
Committee Meeting

of

SENATE ENVIRONMENT AND ENERGY COMMITTEE

Senate Bill No. 1410, Senate Bill No. 1411,
Senate Bill No. 1815, and Senate Bill No. 1856

ASSEMBLY ENVIRONMENT AND SOLID WASTE COMMITTEE

Assembly Bill No. 2290, Assembly Bill No. 2577, and Assembly Bill No. 2606

LOCATION: Toms River Town Hall
Toms River, New Jersey

DATE: August 12, 2010
10:00 a.m.

MEMBERS OF COMMITTEES PRESENT:

Senator Bob Smith, Chair
Assemblyman John F. McKeon, Chair
Senator Robert M. Gordon, Vice Chair
Assemblyman Reed Gusciora, Vice Chair
Senator James Beach
Senator Christopher "Kip" Bateman
Senator Jennifer Beck
Assemblyman Peter J. Barnes III
Assemblywoman Pamela R. Lampitt
Assemblyman Charles S. Mainor
Assemblywoman Denise M. Coyle
Assemblyman Scott Rudder



ALSO PRESENT:

Judith L. Horowitz
Amy Denholtz
Carrie Anne Calvo-Hahn
Office of Legislative Services
Committee Aides

Kevil Duhon
Senate Majority
Mishael Azam
Assembly Majority
Committee Aides

Christina Gordillo
Senate Republican
Thea M. Sheridan
Assembly Republican
Committee Aides

Meeting Recorded and Transcribed by
The Office of Legislative Services, Public Information Office,
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SENATOR BOB SMITH (Co-Chair): We're going to have a very long and very interesting day today here in Toms River, the capitol of the Jersey Shore.

We have Mayor Tom Kelaher, here present, to welcome.

Mayor, if you'd come over and say a few words, we'd appreciate it.

MAYOR THOMAS F. KELAHER: (speaking from audience) I can do it right here.

SENATOR SMITH: Sure.

MAYOR KELAHER: Good morning, everybody. I just want to welcome everybody. We thank you for coming.

It's obvious that the condition of Barnegat Bay affects everybody, and everybody's interested in it.

Senator, I'm grateful to you and your Committee, and the Assembly Committee, for being here and taking an interest in it. The Bay of the River -- particularly surrounding Toms River and all the other communities in the county -- (indiscernible) recreation, quality of life, (indiscernible) economy. And so (indiscernible) both sides of your story -- (indiscernible).

SENATOR SMITH: Thank you, Mayor.

And we have the legislative delegations that represent the areas around the Barnegat Bay present.

Senator Connors, if you'd come forward-- I understand you'd like to say hello and welcome us. And bring your delegation with you and maybe introduce them.

SENATOR CHRISTOPHER J. CONNORS: Good morning.

I have with me Assemblyman Brian Rumpf and Assemblywoman DiAnne Gove from the 9th Legislative District.

Good morning Chairmen and members of the Committee. On behalf of the people of the 9th Legislative District, we want to thank Chairman Smith and Chairman McKeon for holding today's hearing in Ocean County. We also want to take this opportunity to commend the stakeholders and citizen activists who are participating in today's meeting in support of the Barnegat Bay.

Barnegat Bay plays a significant role in the local area, both in environmental and economic terms. Therefore, protecting the integrity of the Bay is of paramount concern not only to our delegation, but also to a large segment of our constituency, many of whom are here today.

Last year, our delegation respectfully requested a legislative hearing on the Barnegat Bay, which the Chairmen were kind enough to hold in Ocean County, in Lacey Township. Today's hearing will only build upon the progress made last year as more interested parties from the public and government work together in common cause. Working collectively with our legislative colleagues, as well as actively engaged citizen groups, we want to protect the Bay's unique and diverse wildlife. Equally important, protecting the Barnegat Bay is crucial from an economic standpoint, given its importance to tourism and the recreational fishing industry, as well as to the hardworking bay men, including the commercial hard clam and crabbing industry.

We would be remiss if we did not mention the tremendous efforts of the Barnegat Bay Partnership, under the leadership of Dr. Stanton Hales. For years, our delegation has relied on the expertise and research provided by him and his extremely capable staff. We are extremely pleased that the Committee--

UNIDENTIFIED SPEAKER FROM AUDIENCE: Louder, please. We can't hear a word.

SENATOR SMITH: Try the other mike. (referring to PA microphone)

SENATOR CONNORS: I'm going to pick up where I left off because I'm not going to inundate you with too much verbiage.

We would be remiss if we did not mention the tremendous efforts of the Barnegat Bay Partnership. Under the leadership of Dr. Stanton Hales, for years, our delegation has relied on the expertise and research provided by him and his extremely capable staff. We are extremely pleased that the Committee has provided the Barnegat Bay Partnership a significant role in these hearings. It is essential that the recommendations and position of the Partnership be strongly considered in any policies instituted to protect the Bay.

Again, we want to thank Chairman Smith and Chairman McKeon for holding today's hearing in Ocean County. Your continued efforts have afforded the Bay's supporters the opportunity to play a critical role by contributing to the public dialogue on the State's efforts to protect this national treasure.

Again, Mr. Chairmen and members of the Committee, we thank you very, very much for being in Ocean County. And we look

forward to the recommendations that will be forthcoming from all the stakeholders who are here today, the recommendations of this Committee, and the transcript that will follow this proceeding.

Thank you.

SENATOR SMITH: Senator, I'm not sure -- did you introduce your two Assembly colleagues?

SENATOR CONNORS: Yes, I did, but no one could hear.

SENATOR SMITH: Right.

SENATOR CONNORS: This is Assemblyman Brian Rumpf and Assemblywoman DiAnne Cove from the 9th Legislative District. (applause)

SENATOR SMITH: Thank you.

SENATOR CONNORS: Thank you, Mr. Chairman.

ASSEMBLYMAN JOHN F. McKEON (Co-Chair): Senator, Assemblyman, thank you very much.

And, Senator Connors, I'd be remiss if I didn't note a lot of us worked in a bipartisan way toward open space, and we all very much appreciated that leadership that you showed during that period of time.

SENATOR CONNORS: Thank you.

ASSEMBLYMAN McKEON: And with that, I'd like to introduce another of my colleagues, Assemblyman Tom (*sic*) Wolfe, from the 10th District.

ASSEMBLYMAN DAVID W. WOLFE: David.

SENATOR SMITH: I think it's David.

SENATOR GORDON: That's *Bonfire of the Vanities*.

ASSEMBLYMAN McKEON: That's *Bonfire of the Vanities*.

Thank you, Senator. I'm losing my mind.

Assemblyman Wolfe, would you come up -- step up and say a few words?

ASSEMBLYMAN WOLFE: I have my latest book with me.
(laughter)

Thank you very much.

