

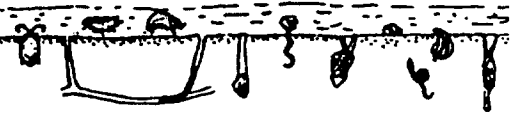


Wetlands

Board

BULLETIN

THE COLLEGE OF WILLIAM AND MARY
SCHOOL OF MARINE SCIENCE
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Dr. Frank O. Perkins, Dean/Director



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THE GREENHOUSE EFFECT, SEA LEVEL RISE, AND THEIR IMPACT ON TIDAL WETLANDS

by Julie G. Bradshaw

The Greenhouse Effect

The greenhouse effect is the name given to a phenomenon in which gases in the earth's atmosphere act to trap heat reflected from the earth's surface and prevent its release, similar to the function of the glass covering of a greenhouse. Without this phenomenon, earth's average temperature would be approximately 60 degrees F colder than it is presently. However, atmospheric concentrations of the gases that contribute to the greenhouse effect have been increasing and may be giving us too much of a "good" thing. The increasing concentrations of "greenhouse gases" and their consequences for earth's climate have environmental scientists and citizens around the world concerned over implications for the future.

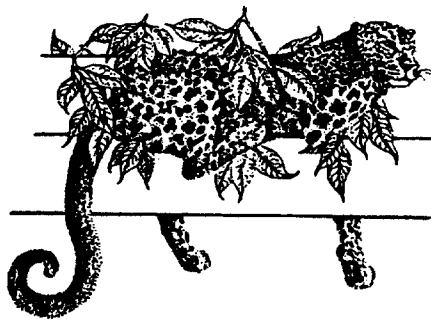
One of the most important gases contributing to the greenhouse effect is carbon dioxide, which is released when fossil fuels, such as oil, gas and coal, are burned. Automobile engines, home furnaces, coal and oil-fired power plants are some of the primary sources of carbon dioxide. Burning of modern fuels, such as wood, also contributes to rising carbon dioxide levels. Carbon dioxide is also taken up by plants in the process of photosynthesis. The current rapid rate of deforestation is reducing that important sink of carbon dioxide. Trace gases such as nitrous oxide and chlorofluorocarbons are another component of the greenhouse effect. Like carbon dioxide, nitrous oxide is produced during combustion of fossil fuels and is also an important factor in the acid rain problem. Chlorofluorocarbons are used in refrigerators, air conditioning, aerosol sprays, and foam products.

The future rate of increase in greenhouse gas concentrations is a matter of considerable uncertainty, but some scientists have projected that the concentrations will effectively double their present levels sometime between the years 2030 and 2050. The general warming of our atmosphere associated with these increased greenhouse gas concentrations is expected to produce an average global temperature 3-8 degrees F higher than the present (i.e., warmer than the earth has experienced in the last 100,000 years). Several complex computer models have been formulated which predict the effect of increasing greenhouse gases on the world's climate. In the tropics, relatively little change in temperature is expected to occur, whereas in higher latitudes, temperature increases of greater magnitude are projected. Other worldwide climatic effects include changes in rainfall and wind and storm patterns and magnitudes. Among many other predictions of global importance, climatic changes are expected to affect agriculture, fish and wildlife populations, and human health and property.

Sea Level Rise

The global warming which is a predicted result of the greenhouse effect is expected to increase the present rate of sea level rise by increasing the rate of glacial and polar ice melting and by thermal expansion of seawater. Variations in sea level are natural and have occurred throughout geologic history. Generally, sea level has been rising since the last ice age (about 18,000 years ago). Scientists have estimated that in the last 100 years, average global sea level has risen approximately 4-6 inches (i.e., 0.04-0.06 inches/year). This rate of sea level rise is not constant worldwide, but varies depending in part on the rate of subsidence of the land. In Hampton Roads, Virginia, for example, the land is subsiding at a rate of approximately 0.12 inches/year, so the net sea level rise over the past 100 years in Hampton Roads has been approximately 0.16-0.18 inches/year,

