areas on the Eastern Shore are very productive, and forests are not growing back. On the other hand, he does see agricultural trends having a clear effect in some areas, such as the Hudson River valley. This is part of a very widespread trend, says Cooksey. As land changes hands these days it tends to move "out of the hands of people who have historically worked the land — like farmers and foresters — and into the hands of those we might call white collar." These landowners may let the trees grow, but whether trees in a heavily suburbanized area will actually behave like a forest, no one knows.

For those concerned about the health of the Chesapeake watershed, how can we assure that a "critical mass" of trees will be left to provide the true functions of a forest?



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The Role of Land Trusts

"I think that land trusts will play a tremendous role in terms of forest conservation," says Cooksey. "And smart growth [the clustering of development to avoid unwanted sprawl] as well." The reason, Cooksey says, is that the people working for local land trusts have local knowledge — they know the owners and managers of the land." He thinks the land trusts can provide "groundtruthing" as forest conservation plans are put into effect. "Who better to act as an ombudsman than people who have local interest and knowledge?" he asks.

According to Rob Etgen, executive director of the Eastern Shore Land Conservancy, land trusts have become much more aware in the past several years of the ecological importance of open space and preserved landscapes. "We see this trend nationwide," he says. Etgen notes that the Eastern Shore Land Conservancy is currently working to save a significant land parcel just over the Bay Bridge that is one of the largest contiguous blocks of forest land in the mid-Shore area.

In Cooksey's view, these riparian forests are especially "strategic." Though they only comprise some 5 to 10 percent of the land in the watershed, he says, they play a key role in providing habitat and protecting

water quality. Unfortunately, he says, close to 50 percent of these stream-side and shoreside forests are now thought to be disturbed or degraded.

Another conservation group well known for its policy of purchasing lands to protect them is the Nature Conservancy — the Maryland Chapter has singled out for protection what it sees as four of the most biologically significant and least disturbed waterways in the Chesapeake region. These are the Nanticoke River on Maryland's Eastern Shore; Sideling Hill Creek, a watershed that drains 100,000 acres of western Maryland and Pennsylvania before entering the Potomac; Nassawango Creek, an 8,000-acre watershed on the Eastern Shore which feeds into the Pocomoke River; and Nanjemoy Creek, a 3,000-acre system which flows into the Potomac just south of Washington and home to a large blue heron rookery.

The price tag the Nature Conservancy placed on this effort when it was announced came to \$10 million.

Of course not every local land trust can expect to raise that kind of money. The names of these trusts often reveal their local focus: the Harford Land Trust, the Fairfax Land Preservation Trust, the Potomac Conservancy, the Canaan Valley Institute. (See sidebar, "Local Land Trusts" on page 4.) "Many local land trusts not only lack the funds, but they lack the personnel to organize large fund raising efforts," says Elizabeth Hickey, of the University of Maryland's Environmental Finance Center. Hickey and others are interested in ways that small land trusts could work together to accomplish their goals — by sharing resources, such as computers and GIS information, for example, or by better using established networks such as USDA's Natural Resource Conservation Service to get the word out about their efforts.

In some sense, the land trusts face the same problem as the forests themselves: separate ownership and fragmentation. Is it possible to join these fragments and, in effect, create a patchwork forest from public and private forest fragments? One way is through obtaining easements from private owners.

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Local Land Trusts

BY ROB ETGEN, EXECUTIVE DIRECTOR, EASTERN SHORE LAND CONSERVANCY
AND NICK WILLIAMS, MARYLAND ENVIRONMENTAL TRUST

Land trusts are said to have originated with a group of citizens in Stockbridge, Massachusetts who, in 1853, started a “village improvement society” — their purpose was to set aside land for public enjoyment. Local land trusts grew slowly through the 20th century; in the last several decades, however, their numbers have exploded: there are some 1,200 in the U.S., and they’re increasing by about 50 a year. When it comes to local land use practices and policies around the country, land trusts are now a major player. According to a 1998 survey by the Land Trust Alliance, a national land trust umbrella organization, local and regional land trusts have saved more than 4.7 million acres of America’s open spaces.

For years, land trust activity in Maryland lagged far behind other states, especially New England, with only six trusts operating prior to 1989. Today, 43 trusts are active in the state and their accomplishments are impressive. By the end of 1998, Maryland’s local land trusts were directly responsible for protecting 36,530 acres of the state’s endangered open spaces and natural areas, more than a three-fold increase over the 11,590 acres in 1990.