ASSEMBLYMAN McKEON: That won't be the first or last mistake I make today. There's no question.

ASSEMBLYMAN WOLFE: Thank you, Chairmen and Committee folks from the Assembly and also the Senate. On behalf of Senator Andy Ciesla and Assemblyman Jim Holzapfel, I want to welcome you also to the 10th Legislative District, in which Toms River is one of the -- the home and the center for our district.

I usually don't have prepared remarks. I'm used to speaking off the cuff. But I really wanted to say thank you for being here. The audience here represents a lot of different entities and factions involved with the environment and the pristine place where we live -- to preserve it and make it a little bit better.

And I know that your hearing today is really a culmination of a great effort that has been really seized on by the media. It's very important not only that we have the hearing, but that we move forward with action legislatively and politically.

I have a few words which I would like to say, and I will be very brief.

Our Legislative District recently signed on as co-sponsors of Senate Bill 1411 and Assembly Bill 2290. And as you're aware, lawn

fertilizers contain extremely high concentrations of nutrients such as nitrogen and phosphorous, which pollute our Bay. This legislation will reduce the amount of those fertilizers and restrict the most harmful forms that are being used at all.

The waterways such as Barnegat suffer from the effects of the fertilizers. We feel that the labeling and regulation of the amounts that are used of these chemicals could be better used to protect the Bay and other local waterways. The Bay is enjoyed not only by Ocean County residents, but also residents from all over the state. And I know both Chairmen are summer residents. Welcome again.

The pollution is detrimental to not only our economic, but our aesthetic and recreational value. By educating the public as well as professional landscapers on the effects of the harmful chemicals and their detrimental effect on rivers, bays, and oceans, we hope to prevent further damage to our precious waterways and improve them for years to come.

We also live-- We're going to leave you copies of a letter which our delegation recently sent to Agriculture Secretary Douglas Fisher. In fact, it was recently -- it was back in January -- where we wrote to him in support of the State's Soil Conservation Committee's request to consider amendments to their standards for soil erosion and sediment control. The amendments they requested will continue to maintain healthy soil for the Barnegat Bay watershed and throughout the State of New Jersey.

These amendments to a bill that was passed in 1975 would help sustain essential physical, chemical, and biological functions for the distribution of soils. These amendments would also provide for further conservation districts with extreme guidance, tools, and restoration

standards to ensure that falling -- any disturbances of the soil in the area -- they could properly be restored. By ensuring healthy soils, we can ensure healthy watersheds. New Jersey has potentially become the conservation leader on this ecological and economic issue.

Again, I want to thank you for being here. The shore is very important. We look forward to working with you.

I might add that I know some legislation we're going to be looking at today is modeled after legislation that has been successfully implemented in other states. And I think not only could we implement what they've done, but also make it a lot better.

So thanks for being here, good luck. You're going to hear some good people today. They care a lot.

Thank you very much. (applause)

SENATOR SMITH: Thank you, Assemblyman. And thanks to your entire delegation for your support of these efforts.

Just to put things in a little context, we were here in Lacey Township a year ago. And at that hearing, scientists, various groups, citizens came forward and said the truth, which is that our Bay is dying. And in the year since the Lacey Township hearing, Assemblyman McKeon, in his Committee; I, in my Committee, have been working on a package of bills which we think address the major issues concerning the Barnegat Bay. And they are soil standards so that we reduce runoff into the Bay; the contribution of people who develop around the Bay toward the solution of those problems; stormwater utilities which are being used around the country in exactly the same kinds of situations to clean up water bodies;

and then finally, regulation of fertilizer. You have before you the strongest fertilizer regulation bill in the United States of America. (applause)

And let me ask that everybody withhold their enthusiasm because we have a really long day, and we have a lot of people to hear from, and we want to do this right.

Assemblyman McKeon and I have agreed to a batting order. And the batting order is as follows: We're first going to do the soil standards restoration bill. We're secondly going to do the contribution of developers toward the solution of the problem with stormwater basins. Thirdly we're going to do the stormwater utility bill. And then finally we're going to do the main event, which is the fertilizer bill.

I ask everybody to be courteous to each other. This is America. The greatest thing about our country is we don't all have to agree on everything. This is a democracy. And hopefully 50 percent plus one will ultimately decide the right thing.

Assemblyman McKeon, would you like to make any opening remarks?

ASSEMBLYMAN McKEON: Thank you, Senator.

Just very briefly. This is the kind of topic -- as much as when you usually see a crowd like this, there's going to be a lot of dichotomy of opinion. But I can't imagine one of you out there who doesn't believe that the Bay is in trouble and, secondly, that something needs to be done about it. We might have different approaches, and there may be some nuances to the way that happens. What's difficult -- and getting to the end of it on the fertilizer bill -- is that we have such an ecologically diverse state. It's hard

to come up with one size that fits all. But certainly it's untenable to have different standards for fertilizer application in different parts of the state.

So with Senator Smith, and with our respective hardworking committees, we really tried to be open-minded to all of the stakeholders, take everything into account, and come up with something that is reasonable and, most importantly, would be effective in the long run. We're going to get into a lot of detail about a lot of things today. But one of the great things about living in New Jersey is Barnegat Bay. And that is a real jewel that leads to the extenuation of the quality of life for all of us. And shame on all of us if we don't do anything we can to protect it, so that generations yet unborn and those who are still young can enjoy the same wonderful quality that all of us continue to enjoy and those who came before us--

So with that, Senator Smith, I think the first bill you're going to move on the Assembly Committee has already passed. So we can take a break.

SENATOR SMITH: Okay.

All right, our first bill is Senate Bill 1410, which is analogous to Assembly Bill 2501.

Let me just ask, would it be a good idea to call the roll so that we have an official record of who is present?

If you'd do that first--

MS. HOROWITZ (Committee Aide): (speaking away from microphone) First, the roll for the Senate Environment and Energy Committee; Senator Smith.

SENATOR SMITH: Present.

MS. HOROWITZ: Senator Gordon.

SENATOR GORDON: Here.

MS. HOROWITZ: Senator Beach.

SENATOR BEACH: Here.

MS. HOROWITZ: Senator Bateman.

SENATOR BATEMAN: Here.

MS. HOROWITZ: Senator Beck.

SENATOR BECK: Here.

MS. HOROWITZ: And then the roll for the Assembly Environment and Solid Waste Committee, Senator (*sic*) McKeon -- I mean Assemblyman McKeon.

ASSEMBLYMAN McKEON: I was just demoted. (laughter)

MS. HOROWITZ: Sorry.

Assemblyman Gusciora.

ASSEMBLYMAN GUSCIORA: Aye.

MS. HOROWITZ: Assemblyman Barnes.

ASSEMBLYMAN BARNES: Here.

MS. HOROWITZ: Assemblywoman Lampitt.

ASSEMBLYWOMAN LAMPITT: Here.

