MARYLAND

Research, Education, Outreach *September-October 1994*

MARINE NOTES

SPOTLIGHT ON ENVIRONMENTAL FINANCE

THE COST OF CLEANUP: *FOOTING THE BILL*

Whether flowing off the Chesapeake's vast watershed or falling from the sky in rain and snow, too many nutrients find their way into the Bay's rivers and mainstem. According to most researchers, these unwanted nutrients, mostly nitrogen and phosphorus, fuel unwanted algal growth and loss of vital oxygen in the estuary. Because of these consequences, nutrients — from sewage, from fertilizer, from air pollution — have come to represent the estuary's most significant systemic problem.

States in the Bay region, joined by the federal government, have committed themselves to reducing that unwanted load of nutrients by 40 percent (based on 1985 levels) by the year 2000. But with nutrient-reduction plans taking shape for each of the Bay's tributaries, citizens and decision makers alike have turned their attention to a nagging question: how much will these efforts cost, and how will we pay for them?

Throughout the summer and early autumn, a Blue Ribbon Panel, chaired by Eileen Rehrmann, County Executive of Harford County, has struggled with this funding issue, trying to rise above the normal debate about raising or cutting taxes. Appointed by Maryland Governor William Donald Schaefer, the Panel has wrestled with charts and graphs and a pile of information about waste treatment plants, stormwater runoff, agricultural programs and resource protection.

Their assignment: to come up with creative funding mechanisms to implement a "Tributary Strategies" plan, the state (and Bay Program's)

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THE ISSUE AT A GLANCE

■ **THE GOAL:** To reduce the flow of nutrients into the Chesapeake Bay by 40% and to hold it there.

■ **THE CHALLENGE:** To raise an estimated $60-90 million a year to pay for new or expanded Tributary Strategies programs to accomplish this goal.

■ **THE PROBLEM:** How to pay the bill, if current taxes do not cover the shortfall.

Maryland's Ten Bay Tributary Basins

Cleanup, cont.

effort to clean up the streams and rivers that feed the Bay.

Their task has not been an easy one. Estimates are that cleaning up the tributaries could cost an additional $60-90 million a year.

The Nutrient Problem

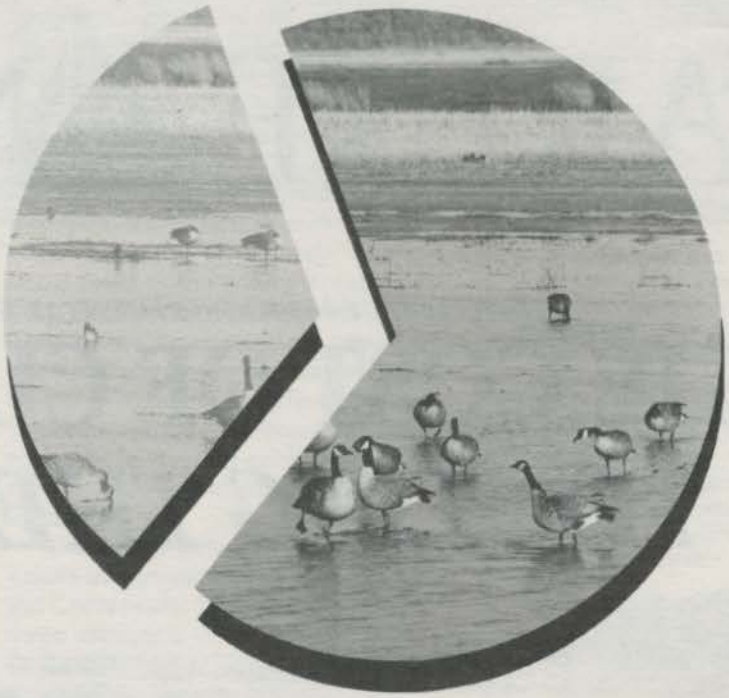
When the problem of excess nutrients was discovered, the Bay states began working to stem the tide of phosphorus and nitrogen entering the Chesapeake, beginning with waste treatment plants.

"We know how to control most nutrients," says Cecily Majerus, Governor Schaefer's coordinator for Chesapeake Bay programs. "We already have programs for reducing nutrients from waste treatment plants, for example. And the level of phosphorus entering the Bay is already down. The biggest problem is nonpoint."