What Is a Local Land Trust?

Land trusts are generally private, nonprofit charitable corporations

dedicated to land conservation. They protect land resources through a variety of techniques, most of which involve leveraging their tax exempt status. For decades, Maryland has been the beneficiary of national, regional and statewide land trusts such as the Nature Conservancy (44,000 acres protected), the Chesapeake Bay Foundation and the Maryland Environmental Trusts (63,460 acres). Unlike these larger organizations, local land trusts are generally formed and run by local residents; though the lands they acquire may not meet criteria of the larger organizations, they are extremely valuable on a local scale.

Some groups such as the Cecil Land Trust have been combining their land trust function with broader educational and community service goals. Others like the Gunpowder Valley Conservancy have chosen to add a land trust “arm” to an existing organization. And in western Maryland, five local trusts established an association primarily to apply for region-wide grant funding under the State’s Rural Legacy Program.

The types of lands that local land trusts seek are numerous and varied. As Jean Hocker, Executive Director of the Land Trust Alliance, says, “Different trusts may save different types of land for different reasons. Some preserve farmland to maintain economic opportunities for local farmers. Some

preserve wildlife habitat to ensure the existence of an endangered species. Some protect land in watersheds to improve or maintain water quality. Whether biologic, economic, productive, aesthetic, spiritual, educational or ethical, the reasons for protecting land are as diverse as the landscape itself.”

Tools of the Trade

Land trusts have been employing sophisticated techniques to accomplish their goals, though common to all is a focus on meeting the needs of landowners without sacrificing the environmental or natural assets of a property. While the most obvious way to protect land is outright purchase, that has become increasingly difficult because of prohibitive land prices throughout much of the state. So land trusts have developed a variety of approaches (see “Methods for Protecting Land” on page 5).

With conservation easements, the landowner and conservation organization negotiate the restrictive provisions that will both protect the environmental assets of the property and allow the landowner reasonable use. Once the terms are agreed upon, the easement is executed and recorded in the county land records. The conservation organization then begins the perpetual responsibility of monitoring the property to ensure that restrictions are not violated by either present or future owners. Because land acquisition and management costs are so high, Maryland local land trusts are placing greater emphasis on the use of donated conservation easements.

Owners of certain types of land, or land in designated areas, may also apply to sell easements to local, state and federal programs such as the Maryland Agricultural Land Preservation Foundation, the state’s Rural Legacy Program and USDA’s Forest Legacy Program.

The majority of land trust conservation easements in Maryland are donated by property owners. According to John Bernstein, Director of the Maryland Environmental Trust, which holds 478 conservation easements that protect 63,460 acres, “the prima-

Methods for Protecting Land

► **Bargain sale** — purchase by the land trust at an agreed upon price that is below the fair market value of the land. The IRS considers the difference between the fair market value and the sale to be a landowner's charitable contribution and, therefore, deductible for income tax purposes. Bargain sales allow the landowner and land trust to adjust the transaction to balance the need for immediate income with longer term tax advantages. Some local trusts such as the Harford Land Trust use this technique to "preacquire" parcels that local or state government envisions as a future park, forest, wildlife area or recreational area. The land can be transferred later on to a public agency and the local land trust reimbursed.

► **Donated conservation easements** — a voluntary and perpetual legal agreement between a property owner and a land trust which restricts the type and amount of future development. Typical provisions include restrictions on most or all residential, commercial, and industrial development, prohibitions against dumping, and requirements that landowners maintain vegetated buffer strips along waterways.

► **Conservation buyer transactions** — the land trust purchases a property, protects it with a permanent easement, and resells it with the permanent restriction (often with a reserved right to build one house). The buyer benefits from the lower price of the restricted land. In counties with Transferable Development Rights (TDR) programs, land trusts may finance the deal by selling TDRs from the property to developers seeking greater building density in designated growth areas.

ry motivation for donation of easements is the sincere desire of the landowner to have his or her land preserved for future generations." At the same time, there are also tax advantages with conservation easement donations, for instance, a charitable deduction can be taken that is equal to the fair market value of the development rights surrendered. Conservation easements are now at the forefront of techniques that land trusts use. As Jan Hollmann, former President of the Severn River Land Trust, once said, "We get perpetual protection for critical lands without the worry of changing laws and without the management cost and responsibility of land ownership."