MS. HOROWITZ: Assemblyman Mainor.

ASSEMBLYMAN MAINOR: Here.

MS. HOROWITZ: Assemblywoman Coyle.

ASSEMBLYWOMAN COYLE: Here.

MS. HOROWITZ: Assemblyman Rudder.

ASSEMBLYMAN RUDDER: Here.

SENATOR SMITH: Thank you, Judy.

Our first bill is S-1410. This is the bill that requires post-construction restoration of optimal soil conditions under the Soil Erosion and Sediment Control Act. And the issue here is that whenever construction activities occur, soil is compacted, and it then acts as though it's asphalt or concrete. It increases runoff not just into the Barnegat Bay, but into all the lakes, rivers, and streams of New Jersey.

Let me first ask if there is the soil conservation district present.

Louise Davis, are you here?

L O U I S E D A V I S: I am.

SENATOR SMITH: Would you like to say a few words?

MS. DAVIS: (indiscernible) (speaking from audience)

SENATOR SMITH: Please come to the microphone.

MS. DAVIS: Thank you.

I'm Louise Davis. I'm representing both the State Soil Conservation Committee and the Association of Conservation Districts.

I applaud the focus and recognition on the importance of soil and the focus of a legislation supporting healthy soil.

The amendments to the -- that you have made, from the version into your Senate version -- we very much applaud that you recognized and designate the local soil districts as the approved inspection -- *sic*) of the plan and the site. They are the local authorities. They are well-trained, and they are the right people to guide and oversee this process.

We support the recognition that practical and cost-effective methods be used, and that you tie into the soil erosion and sedimentation standards which we regularly update as science and technology changes.

Thank you.

SENATOR SMITH: Great. So you believe we are--

MS. DAVIS: I was going to say I think we're on the right track. We really appreciate the fact that you're looking at soil and recognizing it for the importance that it is.

SENATOR SMITH: Okay. We appreciate that comment.

Deirdre -- I can't read your handwriting, Deirdre -- from the Township of Toms River -- in favor. Do you just want to be recorded in favor? (affirmative response)

I also note the presence of Mayor Ron Jones, from Beachwood, who is in favor of the entire package.

Mayor Jones, give us a wave.

Jeff Tittel, in favor.

Did you want to say a few words?

J E F F T I T T E L: Yes.

Thank you.

Jeff Tittel, Director, New Jersey Sierra Club.

I just want to thank you for this legislation and the opportunity to speak very briefly on it.

One of the problems we face, not just here in Barnegat Bay but around the state, is soil compaction. When soils get run over by bulldozers, they basically turn into concrete. And what happens is, when it rains, instead of that water seeping into the ground and recharging our aquifers, it runs off as stormwater, picking up nutrients and soil with it and polluting our waterways. But what's even more critical is when those aquifers get depleted because the water is not recharging. In the summertime, especially a hot summer like this, the aquifers have less water that goes out through

springs, and fissures in rocks, and places to keep our streams flowing. And the reason that you saw the stream levels drop so bad this summer, besides the hot weather, is that our aquifers are losing water. And one of the reasons is that we're putting this concrete shroud over the land. And that concrete is not just (indiscernible) of buildings, but it's also compaction soil and putting lawns on top of it, which act just like concrete.

So we think this is an important bill, not only for Barnegat Bay but statewide, to help recharge our aquifers and also deal with nonpoint pollution.

Thank you.

SENATOR SMITH: Thank you, Mr. Tittel.

I have a ripped up slip from David Pringle saying the New Jersey Environmental Federation supports. So I assume that we're just going to record that rather than speak. I see a thumb up.

Stefanie Riehl, from the New Jersey Builders Association, wanting to talk about the amendments.

Stefanie, if you'd come forward.

S T E F A N I E R I E H L: Good morning.

Stefanie Riehl, New Jersey Builders Association.

We just wanted to go on record thanking the Committee and the sponsors for the amendments to the bill. And we believe that these amendments will go a long way toward protecting the health of Barnegat Bay and also keeping the health of our economy in mind.

Thank you.

SENATOR SMITH: By the way, just so the world knows what the amendments are, they were amendments suggested by the New Jersey

Builders Association, and I thought they were extremely responsible amendments -- one being that whatever the standards done by the Soil Conservation Service, under the Soil Erosion and Sediment Control Act, that they be cost-effective. And that's not a bad thing. They say that what you should do should have some consideration of the cost of doing it. And number two, we have a terrific second amendment. It's a terrific amendment.

MS. RIEHL: There was--

SENATOR SMITH: It's terrible to get old.

MS. RIEHL: There was some--

SENATOR SMITH: Oh, public process. The standards that are developed will go through a public process, and there will be an opportunity for everyone to get their input on those standards, which is the right way to do something like this. Because it will have a dramatic impact on the way in which construction occurs in New Jersey. They're both good ideas. Thanks to the New Jersey Builders for coming up with them.

Thank you.

Cindy Zipf, Clean Ocean Action, in favor. And brevity is even better. (laughter)

Suzanne, from the Solar Alliance.

S U Z A N N E P A T N A U D E: I just saw the amendments. We're in favor.

We just wanted to go on the record and thank you for the amendments. Thumbs up on the bill.

SENATOR SMITH: Thumbs up.

Louise Davis, New Jersey Association of Conservation Districts,
in favor.

MS. DAVIS: I already spoke.

SENATOR SMITH: You've already spoken.

Carleton Montgomery, Pinelands Preservation Alliance.

Carleton.

C A R L E T O N M O N T G O M E R Y: Hello. I'm Carleton
Montgomery, Executive Director of the Pinelands Preservation Alliance.

Thank you for holding this hearing and for bringing this bill
forward.

The bill reflects the growing recognition that soil health is
critical to stormwater control, flood control, the health of natural
communities -- the plants and animals -- and to restoring Barnegat Bay.
And the bill also recognizes a key truth: that a healthy soil is a natural soil,
that the soil that retains the structure and chemistry occurring naturally in
each part of the state--

The Pinelands, like other parts of the state, bears witness to
countless instances in which harm is done by construction that needlessly
strips vegetation and leaves disturbed soils without their natural structure.
Such soils, even with turf grass laid over them and maintained with
intensive watering and fertilizer, can become as hard as concrete,
concentrating stormwater and contaminants which flow ultimately to
Barnegat Bay, out of the Pinelands and other coastal estuaries.

In contrast, the soils with natural structure and vegetation
cover bring irreplaceable benefits: better flood control, better stormwater
control, dilution of contaminants and excessive nutrients from human

activities, the avoidance of evasive species -- and all at no cost. The natural stormwater system is already in place, and it requires no engineering or maintenance.