or 16-18 inches total. Eugene Island, Louisiana is subsiding at a rate of 0.35 inches/year, and experiencing a sea level rise of 0.39-0.41 inches/year. Some localities on the west coast of our continent are actually experiencing falling sea level because the land itself is rising; land at Sitka, Alaska is rising at a rate of 0.14 inches/year, resulting in a drop in sea level of 0.08-0.10 inches/year, or 8-10 inches over the past 100 years. Scientists have predicted a much greater rate of sea level rise in the future. By the year 2100, sea level in Hampton Roads may be 72-100 inches (i.e., 6 to nearly 9 feet) above its present level.



Implications for Tidal Wetlands

The projected rates and magnitudes of sea level rise have obvious implications for loss of coastal property and structures, but perhaps a less obvious prognosis for tidal wetlands.

The salinity regime of tidal rivers such as the James, York, Rappahannock and Potomac Rivers would be altered by the projected rise in sea level, with salt water reaching farther upriver than its present extent. Therefore, the character of wetlands at a location would be expected to change to more salt tolerant plant communities.

Tidal wetlands have a natural ability to keep pace vertically with some rise in sea level because of their tendency to increase their elevation through sediment accumulation and peat formation. However, the rate of sea level rise which is projected may be much greater than the rate at which marsh surface elevations can increase. Tidal wetlands could then be subject to greater inundation and erosion, which could initially change the character of the plant community and eventually result in open water communities where wetlands had once been.

In addition to vertical accretion, a natural response to gradual sea level rise is for wetlands to migrate landward as the rising water levels flood coastal areas. As the landward reach of the tides increases, wetland plant communities become dominant where former upland communities had been. However, if man-made barriers such as bulkheads exist on a shoreline, the wetlands will not be able to migrate shoreward, and will instead be squeezed out between the advancing tide and the unyielding shoreline.

Researchers have estimated that a majority of the nation's coastal wetlands could be lost as a result of the projected rapid sea level rise and the continued development and hardening of shorelines. The essential role which wetlands play in the marine ecosystem as spawning and nursery areas for marine organisms and as producers of food for the estuarine food web would also be lost.

Implications For Wetlands Management

How can we minimize the future loss of wetlands that has been predicted? Wetland managers may consider favoring non-hardening shoreline defense measures such as gapped breakwaters which would permit landward migration of wetlands. Decreased

waterfront development and establishment of buffers of no development near the shore may also allow continued existence of wetlands. These actions deal with the symptoms of the greenhouse effect and global warming, but as citizens we could also attack the cause of the problem by supporting measures which would reduce emission of the gases which drive the greenhouse effect. Increased energy efficiency, use of alternative energy sources, and decreased deforestation could all help to slow the rising atmospheric concentrations of carbon dioxide. Finding alternatives to, and decreasing or eliminating production and emission of, chlorofluorocarbons could also help slow the rate of global warming.

Julie Bradshaw is a marine scientist for the Virginia Institute of Marine Science Wetlands Ecology Program.

A NOTE FROM THE VIRGINIA MARINE RESOURCES COMMISSION

Farewell Message From VMRC Chief

On the eve of my retirement, I have sent the following letter to each Wetlands Board Chairman:

"As some of you know, I will retire from state service on November 1, 1988, having attained the (unenviable) age of 62 on October 29th, and having served with the Commission since July 1, 1975.

I want to convey my personal appreciation for the work of you and your board during the many years of our professional association. I believe we can all take pride in some solid accomplishments during the past decade.

First among these is the simplification and streamlining of the shoreline permit process. Second is the increase in authority and responsibility of local wetlands boards in the local/state/federal regulatory process. Third is the steadily increasing value of the annual Wetlands Symposium we hold at Hampton University each year.