Government Interest

Many local and state government agencies have recognized the limitations of zoning and public acquisition for protecting open space and natural areas — for this reason, they have been increasing financial support to

land trusts to protect resources. With passage of the 1990 Consolidated Land Preservation Act and subsequent appropriations from the legislature, the Maryland Environmental Trust now administers a \$1.5 million revolving loan fund for local land trust acquisition projects; it also provides \$20-30,000 a year for small operating grants to local trusts.

Maryland's Rural Legacy Program (RLP) encourages land trusts to partner with counties in defining priority rural resource areas for easement and fee purchase protection. Local trusts such as the Carroll County Land Trust (CCLT) also negotiate easement purchases on behalf of Program Open Space, the state's primary acquisition arm for state forest and park lands.

In recent years, the Department of Natural Resources has shown increasing interest in local land trusts managing newly acquired state lands. The American Chestnut Land Trust, for example, manages DNR's Jett property in the Parkers Creek watershed.

Some counties are investigating various mechanisms to encourage and assist local trust activity. Calvert County, for instance, has established a \$1 million revolving fund for local land trust acquisitions and the American Chestnut Land Trust used this fund to acquire a 140-acre farm. Meanwhile, Montgomery, Harford and Anne Arundel counties have all passed property tax credit ordinances implementing the Conservation Lands law.

Other local governments have discovered conservation easements as a way of preserving natural areas which could be sold as surplus by a changing administration. The conservation easement will maintain the property in perpetual open space regardless of future political changes. The Maryland Environmental Trust currently holds conservation easements protecting publicly owned Jefferson-Patterson Park in Calvert County, James Run Watershed in Harford County, a Charlestown waterfront park in Cecil County, a Severn River shoreline property owned by Anne Arundel County and others.

Looking Ahead

Population growth and land development in Maryland are continuing. Forests are being cleared at a rate of roughly 5,000 acres a year. The Department of Agriculture estimates that an average of 13,630 acres of agricultural land was converted to other uses each year during the 1990s; more than 24,000 acres were lost in the last two years. In addition to the elimination of natural and open space lands, unmanaged growth or sprawl has led to increases in pollution and congestion, not to mention impacts on quality of life.

The surge in local land trust activity in Maryland could not have come at a better time. With the cumulative impacts of overdevelopment and increasing awareness of the real costs of sprawl, public support is growing for more effective preservation of natural areas. Through their free market, entrepreneurial approaches, local land trusts are likely to play an ever greater role. ♡

Land Trusts, continued



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A Patchwork Solution?

The Land Trust Alliance is one group trying to help local trusts, large and small, work together. By its estimate, there are some 1,227 local, regional and national land trusts in the U.S. Funding is of course a major stumbling block, though many trusts have been successful in garnering support to buy up open space and streamside and forested land. Purchasing easements on pieces of privately owned property to save “ordinary” woods, however, could be a fund-raiser’s nightmare.

According to Hickey, “The key will be finding a way to fund the purchase of easements along a targeted stretch of the watershed. We can’t rely on government subsidies for this. We will need to tap private capital.”

Michael Curley, a member of the U.S. EPA’s Environmental Finance Advisory Board, wonders why there couldn’t be something like a revival of the grange concept. “It worked for farms,” he says. “Why couldn’t it work for forests?”

The idea here would be for owners of tracts of forest — no matter how small — to join the forest “grange,” agreeing to set aside easements on their land to protect trees from the ax. But who would run these “granges” in small towns throughout the state?

Local land trusts could. Or where there are no land trusts, Curley says, “let the volunteer fire departments run them. Someone local. Someone the people trust.”

Such an effort would save the forests from the grassroots up, using the power of individual landowners to save the forests, rather than dismantling them, piece by piece.

But would the average Bay-area landowner be willing to give up his or her development rights? Depend-

ing on their socioeconomic level, could they afford to?

If experts like Richard Cooksey are right, in many suburbanized areas, land owners with white collar jobs may well be willing to set aside easements. Curley notes that he has already done this on his Maryland property, once a farm.