It's also excellent that this bill recognizes soil types, because there is no one answer to all soil types in the state. Pine Barrens soils are different from soils in North Jersey. And the bill directs the Committee clearly to provide standards applicable to each soil type. In the Pinelands, where the soils are very acidic, low in nutrients, and highly porous, it's a different condition from elsewhere. And where those conditions apply, natural vegetation is very healthy, the aquifers are healthy. But when we begin to engineer around those natural soil types, when we begin to add foreign soil for fill, or to bring in fertilizers and liming in order to change the nature of the soil, or compact the soil through construction, we lose all the benefits that that structure provides in a natural Pine Barrens setting.

I do want to suggest one amendment, a very small amendment. Among the agencies that you direct the Soil Conservation Committee to consider -- to consult with, we'd ask that you add the Pinelands Commission science program. The Pinelands Commission has a team of Ph.D. scientists who all have unique expertise in Pinelands conditions and Pinelands soils -- basically the soils of the entire outer coastal plain. They have worked from time to time with the Soil Conservation Committee on issues relating to the restoration of soils after construction work. And I think it would be a terrific way to make sure that about a quarter of the state gets the right treatment in these regulations that are ultimately adopted.

SENATOR SMITH: Carleton, thank you for your comments.

I think there are at least another two witnesses who are going to suggest amendments. The sponsor's plan on the Assembly side and the sponsor on the Senate side-- We're going to take under advisement any suggested amendments. Today we're not really going to do amendments because, quite frankly, as you can see we really don't have an opportunity to evaluate them on the spot, especially with about 400 people in the room. So we're going to take those back to the drawing board. Staff in both committees is making note of your suggestions, as they will with the two other speakers, and then we'll consider them separately. We can always do floor amendments.

Thank you for your comments in support.

David Friedman, Ocean County Soil Conservation, in favor.

Mr. Friedman.

DAVID B. FRIEDMAN: Good morning.

I'm going to try to be very brief.

We have packets over there on the side for all the legislative Committee to take a look at. Our testimony is in there, and we'd like to leave that with you this morning.

We like to use the example that soils are very much like a sponge in a sense that they're a mixture of large, medium, and small pores. And all the important functions in a soil take place in these pores in the exchange of gases, in storage of water and nutrients, all the micro and macro organisms live in the pores of the soil. And most people don't realize that the roots of the plants don't just grow in the soil, they grow in the pores of the soil. In a typical soil, you will see about 50 percent storage space in any

soil that's undisturbed in the woods. (witness stands away from microphone)

If both of these jars had geometrically sized (indiscernible) particles that go all around -- and this one is very large. I will pass this around to you. And if you look at the jar with the smaller stones in it, simulating soil particles, you might say they don't weigh the same, but they weigh exactly the same, because there's 50 percent storage space in the soil.

SENATOR SMITH: If you'd stand next to one of the recording mikes-- See, the mike you have in your hand amplifies sound in the room, but the mikes that are on the table are for the transcript.

MR. FRIEDMAN: I'm sorry.

SENATOR SMITH: That's okay.

MR. FRIEDMAN: What I'd like to do is just show you this very brief demonstration to depict why healthy soils are important in every watershed throughout the state.

This is an example of a soil that has organic matter in it, and it also has a sugar-based protein named globulin. It actually holds the soil particles in place because it lives in the organic matter of the soil. Watch what happens when I put it in this jar. You'll notice it doesn't break up because it has soil aggregates. Take that same soil that's been run over by heavy equipment and watch what happens to the jar. It begins to disintegrate and fall apart immediately. The whole point is just to show you that healthy soils are very important in all the functions that we talked about.

I just want to close by mentioning one thing. We've been working very closely with the Ocean County Board of Freeholders. They

have done a number of stormwater basin restorations to date where they've gone in and restored the vital soil functions in the basins, and it does work.

I thank you for all your support.

SENATOR SMITH: Thank you, Mr. Friedman.

Peter Ferwerda, representing himself, in opposition.

Mr. Ferwerda, I don't know if I'm saying your name properly, sir.

P E T E R F E R W E R D A III: Thank you.

Good morning.

SENATOR SMITH: Good morning.

MR. FERWERDA: I have to apologize up front that I'm not experienced in addressing your panel about these types of issues.

However, the bill related to the Soil Erosion and Sediment Control causes me a great problem. It talks about water, but it forgets about the air we breathe and the air that our plants take in as well, to remove -- through the process of photosynthesis, and then purify it, and then release it back into our atmosphere.

The solution to pollution is dilution. People later on will be talking about the Bay, the quantities of water -- some water -- that they're moving towards it. I don't wish to, at this time, go any further on this (indiscernible) other than to mention that that is also true with the air.

As we saw with the early years of the development of our state, we concentrated our factories in small, urban areas. The pollution -- deterioration of buildings -- is part of the problem, or toxic assets, that we have today in our state.

What I'd like to talk about is the problem with the resource extraction industry. The resource extraction industry operates under, in most cases, a municipal license but never receives a certificate of occupancy. So the problem is that when the industry is done with a site -- and there are many places within Ocean County that remain without a vegetative cover or any other form of restoration.

I, unfortunately, several months ago found out, to my dismay, that my wife has spots on her lung. I have been involved with various different practitioners, and they're talking about cancer and they're talking about causation. She and I were informed that the contributor is silica dust. Silica dust is, as Mr. Friedman indicated earlier, soils that have been disturbed, soils that have been run over by construction equipment, areas that have remained unrestored for greater than 30 days, areas that are greater than 5,000 square feet.

In my situation -- I live in the village of Warren Grove, which has a large resource extraction industry and operation. They have a large area -- super large -- possibly maybe 200 acres without any vegetative cover. Now, if this industry follows the best practices of other miners in our community -- and presently there is a controversy relative to Wal-Mart placing a store on what had been a municipal toxic asset, because it wasn't restored. It serves as a wonderful playground for children, but at the same time there are injuries that result.

So I'm here -- and I wrote you, Senator Smith, a letter that I was going to give you today explaining my views, explaining what I would like to see in terms of massaging the bill that is in front of you. But what I want to have eliminated is the buck passing. This is a State law, so the

State should enforce it. Well, they got a municipal permit, and our plant is part of their permit, so maybe municipalities should enforce it. My wife's lungs don't care, because it probably would not have occurred if there had been proper soil management practices being enforced.

And with that, sir, I hope you will take my comments. I wish to deliver to you this letter.

SENATOR SMITH: Sure. Give it to the staff over here, and they'll make copies for members of the Committee. Actually, our Sergeant at Arms will take care of it.

MR. FERWERDA: Okay.

SENATOR SMITH: Thank you for you comments today.

MR. FERWERDA: Have a nice day.

SENATOR SMITH: You too.

Mr. Ed Wengryn, New Jersey Farm Bureau.