Unfortunately, the important business of preserving our valuable tidal wetlands resources has probably been less difficult in the past than it will prove to be in the future. Developmental pressures are increasing everywhere along our coasts as people continue to migrate to these popular areas. I am pleased that my deputy, Bob Grabb, has been selected as my replacement. Bob is very knowledgeable and competent and has served in this division since 1980.

I believe our experience with administration of the Wetlands Act has proven the wisdom of our legislature in developing a local option process for management of this "land use" program. You and your board have certainly earned my respect and gratitude for a job well done.

Please convey my earnest thanks and my best wishes for the future to your board and staff."

The Wetlands Advisory Group at VIMS and the Regulatory Functions Branch of the Norfolk District, U.S. Army Corps of Engineers, deserve a full measure of credit for the accomplishments noted in the foregoing letter. We are particularly fortunate in Virginia to have the technical and scientific support of a prestigious institution like VIMS. Their credibility is a key factor in the local/state/federal cooperative relationships we have established over the years.

The General Permits developed by the Norfolk District Army Engineers have markedly changed the inter-governmental

relationships of the 1970's. This official recognition by the federal government in the capability and responsibility of lower levels of government is almost certain to continue and will inevitably lead to greater reliance on the work of local boards.

1989 Wetlands Symposium

Bob Grabb and his staff have already begun to plan the agenda for the 1989 Eighth Annual Wetlands Symposium hosted by Hampton University. The meeting this year will be held on Saturday, February 4, 1989. While very tentative, it appears that the morning agenda will focus on the work of the new Local Assistance Board created as a result of the Chesapeake Bay Preservation Act. It is inevitable that this new agency will interface directly with local boards, as well as VIMS and VMRC. The afternoon session will be devoted to recent litigation, enforcement and the problem of after-the-fact permits.

Plan now to get as many members of your board, your staff and your legal advisors out for this important get-together, which has proven to be an excellent opportunity to exchange valuable information.

Future Plans

I hope to stay involved to some degree and, in fact, have accepted a request from Old Dominion University to teach a graduate course next semester on Environmental Management in their School of Public Administration.

I hope our paths will cross again. As already noted, your workload, responsibilities and problems are sure to increase steadily as they have since 1972!

With kindest regards, I am

Sincerely,
Norman E. Larsen
Chief, Habitat Management

SPECIAL FEATURE

The following section will be an ongoing feature on specific counties and cities and their wetlands board members.

CITY OF NORFOLK

The tidal wetlands within the City of Norfolk have been subjected to enormous development pressures historically. Since the turn of the century, entire creeks, e.g. Boush, Mason, Tarrant, Newton, Lamberts, Smith and Colley, have been either filled in or reduced to mere vestiges of nineteenth century areas. Against this background, the remaining 722 acres of tidal wetlands represent a valuable resource well worth the conscientious management program currently protecting them.

The value of these areas to wildlife, fishes, water quality and the quality of life in general is many faceted. They make significant contribution to the estuarine food web by virtue of the organic matter produced and exported to adjacent waters. Marshes provide important nursery areas for the juveniles of many commercially important finfish and shellfish as well as feeding areas for numerous forage fishes. The wildlife habitat they provide for waterfowl, wading birds, shorebirds, song birds and small mammals is vitally important, particularly in a highly-urbanized setting. Their role as a filter for upland runoff and as a center of nutrient cycling is again especially important in intensely developed areas where upland inputs of nutrients and various pol-

lutants can have a significant impact on adjacent water quality. Tidal marshes can also provide an effective buffer against shoreline erosion by binding sediments and dissipating wave energy. These same areas can effectively mitigate the impacts of coastal flooding by absorbing floodwaters and buffering flood heights.

Over half of the tidal wetlands in Norfolk (408 acres) is comprised of Type I Saltmarsh Cordgrass marshes. These areas are regularly flooded by tides and provide some of the highest ecological values to the estuarine system. The majority of these marshes, 218 acres, are located within the Lafayette River system with the Little Creek system supporting the second highest acreage at 125 acres.