For those in more remote areas, where the need to harvest or sell forest lands may be far greater, the challenge could be more difficult. According to Mick Womersley, of the University of Maryland School of Public Affairs, land preservation incentives do not necessarily serve this outlying, and often poorer, population very well. This group may not have access to information, and may not benefit from certain incentives, such as conventional tax breaks.

The Prognosis?

Whether through the grange concept or some alliance of many small land trusts, the protection of the Chesapeake watershed’s remaining forests lies in the hands not only of large land holders — whether states or big businesses — but in the multitudinous hands of small landowners. The question of whether the watershed’s forest jigsaw can be held together depends on answering a number of very difficult questions. Who will reach all these private landowners with the message that they hold the fate of the region’s forests in their keeping? How will the landowners respond, even if they hear this message? What factors will weigh in the balance, between private property rights and a desire to preserve woodlands? Just how important are forests and woods to the average citizen? How much do they care?

These questions, along with the difficult puzzle of how to pay, line the path of those who do want to save what remains of forests in the Chesapeake region. As we move through the next century, photographs taken from space will tell the tale — of a green quilt of trees and streamside buffers, connected by wooded corridors, or a broken jigsaw puzzle of forests fragmented by highways, homes and shopping centers. ✓

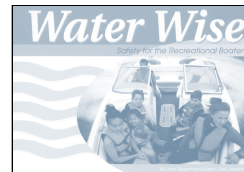
Publications

Marine Bioinvasions

A significant economic and environmental concern on a regional, national and global level, marine bioinvasions were the subject recently of The National Conference on Marine Bioinvasions sponsored by MIT Sea Grant. At the gathering, U.S. Secretary of the Interior Bruce Babbitt called for increased funding, worldwide cooperation and formal enforcement measures to address the problem.

A new 4-color MIT Sea Grant publication, “A Quick Guide to Marine Bioinvasions,” provides an introduction to the topic, with basic hows, whys and whats answered. For a copy of the free publication, contact MIT Sea Grant by e-mail, chardi@mit.edu; phone, (617) 253-7092; or mail, MIT Sea Grant Publications Ordering, 292 Main Street, Building E38-300, Cambridge, Massachusetts 02139.

Recreational Boating Safety



Each summer, thousands of novice boaters head for the nation’s rivers, lakes and

coastal waterways with scarcely a clue about safe boating. The results are sometimes tragic.

But it doesn’t have to be that way. A few minutes with *Water Wise: Safety for the Recreational Boater*, the latest safe boating guide from the Alaska Sea Grant College Program, can save recreational boaters time, trouble and money. And it can help make boating a safe, memorable adventure.

The U.S. Marine Safety Association and the Alaska Sea Grant College Program collaborated to publish the book. *Water Wise* is designed to meet the needs of novice and veteran boaters alike. It is written by experts Jerry Dzugan and Susan Clark Jensen in a straightforward style with dozens

End Notes

of photos and graphics throughout the book's 200 pages.

Chapters cover preparations for a safe trip, reading the weather, survival on the water, first aid, fire fighting and prevention, personal flotation devices, rescue signals and communication electronics, safe seamanship, and several other major topics.

Water Wise is available from Maryland Sea Grant for \$19.95. Call (301) 405-6376, e-mail connors@mdsg.umd.edu or check the online catalog at www.mdsg.umd.edu/store. For other information about the book, call Alaska Sea Grant, (907) 474-7449 or check their web site, www.uaf.alaska.edu/seagrant/. The book may also be ordered from Alaska Sea Grant.

Marine Aquaculture in the 21st Century

What will marine aquaculture look like 25 years from now and what will it take to get it there? These were the questions posed to participants of a roundtable discussion held at a marine aquaculture workshop on 26-27 June 1998 at the University of Connecticut Stamford campus. Cosponsored by Connecticut Sea Grant and the University of Connecticut Biotechnology Center, the workshop featured invited speakers from Israel, Ireland, Canada and the United States.

Four technical sessions at the workshop focused on emerging technologies and operational systems that will help increase aquaculture production over the next decade, both on land and offshore. Many presentations focused on minimizing environmental impacts. Others addressed the application of biotechnology to aquaculture production.

Extended abstracts from the workshop and a white paper summarizing directions for marine aquaculture in the 21st century are available from Connecticut Sea Grant. The abstracts cost \$5.00 plus \$1.50 postage and handling. For information on the cost of the white paper or to order either publication, call (860) 405-9127.