"Nonpoint" is a term our forebears would not have known, though they would have understood at least part of the problem: runoff from land that has, for example, lost the protective forest cover.

"If you look at cores from the Chesapeake Bay bottom," says Grace Brush, researcher at The Johns Hopkins University, "you can see exactly when the clearing of land began." What you see, according to Brush, is an influx of sediment, and a change in pollen type, from oak, maple and ash to crops like tobacco and corn. "The changes in the Bay began with deforestation," Brush says, "and then became more pronounced with the use of fertilizer."

But the problem of nonpoint pollution has worsened over this last half century: with population surging in the Chesapeake region — an 18 percent growth is expected in Maryland by 2020 — and with the development of once-pristine areas, suburban communities, streets and highways have also become a sizable source of nutrient loading to the Bay. With an increase in the problem has come an increase in the need for funding.



Maryland is about two-thirds of the way toward funding programs needed to clean up Chesapeake Bay tributaries. According to natural resource experts, full funding will make possible the 40% reduction of nutrients necessary to turn the tide for the Bay's health.

The Funding Dilemma

According to many mayors and planners in small communities, there are two major funding difficulties connected with nutrient reduction. The first is the drying up of federal construction grants — especially for waste treatment facilities — and the second is how to finance projects to stem nonpoint pollution, such as stormwater runoff from urban and suburban lands and the runoff of fertilizer from agricultural fields.

"People don't realize that these [nonpoint problems] are structural problems," says Donald Outen, Chief of the Bureau of Water Quality and Resource Management in Baltimore County. "These problems will become more expensive if we ignore them. This is something the locals will get stung by."

Outen points to erosion and the channelizing of stream beds, for example. Though the state's Tributary Strategies aim at restoring waterways for environmental reasons, channelized stream beds can, Outen says, cause mechanical problems, exposing pipe lines running beneath the streams, such as sewer lines. Stream erosion can also cause problems for bridges and other infrastructure.

"It's a massive problem that is not in the public consciousness yet," says Outen. "It's like taking care of a cavity, before it rots your teeth."

In Baltimore County, according to Outen, his department has adapted a watershed approach, working environmental mandates and a special restoration fund into their normal capital budgeting process. "Some people raised their eyebrows," he says, when these environmental projects were made part of the capital budget. "But I talked to the budget committee," Outen says. "They understand the need. Paying for water quality is no less important than paying for potholes."

Outen and others often point out that funds are frequently available from Federal and other sources, if one looks hard enough. In Baltimore County, for example, they are taking advantage of opportunities to work with the Army Corps of Engineers, the Fish and Wildlife Service and others who can help fund environmental projects. "We are not waiting for funds to be passed down through the usual channels," Outen says. "We are working directly with the Feds."

Despite the availability of some money for nutrient-reduction efforts, Outen expects that their current budget will not be enough, as Baltimore County, like other counties, continues to focus on nonpoint issues. And beyond this, there are often "institutional problems," according to Outen, which can make money harder to get from the State.

"I see two problems," says Outen. "One is that many state programs have a cost share element. And many small counties and localities just can't afford their share of the cost." This means, according to Outen, that many such programs end up primarily reaching the larger, richer counties.

The second problem, he says, is that projects are often constrained by the state fiscal year. "The state expects the locals to spend funds in a year, which locals often cannot do," Outen says. "It usually takes a minimum of two years for a capital project," he says.

Outen is not alone in wondering whether there could be more flexibility in the way funds are used to address environmental problems. The Blue Ribbon Panel convened by Governor Schaefer has also been examining ways in which state and local governments could more easily shift funds or otherwise adapt sometimes rigid budget regimes to the more holistic approach appropriate to watershed-wide management.

In order to attack this problem, a number of resource managers and others are teaming up with investment bankers, private financial consultants and bond experts to explore the answer. At a recent meeting at the University of Maryland, for example, an unusual mixture of financial experts and environmental analysts came together to discuss the problem and urge each other on in the quest for some creative solutions. Although some have used funding shortfalls created by federal environmental laws (so-called "unfunded mandates") to push the elimination of various environmental programs, others have taken the funding issue as a challenge. Innovative approaches to finance could help defuse what may become an increasingly polarized debate. (See box above.)