Actually, why don't we bring up Ed Wengryn, New Jersey Farm Bureau, with amendments; Bill Wolfe, in favor with amendments; and Emile DeVito, in favor, but with amendments. This is the amendments panel.

Staff is taking good notes.

E D W E N G R Y N: No, my comment on the sheet was the amended version of the bill that you have -- I'm in favor of. So I'm good to go.

SENATOR SMITH: Oh, the New Jersey Farm Bureau supports it.

MR. WENGRYN: Yes.

SENATOR SMITH: Thank you, sir.

Mr. Wolfe.

B I L L W O L F E: Thank you for taking on this topic. It's very important.

I would just like to make two recommended amendments, and both of them grow out of a prior Ocean County Soil Conservation Service report on soil compaction that is probably part of the -- I'm assuming it's part of their testimony.

One would be to explicitly have the bill apply to site preparation, construction, and demobilization activities, because that's where the compaction occurs. And the way the bill is drafted right now, it's not clear that it applies to those activities.

The second issue is with respect to the DEP's water quality standards for total dissolved solids and total suspended solids, and their monitoring network that monitors the stream network to see whether or not there is a healthy condition and whether or not the standards can ultimately be enforced.

The bill should just generally direct the Department to remedy the flaws that have been identified in those standards, pursuant to the Ocean County study. And that would greatly improve the implementation of the program.

SENATOR SMITH: Thank you for your comments.

Mr. Emile DeVito, New Jersey--

And I didn't identify him. Mr. Wolfe is from New Jersey PEER. Emile DeVito, from the New Jersey Conservation Foundation.

Emile.

E M I L E D. D e V I T O, Ph.D.: Senator Smith and other members of the committees, thank you very much for allowing us to speak.

I want to thank you for specifically referring to solar facilities in the legislation. Earlier in the year solar panels were exempted from impervious cover regulations. And, Senator Smith and others, you said you would deal with solar facilities with this bill. And I want to thank you for that.

I just want to make one point, and that is: The damage to soil doesn't only occur during construction. We had folks testify along the way that when the soils are wet after heavy rains -- even driving over them with small equipment causes compaction.

So regarding the solar facilities, I sent you a suggested amendment a couple days ago regarding long-term maintenance of all the roadways within the solar facilities, so that in between all the rows of solar panels -- as all the maintenance trucks drive back and forth over the years during rainstorms -- the solar facilities won't become compacted; so that we can maintain the interstices between the solar arrays. So we have given you that suggested amendment. We hope you can include it for the long-term maintenance.

Thank you.

SENATOR SMITH: Emile, I don't want to be disingenuous. The solar impervious coverage bill, as you know, was my bill. And we're the Energy and Environment Committee. We're actually the Environment and Energy Committee. In New Jersey, we're doing everything we can to spur on solar and alternative, carbonless forms of energy. The amount of soil to be impacted by solar facilities in New Jersey will be less than a thousandth of a percent of the land in New Jersey. So we put that in a separate

category. We're trying to do everything we can do to that. I don't want to give you a lot of hope that that amendment will occur. Okay?

DR. DeVITO: Okay. Thank you.

SENATOR SMITH: But we appreciate your comments.

Thank you both.

We have a whole bunch of people who have given a single slip for all four bills generally in favor. I would suggest that you not snatch defeat from the jaws of victory. (laughter) Let me just mention that you're in favor. If you absolutely, positively have to come up, come up. But otherwise, I'm just going to record you in favor.

William deCamp, from Save Barnegat Bay, in favor of all four bills; Stephen Atzert, A-T-Z-E-R-T, citizen representing himself, in favor of all four; Tom Fote, in favor of all, Jersey Coast Anglers.

T O M F O T E: I would like to speak.

SENATOR SMITH: All right, Tom. Come on up.

MR. FOTE: Usually I would just pass.

Thank you for having this hearing in Toms River.

But when it comes to soil compaction, that is one of my areas of expertise. Most of you know me (indiscernible). But my career before that was an Army Corps of Engineers Officer, and I looked at building roads and everything else. And this is where I feel strongly that we need to do what we do. When you visit Vietnam, that was my area of building. What we did over there was left a lot of atrocious things that are basically being done to this day.

One of the things I want to talk about -- and nobody else mentioned it -- if you go up to Manasquan and you go up to Lightening

Jack's -- that marina there -- and you look at the bottom -- that bottom used to be all gravel. It had a certain kind of ecology because that was there -- gravel. It basically created certain types of life forms, certain types of marine organisms.

Because of construction in Manasquan -- reservoir and other road construction -- there is now an inch of soil on all that gravel. It has changed the whole ecology of that upper end of the Bay. So whether we have more weakfish, whether we have more striped bass, whether we have more winter flounder, they're not seeing the food they should see because of that soil. And that's why I felt it was important just to say a few words on that.

Thank you for your indulgence.

SENATOR SMITH: Thank you, Tom.

Gail M. Saxer, S-A-X-E-R, from the League of Women Voters, in favor of all bills.

G A I L M. S A X E R: Sir, I'd just like the record to reflect that that includes the League of Women Voters of Ocean County, New Jersey, and the United States. (applause)

SENATOR SMITH: Wow.

I'm sorry, I'm violating my own rule. Let's curb our enthusiasm. (laughter)

Dr. Michael Kennish, Rutgers, in favor of all bills; Fred Akers, Great Egg Harbor Watershed Association, in favor of all bills; Tim Dillingham, Dr. Steve Souza, Helen Henderson, from the American Littoral Society, in favor of all bills; Greg A-U-R-I-E-M-M-A, Esq., from the Sierra

Club, in favor of all bills. And I think that's our whole list for the-- Mike Pisauro, from the New Jersey Environmental Lobby is in favor of all bills.

Yes, sir, mister--

D O U G O' M A L L E Y: Doug O'Malley, Environment New Jersey, in favor of all bills.

SENATOR SMITH: Terrific.

E D I T H G B U R: Edith Gbur, Jersey Shore Nuclear Watch, in favor of all the bills.

SENATOR SMITH: Okay.

The slip that I was just given is Carol E. Gay, New Jersey Industrial Union Council, New Jersey Ocean County Progressive Democrats of America, in favor of all bills.

I think that's all the slips on this bill.

The Assembly is already ahead of us.

Clarissa Green, citizen, in favor of all bills; Calvin Chamberlin, homeowner, in favor.

I assume, Mr. Chamberlin, that's in favor of all bills.
(affirmative response)

Elaine Chamberlin, homeowner, in favor of all bills; Patricia Barndt, Vice Chair of the Shade Tree Commission in Beachwood township, in favor of all bills. Marianne P. Clemente, League of Women Voters, Chair; Barnegat Climate Action Commission, in favor of the total package. Philip Bartlett, from Save Barnegat Bay, in favor of all bills; Vic Palmieri, representing himself, from Toms River, New Jersey, in favor of the total package.