Web Sites of Interest



■ **What You Can Do to Clean up the Chesapeake.** A publication called *Fragile: Handle with Care*, recently produced for the Maryland Tributary team by "SunSource" of the *Baltimore Sun*, offers ways in which individuals can help clean up the Bay. The publication was printed as a supplement to the *Sun* in June and is also available on the web at www.dnr.state.md.us/bay/protect.

The online publication covers clean-up in the home, yard, roads and fields and community as well as classroom activities for young people. Maryland's Tributary Teams — comprised of local citizens, farmers, business leaders and government officials appointed by the Governor — are working to keep local waterways clean and healthy.

■ **Students Can View Research Vessel Operations on Web.** The National Oceanic and Atmospheric Administration has created a web site that enables students with an interest in ocean science to track the operations of a Hawaiian-based NOAA fisheries research ship. Through the web site, students can also contact and interact with ships' officers and scientists while they are at sea conducting research on Hawaiian monk seals, coral reef fish, seabirds, lobsters, yellowfin tuna, and swordfish.

The officers of the NOAA ship Townsend Cromwell, in collaboration with NOAA Fisheries Honolulu, initiated the web site with the help of a Pioneer Grant. Using the Internet and Inmarsat (satellite communications), the project enables students to track the vessel's position through posted electronic charts and to view pictures taken aboard ship and from small

craft conducting research around the coral atolls. Though geared toward high school students, the project is open to all. Students and teachers can access the website and ask questions about what they see. Questions will be answered by knowledgeable persons aboard and posted back on the web site for all to view and benefit from. The web site address is: atsea.nmfs.hawaii.edu.



■ **Volcano Cruise.** On January 3, 1983 fountains of lava erupted from a fissure on Hawaii's Kilauea volcano, sending rivers of molten rock flowing towards the sea.

Sixteen years later, the eruption continues with no signs of letting up.

Scientists from around the world have converged on Kilauea to witness these fireworks. Though more is now known about the volcano than any other volcano in the world, many of Kilauea's secrets remain hidden beneath the Pacific. Scientists continue trying to unlock some of those secrets. Deep underwater on Kilauea's east flank, numerous eruptions have built a ridge that extends 75 kilometers from the shore and plunges to a depth of 5,400 meters. This is the Puna Ridge. Within it lie vital clues to Kilauea's past and future.

A new website, called "Voyage to Puna Ridge," follows the daily activities of scientists aboard the University of Washington's R/V *Thompson* during an October 1998 cruise. The site, www.punaridge.org, was funded by WHOI, NSF and the Hawaii Department of Education. Read daily reports from researchers on the cruise off Hawaii to study the underwater aspects of Hawaii's Kilauea volcano. Also included are journals written by teachers who brought their classrooms along for the adventure, "science factoids," learning activities and a media gallery of images.

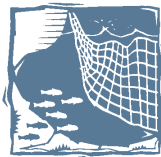
Calendar

July 24-30 — Coastal Zone 99

San Diego, California. Program and registration information is now available for the upcoming CZ99 conference at the Town and Country Resort. This year's conference, entitled "The People, the Coast, the Ocean — Vision 2020," will explore issues related to coastal management and planning, engineering and technology, public participation, dispute resolution, and program and policy evaluation, to name a few. Contact the Coastal Zone Secretariat by phone, (617) 287-5577; e-mail, cz99@gemini.cc.umb.edu; or on the web at omega.cc.umb.edu/~cz99.

September 25-28 — Agr omedicine

Raleigh, North Carolina. The 12th annual meeting of the North American Agromedicine Consortium will address all aspects of occupational and



environmental health and safety in agriculture, forestry and fisheries.

The North American Agromedicine Consortium (NAAC) founded in 1988, is an affiliation of faculty representing schools of agriculture, forestry and natural resources, life sciences, family medicine and representatives from government, agribusiness and voluntary agencies. The consortium has held biannual meetings for the past eleven years. These meetings have offered participants an opportunity to share, through a multi-disciplinary approach, their expertise and resources in public service, education and research for the enhancement of agricultural, forestry and fisheries safety, and health in the the U.S., Canada and Mexico. For conference information, call (919) 350-8547 or check their website: www.rheswakeahec.org/.

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