Environmental Finance

For more than two years, the University of Maryland System has operated an Environmental Finance Center, part of the Coastal and Environmental Policy Program now housed at the Maryland Sea Grant College. The Center puts on conferences and roundtables in order to attract creative thinking from financial experts, planners and others.

At the First Annual Mid-Atlantic Conference on Environmental Finance, sponsored by the Environmental Finance Center and supported by the Environmental Protection Agency, financial creativity was not lacking. Financial advisors like Scott Resnick, founder of Commonwealth Development Associates, spoke of "slicing and dicing," and other financing techniques normally considered the purview of Wall Street. Resnick pointed toward the use of structured municipal bonds that could differentiate risk and result in lower interest rates. These approaches could be used by small entities that do not normally take advantage of such techniques.

Michael Curley, a private investment banker and a member of the EPA's independent Environmental Finance Advisory Board, asked the audience to consider all the small waterworks around the country, all funded on a small-time basis, paying not-so-great rates to their local banks. These waterworks, he found, were on the whole extremely reliable investments, yet, he said, only about 5,000 of 60,000 nationwide have investment grade ratings. "They have simply been overlooked," says Curley.

"Why not," suggests Curley, "have many of these water systems join together, to share a common bond?" With waterworks from all over the country pooling their resources, he points out, they could negotiate large, long-term bonds at good rates. The savings on their debt service alone would cover anticipated costs for breakdowns or other predictable problems. "I estimate an immediate cost savings of twenty-five percent on the debt service," Curley says, "and it hasn't cost the rate payer a thing."

There are, Curley points out, some snags. Many states do not allow dealings of this type across state lines, or in some cases across county lines. Laws would have to be changed to make this work. But he asked the audience to consider the potential.

The Environmental Finance Center plans additional meetings and programs. For more information, contact Elizabeth Hickey at Maryland Sea Grant, (301) 405-6383.

Economies of Scale

One question confronting the Blue Ribbon Panel (and others in the state who are puzzling over ways in which to fund nutrient-reduction programs) is whether there are economies of scale — or economies of cooperation — which could loosen constraints on funding or make funding more efficient.

Currently under discussion by the Panel are a range of possibilities for different groups or even individuals to join together to seek funds. Farmers in a given region could, for example, jointly fund the building of, say, animal waste containment structures. Rural counties in a given watershed could pool resources to address the most pressing runoff problems in their river basin. Counties or municipalities could join together to form "watershed districts" that could charge fees for nonpoint programs, just as they do for more conventional "point-source" projects. If these or similar ideas found their way into practice, a solution to the funding of nonpoint pollution programs could be much closer at hand.

Regardless of what ideas may emerge, most Panelists argue that local, state and even federal govern-

(Continued on page 4)

Cleanup, cont.

ments should begin thinking more seriously about funding projects on a watershed basis. "We need to emphasize this thinking about watersheds," said panelist Deborah Jennings at a recent meeting. "This should be our most important recommendation."

At least some who work at the county level agree that a watershed funding approach — which accounts for nonpoint sources of nitrogen — would be a step in the right direction. "It does not help us to have access to funds for improving a waste treatment plant," says one planner from Queen Anne County, "if our biggest nutrient problem is coming from farm fields."

New approaches could help relieve the potential burden to farmers of nutrient-reduction programs. For example, at the recent Environmental Finance Conference at the University of Maryland a roundtable comprised of farmers, economists and financial experts concluded that even though agricultural lands need special attention, this does not mean that farmers should have to foot the bill alone.

The formation of some form of authority or district, with the power to collect fees and take out loans, could target areas most in need of funding. Such a district could, some observers have pointed out, enable funds from the State Revolving Fund (SRF) to be more easily used for nonpoint pollution projects.

The Panel is expected to issue its report in November. The report will contain a menu of funding mechanisms which state and local government and others involved in the Tributary Strategies can use to support nutrient-reduction projects. "While no one will escape at least some of the responsibility," says Cecily Majerus, "these ideas may help more equally spread the pain." ■

Students Complete NSF-funded Summer Program

The sixth year of Maryland Sea Grant's successful summer undergraduate research program ended in August, when students presented results of their summer's work at a seminar held at the University of Maryland Center for Environmental and Estuarine Studies (UMCEES) in Cambridge, Maryland. Each of the twelve students were paired with a scientist-advisor, and conducted an independent research project at either the Chesapeake Biological Laboratory, the University's CEES Horn Point Environmental Laboratory (both part of UMCEES) or at the Benedict Estuarine Research Laboratory (BERL) of the Academy of Natural Sciences.