The second most abundant marsh type is the Saltbush Community, Type IV. This is a high marsh community that is irregularly flooded by the tides. This marsh type is found predominately at the heads of tidal tributaries and has been often impacted by ditching for drainage and mosquito control. The largest acreage, 99 acres, is found in the Lafayette River with the Broad Creek drainage having the second highest total at 86 acres.

(City of Norfolk, Tidal Marsh Inventory, VIMS, 1987)

CITY OF NORFOLK WETLANDS BOARD MEMBERS

Dr. Carvel Blair, Chairman.

Dr. Blair served 30 years in the U.S. Navy in submarine and riverine warfare and retired with a rank of Captain. He has worked as both a professor of mathematics and oceanography at Old Dominion University and presently holds a professor emeritus at ODU. Dr. Blair has served as chairman of the Norfolk Wetlands Board since its inception in 1981.

Dr. Blair feels that a great majority of people and businesses look favorably on wetlands protection and "by and large are willing to make the effort and spend the money to protect wetlands". However, "... continuing pressure to develop wetlands, maintaining adequate staffing (presently Norfolk is short one staff person), and a continuing need to educate the public about wetlands" are some of the major problems facing wetlands boards.

During his tenure on the wetlands board, Dr. Blair says he has learned that there is a great willingness on behalf of concerned citizens to take the time and make the effort to serve on volunteer boards and his advice to a new wetlands board member is to "understand the policy, standards, and guidelines of the Wetlands Act and become educated on the ecology of wetlands and dunes using such methods as attending wetlands seminars and obtaining instruction from the Virginia Institute of Marine Science."

(Dr. Blair also serves as chairman of the VMRC Habitat Management Advisory Commission.)

Richard P. Harrison

Mr. Harrison worked as a young man at the Harrison Fishing Pier then went on to teach in high school and at Old Dominion University. He is presently owner of the Willoughby Bay Marina. He has served on the Norfolk Wetlands Board since 1981.

Mr. Harrison believes that "by and large, most people are uninformed about the value of wetlands and those who feel that there are values, don't know what they are."

"Education of the public," says Mr. Harrison, "is one of the problems the board must deal with." He states that he has learned a lot about wetlands and their values and has learned "as a board, ways to protect wetlands." Mr. Harrison stresses "that it is to everyone's advantage to save wetlands. Without wetlands the cycle breaks down. Without wetlands the fishing industry would go down the drain."

R.L. Simpson

Mr. Simpson has worked in the insurance business for over 30 years and now owns a general insurance agency. He has served on the Norfolk Wetlands Board since it was created in 1981.

"I think generally the public is pretty supportive of protecting wetlands and dunes. Some people get annoyed at the regulations, but the attitude and spirit of cooperation by people, especially violators, is encouraging." Mr. Simpson goes on to add, "but you must realize that between the Navy and the City, Norfolk has pretty much been filled. There is not much wetlands left."

Mr. Simpson believes that compliance and understaffing are two of the biggest problems facing wetlands boards. "There is little time for policing. Staff has little time to ride up and down the shorelines to see what is happening." While he sees this as a problem in Norfolk, Mr. Simpson says "I can really sympathize with areas like Middlesex, Gloucester, and Mathews who have so much shoreline to police." He feels there should be a stronger spirit of cooperation between agencies. "There are various other agencies that travel the water, they should be educated on wetlands violations."

Mr. Simpson says that he has been aware of the values of wetlands since childhood. "I spent most of my childhood walking in marshes. But I have learned how to tell *Phragmites* from saltmeadow hay and saltbush!"

Mrs. Evelyn M. Hailey

Mrs. Hailey served in the General Assembly for 10 years, as a Representative and a Senator. During that time she lobbied for oyster bills and sponsored bills concerning environmental issues. She worked with Senator Gartlan on the Coastal Zone Act and sponsored a bill to include the North Landing River in the Wetlands Act. She is serving her third year on the Norfolk Wetlands Board.