Do we have everybody recorded who wants to be recorded?
(affirmative responses)

The Assembly, being the progressive leadership team that they are, have already released this bill. And I think we're, like, a tweak away from being exactly the same, which we'll confirm on the floor. We'll get them consistent.

Any member of the Senate panel who wishes to speak?

SENATOR BATEMAN: No, Mr. Chairman. Just as co-prime on the legislation with you, I appreciate the sponsorship.

I move the amendments and the bill.

SENATOR SMITH: Great.

SENATOR GORDON: Second.

SENATOR SMITH: Second by Senator Gordon.

Ms. Horowitz -- oh, are you okay? (Ms. Horowitz falls)

MS. HOROWITZ: I'm fine. (laughter)

SENATOR SMITH: Can you take the roll, please, on the motion to release with amendments?

MS. HOROWITZ: On Senate Bill 1410 with Senate Committee amendments, Senator Beck.

SENATOR BECK: Yes.

MS. HOROWITZ: Senator Bateman.

SENATOR BATEMAN: Yes.

MS. HOROWITZ: Senator Beach.

SENATOR GORDON: Senator Beach left his vote in the affirmative.

MS. HOROWITZ: Senator Beach left an affirmative vote.

Senator Gordon.

SENATOR GORDON: Yes.

MS. HOROWITZ: Senator Smith.

SENATOR SMITH: Yes. And the bill is released. (applause)

Our next bill is Senate 1856.

ASSEMBLYMAN McKEON: As your lawyer, by the way, I did -- just lay down. We'll get EMTs to come. (laughter)

I just want to acknowledge several public officials and several representatives of public officials before we move forward.

Ben Giovine is here from Congressman John Adler's office. Congressman Adler has recently introduced a piece of legislation relative to not only Barnegat Bay, but all estuaries throughout our great nation, dealing with stormwater management plans hoping to get this issue -- that's a nationwide issue -- to bring focus to it. So we appreciate Congressman Adler's leadership and Ben's presence here today.

We also have several additional local officials beyond those acknowledged before. From Point Pleasant Borough, we have Councilman Jack McHugh and Councilman Chris Leitner who are going to leave a resolution for the community.

Councilmen, welcome to both of you.

And we also have Mayor Jason Varano, from Berkeley.

Mayor, I don't know if you want to give us a wave if you're still here. Mayor, thank you for being here. We appreciate it.

And are the two Councilmen here -- McHugh and Leitner? If you want to be acknowledged. (no response) They may be out with the overflow crowd, but we wanted to acknowledge their presence here today.

I think we're going to go with 2606, yes, authorizing the Ocean County Planning Board for control of stormwater runoff.

I'm going to go right to the witnesses. But, in effect, there's somewhere -- around the Barnegat Bay area -- of 2,700 storm basins. And we really have no collective idea which ones are working, what's in disrepair. And ultimately what becomes at stake is that those basins, which are suppose to keep nonpoint source pollution from getting its way to the Bay aren't operating in a functional way. And that just accentuates the great problem of runoff of things that shouldn't be there that are resulting in the continued environmental degradation of that great body of water.

I'm going to call as the first witness, really, a national expert.

SENATOR SMITH: You have that guy from Virginia?

ASSEMBLYMAN McKEON: Yes. I don't know if he's from Virginia, but Mr. William Hannemann, on storm drain technology.

Is Bill here?

WILLIAM R. HANNEMANN: Good morning.

My name is William Hannemann. I'm from the storm drain technology-- I just wanted to introduce or state to this, the governing body, that there is technology available. It's patented technology that can actually stop and recycle the petroleum products that go into the storm drains, remove the silt and sand, stop the floating debris from going into the estuaries, and also stop and prevent the downflow of heavy metals.

This is a patent that has actually been around for a while, but it hasn't really gotten any recognition. I was down in the Gulf of Mexico working on the oil crisis there. I came back. I read in the *Asbury Park Press* about how my own Barnegat Bay is just as distressed as the Gulf of Mexico.

The only difference being: instead of the oil spewing out at thousands of gallons a day out of a pipe, it's being slowly leaked into our estuaries and into our Bay. And I think-- And I just want to recommend to the governing council here to consider using some of the patented technologies available.

For instance, with the 2,700 storm drains-- When the storm drains will be retrofitted or when new construction takes place, if the storm drain technology can be put in place, I think it would help a great deal.

That's all. I'll be brief.

Thank you very much.

ASSEMBLYMAN McKEON: Thank you, sir.

Cindy Zipf, Clean Ocean Action.

Would you like to testify, Cindy?

CINDY ZIPF: (speaking from audience) We're in favor of the bill. No need to testify.

Thank you.

ASSEMBLYMAN McKEON: Okay. Freeholder John Bartlett.

Freeholder, I know that you signed up on both bills. This is the one--

FREEHOLDER GERRY P. LITTLE: I'm not Freeholder Bartlett. That's Freeholder Bartlett. Who would you like to hear first -- on your bill or the bill that he's going to focus on -- the authorities bill?

ASSEMBLYMAN McKEON: Not the authorities bill.

FREEHOLDER LITTLE: Okay. Then you want me, Mr. Chairman.

ASSEMBLYMAN McKEON: Okay. He signed up for both. That's why I was confused.

FREEHOLDER LITTLE: Yes.

ASSEMBLYMAN McKEON: And I apologize. Since I called the Freeholder, I'm going to ask you to identify yourself.

FREEHOLDER LITTLE: I will.

Thank you, Mr. Chairman.

Members of the Senate and Assembly Environment Committee, I am Freeholder Gerry Little. That's Freeholder Bartlett. We appreciate very much the opportunity to be here to comment on the proposed legislation for the planning board bills, which I believe are S-1856 and A-2606, and the other bill that would create an authority.

I am the Freeholder Liaison to the Ocean County Planning Department and the Ocean County Planning Board. And I will be focusing my comments on this particular bill, and Freeholder Bartlett will comment on the authorities bill.

ASSEMBLYMAN McKEON: Thank you, Freeholder, for clarifying that. Please feel free.

FREEHOLDER LITTLE: I'd like to comment briefly. I raised my family in Surf City on the Bay. We moved here 35 years ago. My kids have grown up on the beaches and bays of Ocean County. And my son is now a college student. So we know Ocean County very well.

Freeholder Bartlett was born in Ocean County, has served as a Freeholder for 33 years, and is one of the longest -- is the longest-serving Freeholder in Ocean County and one of the longest-serving Freeholders in the state.

The other members of our Board have similar experiences in our love for Ocean County and raising our families here. And we would like to assure the Committee that we share very much the sponsors' commitment in protecting Barnegat Bay.

We on the Board of Freeholders consider our stewardship with Barnegat Bay and our marine environment as a foremost responsibility. Our county taxpayers have invested \$800 million to construct a state-of-the-art Ocean County Utilities Authority infrastructure system to keep our coastal waters clean and safe.