The fellowships are supported by a grant from the National Science Foundation through its Research Experiences for Undergraduates (REU) program. Students, their home colleges, research topics and advisors were:

- **Krista Bartz** (Oberlin College, Ohio). The effects of hydrogen concentration on available acetate and reductive dechlorination in anoxic sediments. Advisor, D.G. Capone, CBL.
- **Rachel Beuerman** (Catholic University of America, Washington, D.C.). The role of benthic diatoms in the nutrition of the ribbed mussel, *Geukensia demissa*. Advisor, Roger Newell, HPEL.
- **John DeWitt** (Coastal Carolina University, South Carolina). Effects of toxins in anoxic waters on zooplankton. Advisor, Fritz Riedel, BERL.
- **Christine Fellows** (University of Maryland). The effects of nutrient loading and flow rates on water column nutrient levels in SAV mesocosms. Advisor, Laura Murray, HPEL.
- **Kevin Gray** (Trenton State College, New Jersey). Long-chain alkenones as biomarkers for past sea-

surface temperatures using the marine alga *Isochrysis galbana*. Advisor, Rodger Harvey, HPEL.
- **Troy Gunderson** (Boston University, Massachusetts). Otolith microchemical analysis of the bay anchovy, *Anchoa mitchilli*, in Chesapeake Bay. Advisor, Edward Houde, CBL.
- **Jennifer Kraly** (Ohio Wesleyan University, Ohio). The effect of variable ionic ratios on the zebra mussel, *Dreissena polymorpha*. Advisor, David Wright, CBL.
- **Eric Luft** (University of Maryland). Applications of a laser doppler velocimeter to analysis of flow and turbulence in Chesapeake Bay. Advisor, Lawrence Sanford, HPEL.
- **Tracey McDonnell** (Hood College, Maryland). An investigation of the roles of bacteria and heterotrophic flagellates in the trophic structure of the salt marsh — the phenomenon of bacterial clumping. Advisor, Diane Stoecker, HPEL.
- **Paul Newell** (Evergreen State College, Washington). Nutrient limitation of bacterial growth in the Patuxent River. Advisor, Cindy Gilmour, BERL.

• **Michelle Simons** (Ashland University, Ohio). Heavy metal distributions. Advisor, Jeff Cornwell, HPEL.
• **Brian Wysor** (LIU/Southampton College, New York). The effect of scale on ingestion rates in estuarine mesocosms. Advisor, Edward Houde, CBL.

The students were selected from 185 applicants nationwide. Their twelve-week fellowship began with an orientation and a research cruise. In 1994, the summer's activities included a summer seminar series on science and ethics.

Maryland Sea Grant will offer the REU program again in 1995. It is open to students who will have completed at least two years of undergraduate work by summer 1995, will be enrolled as undergraduates the following fall, and are U.S. citizens or permanent residents. For more information or to request that your name be added to the mailing list to receive application materials in January 1995, call (301) 405-6371.

Educational Scripts on Internet

Teachers, librarians and media specialists who have computers and modems now have access to hundreds of one-page stories on science and the environment. These scripts from the University of Wisconsin-Madison "Earthwatch Radio" series are now available on Internet.

Earthwatch is a two-minute program on science and the environment produced by the UW Sea Grant Institute and the Institute for Environmental Studies. Scripts for the programs offer concise and clearly written reports on a variety of environmental topics, especially those regarding the Great Lakes region.

To get the Earthwatch scripts, use Internet to get to the gopher server at UW-Madison WiscINFO (wiscinfo.wisc.edu). Once you connect, use a search function in the main menu to look for "Earthwatch Radio Scripts."

If you have access to a gopher server at another institution, use it to connect to the UW-Madison WiscINFO system. If you use Mosaic or some other browser, connect to this address: gopher://gopher.adp.wisc.edu:70/11/,browse/.METASGIEW

For more information about Earthwatch Radio, contact Richard Hoops by phone, (608) 263-3149, or email, rwhoops@macc.wisc.edu.