"I believe people are more aware and concerned about wetlands today than a few years ago", says Mrs. Hailey, "In fact, some are outraged at what is happening to the environment. Industry and development are really going full tilt and I am concerned we will lose a lot of wetlands in the process, especially in the smaller cities that are understaffed and not able to deal with the developments." Mrs. Hailey believes that while people are more aware of wetlands today "they do not fully understand the intricacies of wetlands." She says "I've learned so much about wetlands. I've learned to respect the people out there finding violations and dealing with them. I've learned so much about planting grasses and what they can do in helping sand dunes. And I've begun to see neighbors talking to neighbors about the importance of wetlands and dunes. It's been a great experience."

Millard G. Smith

Mr. Smith has served on the Norfolk Wetlands Board for four years. He is a retired surveyor having worked as both a State and City Surveyor.

Mr. Smith thinks "the general public, for the most part, is in favor of controlling wetlands and dunes. People are becoming more aware of protecting wetlands." Mr. Smith says "Ignorance of the wetlands law" is one of the bigger problems faced by the board. "And the many violations. People dump things over the edge of their property not realizing they are impacting wetlands or that they need a permit. I've learned a lot about wetlands that I didn't know before I came to the board," states Mr. Smith. "In the 1950's and 1960's people used to just dump things in the wetlands. They are beginning to realize that is just not done today."

Miss Jean C. Old

Miss Old has worked as a stockbroker for 35 years and is presently employed by Wheat First Securities. She has served on the Norfolk Wetlands Board for two years.

Miss Old feels there is a general lack of education among the public concerning wetlands. "As I see these cases come to the board, most people are totally ignorant" of the Wetlands Act. She cites a lack of authority as one of the major problems facing wetlands boards. "The wetlands board really has no teeth, unless they go to court, to prevent violations. Once a violation has been committed, there is very little we can do about it," she says, and adds "It is a fruitless situation in many cases. The wetlands board needs more authority. Right now people don't pay much attention to wetlands."

Mrs. Beverly Mann

Mrs. Mann was one of the founders of CARE which later became BAY CARE the local chapter of the Chesapeake Bay Foundation. She served on the Norfolk Clean Community Commission and presently serves on the Regional Air Pollution Committee. She has been on the Norfolk Wetlands Board for three years.

Education of the public is one of Mrs. Mann's biggest concerns. "I feel there is a general lack of information going to the public. Someone should better inform or educate the public. The public is being made more aware of wetland values as a result of some of the negative happenings that have appeared in the news," she says, but adds, "the average citizen still has a long way to go" in understanding wetland values.

Another concern, besides the public education issue, is consistency in the permitting process. Mrs. Mann says "it is sad when private interest groups can go to the legislature and change the board's working parameters to further private gain." She feels that such actions undermine a board's credibility.

When reviewing projects, she says "follow your conscience within the guidelines, but be prepared to realize that you cannot save the world. Sometimes a healthy balance is as good as we can hope to do at this stage of the game." She says, "Norfolk is fortunate that we have such an outstanding staff and a well-rounded board, and it helps to have a true scientist like Dr. Blair on the Board."

RECYCLING

Producing one ton of paper from discarded waste paper uses half the energy, half the water, results in 74% less air pollution and 35% less water pollution, saves 17 pulp trees, reduces solid waste going to landfills, and creates five times more jobs compared to producing a ton of paper from virgin wood pulp.

Communities across the U.S. are facing a solid waste crisis. Now that buried garbage is recognized as a common source of groundwater contamination, citizens actively oppose the siting of new landfills, leaving local officials pondering the alternatives. Waste reduction through recycling is being recognized as part of the solution in many communities. The states of New Jersey and Rhode Island now have laws which make recycling mandatory for residents. Other states such as Oregon, Wisconsin, Florida, North Carolina, and Michigan are providing tax incentives and grants to start community recycling programs. Maryland was the first of fifteen states to start a buy recycled materials program.