I think I'm going to reveal to you something which the Committee is unaware of, and as are many of the residents of our county. Since the creation of the Ocean County Natural Lands Trust Program in 1997, our taxpayers have invested about \$100 million to preserve open space, coastal marshlands, and forest. More than 12,000 acres have been protected from development and the impact of stormwater runoff.

Ocean County is the second largest land-sized county in the state. We have 408,000 acres. Only Burlington County is larger. The Committee will be interested to learn that in conjunction with the Forsythe Refuge, State Parks and Forests, our County open space program and municipal open space programs, over 43 percent of our land is permanently protected in public ownership. An additional 14 percent of privately owned land is within the Pinelands Preservation Forest Area. That means 57 percent of those 408,000 acres are permanently protected, and the number is growing each year because of our Open Space Preservation Program.

Ocean County works closely with many partners. You heard the Ocean County Soil Conservation District -- Mr. Friedman was talking a

few minutes ago about our rain garden program. We work with Trust for Public Lands to acquire critical watershed lands in the Barnegat Bay, as identified by TPL's century plan. Recently we worked with TPL in the development of the Barnegat Bay 2020 report that identifies additional preservation priorities. Our Ocean County Health Department works closely with the educational community to promote best management practices for the watershed region, including brochures, Web announcements, PSAs on watershed and fertilizer use. I, in fact, have participated in some of those PSAs. Our educational community and Ocean County College, with the support and encouragement of funding of the Board of Freeholders, is expanding their curriculum to include new science programs, many of which are targeted for our coastal estuary.

Our taxpayers have invested \$12 million to create the Ocean County Marine Academy of Technology and Environmental Sciences in Manahawkin, which we believe is one of the finest high school institutions of that kind in the nation.

Ocean County worked cooperatively with the leaders of the Clean Vessel Act in the 1990s to facilitate the installation of more than 65 pump-out units in our marine facilities. With CDA grants and a partnership with OCUA, Ocean County purchased five mobile pump-out boats. And we continue, each year, to fund the annual appropriations for the operations of these vessels to reduce marine discharge into our bays and estuaries. As a result of that work, a no-discharge zone was established for Barnegat Bay.

Recently, Ocean County -- our Board of Freeholders -- lent our support to the DEP's regulatory effort that led to the C1 protection

designation for the Metedeconk River and the Toms River. Our Health Department maintains a coastal water testing program for a hundred bay and ocean beaches, which many of you, we hope, are here today and enjoying. We welcome all of you to Ocean County.

I want you to know that Ocean County is implementing and meeting all of the requirements of the DEP stormwater regulations. And we have spent millions of tax dollars on that effort. We've been assisting our towns in regional shared services, spending millions to construct vehicle wash pads and truck washes to implement storm drain cleaning programs and street sweeping programs.

Ocean County has -- I heard some numbers thrown around. Ocean County has 10,000 County-owned storm inlets -- 10,000 -- and about 800 county-owned water management basins. Our Ocean County Road Department maintains two specific road crew teams, each with six workers, which are dedicated to stormwater management only. These 12 stormwater management employees tag, inspect, and clean our 10,000 stormwater inlets every year; and they inspect, mow, clean, and excavate, as necessary, over 800 water management basins to make sure they are functioning properly to protect our water quality.

Parenthetically, since we have our State legislators here today, we would ask you to check in to see if the New Jersey Department of Transportation annually inspects, cleans, and tags its State-owned inlets and water management basins along Route 9, Route 37, Route 70, Route 35, Route 88, and Route 72. Those inlets and stormwater basins, as you well know, are maintained and owned by the State of New Jersey, not by

Ocean County. Those are major roadways. They have thousands of inlets and/or basins.

Further, there are thousands of municipal-owned stormwater inlets -- I repeat, municipally owned -- storm inlets and stormwater management basins that are all under the jurisdiction of the Department of Environmental Protection, State of New Jersey, and their requirements.

Finally, there are untold thousands-- And by the way, this is the same in all statewide-- But we're here today focusing, I guess, on Ocean County. Finally, there are untold thousands of privately owned stormwater management basins and inlets in commercial property, in private homeowners associations, etc. These, too, are under the direct and full jurisdiction of the New Jersey Department of Environmental Protection, as well as their enforcement, not Ocean County.

Mr. Friedman mentioned here, as representative of the Ocean County Soil Conservation District, that Ocean County is working on a rain garden program. In the last several years, we have -- our Board of Freeholders has earmarked over \$2 million of our tax dollars to restore and reconstruct state-of-the-art rain garden stormwater management basins, completing that work in-house, with our own employees, getting more work done at a reduced cost.

Additionally, we have included 20 new rain garden projects in the designed engineering specifications for various highway projects that we are -- that we have put out to bid. That program will continue well into the future.

Ocean County has developed equipment washing facilities that treat and recycle wash water. And we support, financially, the Barnegat Bay

Estuary program. We have established hazardous waste collection and safe disposal programs for our residents. Our recycling program has been recognized worldwide as one of the finest. All of these commitments are done in the spirit of protecting our marine and coastal waters for our children and generations to come.

Ocean County is regulated by the Pinelands Protection Act, the Waterfront Development Act, CAFR1, CAFR2, NJPDES, DEP riparian laws, NJDEP stormwater regulations, NJDEP C1 protection zone designation, soil conservation district, State development and redevelopment plan, COAH, municipal development guidelines, and many other regulatory protections, including Federal.

Again, Ocean County is in full compliance with the DEP's stormwater regulations. Ocean County and each municipality are already required, by State law, to have stormwater pollution prevention plans by the DEP. These cover the development of pollution-control ordinances and practices. Ocean County and its municipalities are all in compliance with these DEP regulations. In fact, in 2004, the Board of Freeholders provided \$187,000 in funding for the pollution prevention plans for 31 of our 33 municipalities. Stormwater management plans are also required for every municipality in the watershed. These plans and ordinances ensure that development applications are compliant with the New Jersey stormwater regulations.

The State of New Jersey, under its numerous DEP regulatory auspices, can mandate any necessary changes or improvements for stormwater management and nonpoint source pollution.

ASSEMBLYMAN McKEON: Freeholder, I'm sorry. I'm just going to ask you-- You know how many people are here to--

FREEHOLDER LITTLE: I will.

Let us be clear that under the 1999 constitutional amendment, the State of New Jersey would be required to fully fund those improvements. One of the parts -- one of the components of your bill would allow us to have a mapping system for all of our storm drains and inlets in Ocean County. We had our Engineering Department bring these to present to your Committee today. One of the provisions would be that the DEP would present to Ocean County a stormwater and estuary map within 90 days after enactment. I have brought such a map along. We have had it for 15 years.