Change of Address

The Academy of Natural Sciences announced recently that it has relocated its Benedict Estuarine Research Center to new facilities at The Academy of Natural Sciences, 10545 Mackall Road, St. Leonard, Maryland 20685, telephone (410) 586-9700, fax (410) 586-9705.

Restored Skipjack to be Used for Education

A restored skipjack, the *Sigsbee*, is now at work on the Bay, providing an educational resource for students and other groups.

The *Sigsbee* is the latest of several skipjacks that have been restored by the Living Classrooms Foundation in Baltimore, which also owns the pungy schooner *Lady Maryland*, and a Chesapeake Bay buy boat, *Mildred Belle*, both used as educational vessels. The skipjacks are being restored under a program called Save Our Skipjacks, and uses at-risk students and other youth who learn both construction and life skills while working on the restoration.

The slow demise of the skipjack fleet and the efforts to preserve the boats are embodied in the *Sigsbee's* ironic history. The boat was used to dredge the bay for oysters for about 90 years, and is the second-oldest skipjack still sailing. Its working career was ended when it sank several years ago off Sandy Point State Park just before the start of the

annual Chesapeake Appreciation Days skipjack race. (Proceeds from that event go toward preservation of the dwindling fleet.) A volunteer effort succeeded in raising the boat and taking it to Baltimore, where it was rebuilt by the foundation for use as an educational vessel.

Students from Baltimore and District of Columbia schools helped rebuild the vessel, as did at-risk or troubled youth from the foundation's Fresh Start program. They worked under the guidance of professional shipwrights. A commercial boatyard estimated the cost of restoration at more than $165,000. The program restored the boat for about $70,000, with the help of the youth from the program and school groups, donations of materials and services and grants from the Maryland Historic Trust, Preservation Maryland and others.

The foundation struggled to meet the May launch date for the *Sigsbee*, which was restored over one of the toughest winters in recent memory. Workers on hand beamed as the still-mastless skipjack was raised by a crane and placed in the water at Fell's Point at the foundation's Maritime Institute.

A few weeks after the launch, the *Sigsbee* was again in service on the Bay, carrying a group of students from Baltimore and Washington, D.C. on a voyage of discovery. School groups or organizations interested in using the *Sigsbee* or for more information on the Living Classrooms Foundation or Maritime Institute can contact Terry LaBonne at the foundation in Baltimore, (410) 685-0295. *(This article was excerpted from the "Potomac Basin Reporter.")*

A Special Letter to Researchers

Dear Colleague:

The National Sea Grant College Program received a significant increase in funding this year, when Congress raised its FY 1995 appropriation to $54.3 million, an increase of $7.2 million over last year's funding. This is the first significant budgetary increase for Sea Grant since 1980.

Some of the increase is allocated to specific areas. The National Office of Sea Grant (NOSG) has designated $2.5 million to initiate a new marine biotechnology research effort, in response to specific appropriations language indicating Congressional intent to promote such research. Another $1.5 million will be designated for oyster disease research, reflecting a shift of the annual appropriation of that amount from the National Marine Fisheries Service to Sea Grant. An additional $3.3 million will be used to fund enhancements to core program activities around the nation, in conformance with programmatic priorities of each local Sea Grant program. In addition, Congress again appropriated $2.8 million for research, education and outreach activities associated with the zebra mussel and other non-indigenous species.

This increase represents a tremendous boost to Sea Grant research, education and outreach; it also means that Sea Grant must move forward to distribute the new funds. The Director of the National Sea Grant College Program, David Duane, has announced that this year only there will be a special competition held for all of the appropriations summarized above. The National Office of Sea Grant had originally considered a cap of $400,000 for each Sea Grant Program request, but has lifted that cap to allow more open competition for funds in each of the designated areas.

Maryland Sea Grant has already mailed notification of the availability of these funds, together with the regular Maryland Sea Grant Request for Proposals (RFP) for 1996 and 1997.

Tight Deadlines

Because these new funds are available for the current fiscal year, the NOSG is following a very tight timeline. All proposals passed through Maryland Sea Grant must be reviewed, recommended and delivered to the NOSG office by February 22, 1995. (This is later than the originally announced deadline of February 13, which will give investigators some additional time to prepare their proposals.) *Unfortunately this meant that letters of intent had to have been in our hands by November 8, in order to allow proposals to be prepared by January 9, 1995. These deadlines are necessary to enable us enough time to obtain peer reviews and thus properly evaluate proposals.*

Researchers interested in competing for these funds should pay close attention to communications from the Maryland Sea Grant office, since dates for this process could change.