Recycling cannot solve the solid waste problem, but it can substantially reduce it. Portland, Oregon and Berkeley, California have a 50% recycling rate as their target goal. Wilton, New Hampshire has already achieved a 47% reduction on solid waste

through recycling. Recycling programs should always be implemented before other alternatives, such as incineration. Government officials often look to incineration as the quick fix technological solution, but many problems exist. Incineration leaves up to 30% of the original waste in the form of toxic ash residues which still must be landfilled. Incineration can also emit air pollution. The energy produced through incineration is less than the amount which can be saved through recycling. (Forests In The Rain, Muller and Young, 1986)

VIMS WETLANDS WORKSHOP

The VIMS Wetlands Workshop held October 14th had over 70 participants including wetlands board members, local and regional planners, state agency personnel and others. Sixteen wetlands boards, five state agencies, two Planning District Commissions, and one consulting firm were represented at the workshop. We are considering holding two such workshops each year. Let us know your feelings about this idea.

WETLANDS RECIPES

SWEET GOLDENROD TEA

Goldenrod begins to flower around midsummer and can be recognized by its smooth, untoothed leaves which smell of anise. Collect and dry the leaves or flowers.

2 tsp goldenrod flowers or leaves (dried)
1 tsp fresh lime juice
2 1/3 cups water
maple sugar to taste



Bring the water to boil, add the goldenrod, cover and simmer over low heat for 15 minutes. Pour through a sieve, add the lime juice, and serve with maple sugar. This makes a light, smooth tea. (Stewart and Kronoff, *Eating From the Wild*, 1975)



TIDEWATER CRAB CAKES

<i>1 pound crabmeat</i>	<i>1 teaspoon Old Bay seasoning</i>
<i>3/4 teaspoon salt</i>	<i>1 tablespoon mayonnaise</i>
<i>1 tablespoon Worcestershire</i>	<i>1 tablespoon chopped parsley</i>
<i>1 egg, beaten</i>	<i>2 slices bread, crusts removed, soaked in milk</i>

Mix ingredients and shape into cakes. Place on plate and put in refrigerator 20 to 30 minutes to "set up". Fry quickly in 1/8 inch of bacon grease or shortening until brown on both sides. Serves 4. (VIMS Sea Grant Advisory Service).

VIRGINIA WETLANDS MANAGEMENT SYMPOSIUM

Saturday, February 4th, 9:30 a.m. - 4:00 p.m., Hampton University. Additional information call Dr. Robert Jordan (804)727-5783

AGENDA

9:30 - 10:00	Registration
10:00 - 10:15	Welcome and Opening Remarks, Dr. Robert Bonner, Dean of the School of Pure and Applied Sciences, Hampton University, and Commissioner William A. Pruitt, Virginia Marine Resources Commission.
10:15 - 12:00	Chesapeake Bay Preservation Act and Local Assistance Board - Jeter "Bud" Watson, Executive Director, Chesapeake Bay Local Assistance Department.
12:00 - 1:30	Lunch on Campus (Holly Tree Inn).
1:30 - 2:50	Violations: Restoration or After-the-Fact Consideration
2:50 - 3:00	Break
3:00 - 4:00	Recent Litigation - Impacts and Implications
4:00 - 4:05	Summary Remarks - Robert Grabb, Chief, Habitat Management, Virginia Marine Resources Commission.

THIS ISSUE'S QUOTES

"Human history more and more becomes a race between education and catastrophe." H.G. Wells.

"Perception is always more important than reality." Henry Kissinger.

"We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect." Aldo Leopold

Readers are asked to submit questions concerning wetland ecology to:

Editor, Wetlands Board Bulletin
Virginia Institute of Marine Science
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Gloucester Point, VA 23062

The editors reserve the right to edit letters for clarity and space.



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