Maryland Sea Grant acknowledges that this tight timetable has put a substantial burden on prospective investigators to produce and route proposals through their institutions during the holiday season. We apologize for this inconvenience, but we have no control over these circumstances. There is a bright side to the dilemma of this tight timetable. These special appropriations represent an opportunity for additional funding for Maryland Sea Grant researchers; moreover, the sooner the proposals are reviewed and decisions are made, the sooner funding can be received and work started.

Sincerely,

Christopher F. D'Elia

Christopher D'Elia

Maryland Sea Grant Invites Proposals

Maryland Sea Grant is currently inviting preproposals for projects to be funded during 1996 and 1997. Areas of research emphasis for the next biennium are: fisheries resources and aquaculture, environmental studies, environmental management and policy and new technologies, including biotechnology and seafood processing.

Proposed projects will be evaluated on the basis of technical merit, relevance to Sea Grant's mission and anticipated utility. In past funding cycles, approximately 30-40% of submitted proposals were selected for development into full proposals.

Preproposals, due in the Sea Grant office on December 12, 1994, should include a four-page project description, references, budget pages, a two-page curriculum vitae and cover pages required by the submitting institution.

For a full description of research areas and information on how to submit a preproposal, contact the Maryland Sea Grant office at 405-6371 and ask for an RFP booklet.

Fletcher Is New COMB Director

After a lengthy international search, Dr. Madilyn Fletcher was recently reappointed Director of the Center of Marine Biotechnology (COMB), part of the University of Maryland's Biotechnology Institute (UMBI). COMB is one of four components of UMBI and the research cornerstone of the Columbus Center, the $160 million center for marine research, training and public exhibition scheduled to open at Baltimore's Inner Harbor in 1995.

In her role as director, Fletcher will continue guiding COMB's research, education and training programs in the primary areas of aquaculture, marine-based natural products and microbial processes and bioremediation (microbial degradation of environmental contaminants).

End Notes

Noteworthy

■ **Gross to Head CRC.** Don Boesch, Chairman of the Board of Trustees of the Chesapeake Research Consortium (CRC) and President of the University of Maryland Center for Environmental and Estuarine Studies (UMCEES), recently announced the appointment of Grant Gross as Executive Director of CRC. Dr. Gross comes to CRC following long and distinguished service as Director of the Division of Ocean Sciences at the National Science Foundation (NSF). In that position, he oversaw the largest division within NSF, responsible for an annual budget of some $250 million for research, vessel operations and ocean drilling.

Dr. Gross's research expertise is in chemical processes in marine sediments. Most currently his interests are in marine waste disposal activities in the Chesapeake Bay and the New York bight. At CRC, he will coordinate a broad-based, Bay-wide approach to scientific investigations. The CRC office has moved from its location at the UMCEES Chesapeake Biological Lab in Solomons to its new home at the Smithsonian Environmental Research Center in Edgewater.

■ **Call for Papers: Water Resources.** The Virginia Water Resources Conference will be held April 17-19, 1995 in Richmond, Virginia. Abstracts and presentation summaries are requested on applied and basic scientific research, field studies, management and policy issues and professional investigations in the general categories of water resources quality and quantity and lake ecology and management in Virginia. Abstracts are due *December 23, 1994*. For more information, contact Judy Poff, Virginia Polytechnic Institute and State University, Blacksburg, Virginia, phone (703) 231-8030, fax (703) 231-6673.

■ **Call for Papers: Coast and Estuarine Management.** Abstracts are invited for papers for an international conference, "Strategies and Methods in Coastal and Estuarine Management," which is the 25th Annual Symposium of the Estuarine and Coastal Sciences Association, to be held September 11-16, 1995 at Trinity College, University of Dublin, Ireland. Abstracts are due *January 6, 1995*. For details about topics for papers and abstract submission, write or fax the organizing committee: ECSA25, Environmental Sciences Unit, Trinity College, Dublin 2, Ireland, fax 353-1-671-8047.

■ **Maryland Sea Grant Traineeship.** A traineeship is available for a graduate student with research interests in the area of conservation biology and restoration ecology. The trainee would be part of an interdepartmental team of University of Maryland philosophers, geographers, planners and extension agents working on a project titled "Ecological Restoration and the Concept of Place," headed by principal investigator Mark Sagoff at the UMCP Institute for Philosophy and Public Policy in the School of Public Affairs.

The successful applicant should be able to benefit from and assist with research in the normative and cultural dimensions of environmental policy, with particular emphasis on the interplay between science and policy. Strong writing and oral communication skills are essential.

This traineeship is a 20-hour per week position for one year initially, with the possibility of renewal. It provides a stipend, 10 credits tuition remission and full benefits. To apply, send full resume and writing samples with cover letter by *December 1, 1994*, to: Sea Grant Trainee Search, Mrs. Carroll Linkins, Institute for Philosophy and Public Policy, Van Munching Hall, University of Maryland, College Park 20742.

■ **Hudson River Graduate Fellowships.** The Hudson River Foundation awards up to six full-time research graduate fellowships to advanced graduate students conducting research on the Hudson River system. Fellowships awarded to doctoral students consist of a stipend of $12,000 for one year and an incidentals research budget of up to $1,000. Fellowships awarded to master's level students consist of a stipend of $9,000 for one year and an incidentals research budget of $750. Applicants must be enrolled in an accredited doctoral or masters program, must have a thesis advisor and advisory committee (if appropriate to the institution), and must have a thesis research plan approved by the student's institution or department. Applications for graduate fellowships must be received by *February 18, 1995*. For information about applying for this fellowship, contact the Hudson River Foundation in New York, phone (212) 924-8290, fax (212) 924-8325.

■ **Tibor T. Polgar Fellowship Program.** These fellowships, also administered by the Hudson River Foundation, are part of a research program conducted in cooperation with the New York State Department of Environmental Conservation. The program provides a summertime grant of $3,500 for each fellowship and limited research funds for eight college graduate or undergraduate students to conduct research on the Hudson River. The objectives of the program are to gather important information on all aspects of the river and to train students in conducting estuarine studies and public policy research. Polgar Fellowships may be awarded for studies anywhere within the tidal Hudson estuary from Federal Dam at Troy, New York, to New York Harbor. Applications for Polgar fellowships are due *April 15, 1995*. To apply, contact the Hudson River Foundation, listed above.

Publications, Etc.

Educational Posters

NOAA's National Marine Sanctuary Program protects delicate environments in oceans and bays in a wide variety of locations, such as the Florida Keys, off Washington's Olympic Coast, the Massachusetts coast and Pago Pago, American Samoa. To find out about colorful educational posters showing the fish, mollusks, whales and other marine life that live in these bay, coral reef and ocean canyon sanctuaries, contact: *Marine Sanctuary* magazine, Sanctuaries and Reserves Division, Office of Ocean and Coastal Resource Management, NOAA, 1305 East-West Highway, 12th Floor, Silver Spring, Maryland 20910, phone (301) 713-3125.

Workshop Report

In response to deteriorating conditions in the Chesapeake Bay, Maryland, Virginia, Pennsylvania, the District of Columbia and the U.S. Environmental Protection Agency signed the Chesapeake Bay Agreement in 1987. Implicit in the agreement is a commitment to reduce the nutrient and toxic substances flowing into the Bay. In 1989, the Chesapeake Bay Environmental Effects Committee joined with the Chesapeake Bay Program's Toxic Subcommittee to further address the lack of information concerning anthropogenic impacts to the estuary. The initial goals of the Toxics Research Program were to understand how Chesapeake Bay ecosystem processes influence the transport, fate and effects of toxicants; and to understand the effects that representative toxicants have upon ecological processes, including trophic dynamics, in the Bay.

The Toxics Research Program enlists investigators from throughout the Chesapeake Bay area to address these important issues. In order to facilitate communication between the research community and management agencies, the Program holds periodic workshops to provide a format for presenting preliminary findings and discussion of research priorities. The proceedings of a workshop, held in Solomons, Maryland May 1993, is currently available. *Chesapeake Bay Environmental Effects Studies Toxics Research Program, 1993 Workshop Report* , edited by John M. Jacobs, is available from: NOAA Chesapeake Bay Office, 410 Severn Avenue, Suite 107A, Annapolis, Maryland 21403, phone (410) 267-5676.

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