So we're here today to explain to the Committee that we have concerns with this legislation. We cut \$11 million from our County budget. We have frozen all new programs and services. We are not in any financial position to accept new responsibilities and new programs. So we wanted the Committee to know this, and that's why we appear today.

ASSEMBLYMAN McKEON: Thank you, Freeholder.

FREEHOLDER LITTLE: I would be happy to give -- any questions that you like. (applause)

ASSEMBLYMAN McKEON: Just a couple -- and we appreciate that. Just a couple of thoughts. Number one is that I'm glad we gave you the latitude to accentuate all of the wonderful things that the Freeholders and the taxpayers of this county have been doing to be proper stewards of the Bay.

That having been said--

FREEHOLDER LITTLE: You're welcome, Mr. Chairman.
Thank you.

ASSEMBLYMAN McKEON: You don't want to be disrespectful to me, nor different than anyone else.

FREEHOLDER LITTLE: I'm not. Not at all, sir.

ASSEMBLYMAN McKEON: I was actually complimenting you for your efforts.

FREEHOLDER LITTLE: Thank you. And I appreciate that.

ASSEMBLYMAN McKEON: That having been said--

FREEHOLDER LITTLE: I do.

ASSEMBLYMAN McKEON: Those efforts having been made are clearly not working as it relates to-- (applause)

Please don't--

SENATOR SMITH: Curb your enthusiasm.

ASSEMBLYMAN McKEON: Yes, I didn't do it to invoke that response.

But as I started to say, I think we can collectively agree, regardless of everybody's best efforts -- not the least of which have been the Freeholder Boards for many years. And I respect the number of years of service that you and your colleagues have put in.

We need to all focus on this together as a state. As you talked about the taxpayer-funding -- much of that in Ocean County -- this particular piece of legislation allows for a collection of funds from developers as they continue to develop new land. You know, as you've experienced it as a resident here, that the amount of development that has

taken place in Ocean County has far outpaced much of the development in the rest of the state.

So with that--

FREEHOLDER LITTLE: Mr. Chairman, I need to respond to that.

ASSEMBLYMAN McKEON: All right. I'm going to allow you to respond, and this is no longer going to be a debate as I call the next--

FREEHOLDER LITTLE: No, no. I just want you to know that Ocean County does, indeed, charge a fee for every developer for stormwater management, and has for as long as anybody can remember. All stormwater improvements are required to be paid for by the developer, as well as all transportation improvements: traffic signals, expansions of roadways, upon every application.

ASSEMBLYMAN McKEON: Of course.

FREEHOLDER LITTLE: So we do do that. We want you to know that.

SENATOR SMITH: This bill is a little different. You are allowed, under the Municipal Land Use Law, to require onsite improvements.

FREEHOLDER LITTLE: Absolutely.

SENATOR SMITH: And every planning board--

FREEHOLDER LITTLE: And we do.

SENATOR SMITH: --local and county do that. This bill expands that. This bill says that if your county planning board has a master plan for the repair of your malfunctioning basins, you can collect an appropriate amount from developers for off-site contributions. Under the

current law, that's not Kosher. You've had New Jersey Supreme Court cases saying that it is -- that unless there is a specific statute authorizing it, you can't collect for off-site improvements. And the problem with development around the Bay is that it's not just what's happening on that particular 4-lot subdivision, or 10-lot subdivision, or commercial parking lot. They have an impact on the entire Bay. And the new development should have a responsibility toward helping to repair that.

Your comments said there's not enough money, that our taxpayers are taxed. We're not necessarily disagreeing. But we're saying, "Here you have a chance to collect it from the development community because they do have an impact on your Bay." And you're saying you don't want to accept it. What's wrong with that?

FREEHOLDER LITTLE: Well, as you know, there have been bills in for a number of years to allow off-site improvements to be paid for by developers, including schools and other roadwork, statewide. So if that is a statewide legislation--

SENATOR SMITH: That's what this bill says.

FREEHOLDER LITTLE: --we have--

SENATOR SMITH: That's what this bills says. You have-- The Barnegat Bay is dying. This is your opportunity to collect some money to help correct the malfunctioning stormwater basins in your county. Barnegat Bay is basically all contained in Ocean County -- or almost all contained. You are the stewards of Barnegat Bay. We're trying to give you an additional tool. It's not coming out of your taxpayers' hide. That one is coming out of the developers' hide because they're impacting your Bay. What's wrong with that?

FREEHOLDER LITTLE: Would you like me to respond?

SENATOR SMITH: Sure.

FREEHOLDER LITTLE: Senator, as we said, we charge for off-site stormwater and traffic improvements, and we will continue to do that. We would accept any funding that we could have to improve stormwater runoff control. What we're really talking about--

SENATOR SMITH: So you're in favor of this bill.

FREEHOLDER LITTLE: No, sir. I didn't say that. What we're really talking about is the authority bill. This is just a first step. They're both linked together.

SENATOR SMITH: That's true.

ASSEMBLYMAN McKEON: Thank you Freeholder Little.

FREEHOLDER LITTLE: And thank you for the opportunity, Mr. Chairman.

ASSEMBLYMAN McKEON: It's a pleasure.

Gerald LaCrosse. I don't see a particular organization. It notes that you're in favor.

Gerald, would you like to testify or just go on the record.

UNIDENTIFIED SPEAKER FROM AUDIENCE:
(indiscernible)

ASSEMBLYMAN McKEON: Gerald W. LaCrosse, of Beachwood. It says in favor.

Jeff Tittel, Sierra Club.

Jeff.

MR. TITTEL: I wasn't going to, but I feel I need to. (laughter)

Thank you very much, and I will try to be brief.

I think we all know the reason that we're here is that the current system we have dealing with stormwater in New Jersey is broken. Many of the towns have not come in and done their job and developed plans. We've also seen problems that it's created with nonpoint pollution destroying bays and estuaries, watching dissolved oxygen levels drop all across our shores, and seeing fish kills like we saw in Cape May.

We think that this legislation is important for two reasons. We go after new developments and try to have them do the right thing. But at the same time we're doing that -- and we always hear this from the builders: "You're going after the new stuff. What about the old stuff?" What's important about this bill, and what's important about the other bill coming up after it, is that it's the only way we get to retrofit the problems we already have. If we stop all development coming into, and all stormwater from new development coming into Barnegat Bay, the Bay would still have a problem and would still be threatening to die. And that's why we need this bill and why we need to put together a program with the County, like the 10-town system that was put together in Morris County over a decade ago. And that's why this is important -- because it let's us go after existing problems and try to fix them. And it let's us work together with our towns to develop a plan that's going to look at the entire basin, not just one development at a time, one outfall structure at a time.

And the other reason that I wanted to -- I think that this bill is important, is that there are things happening at the State level that we're very concerned about. There's a new guidance document out on stormwater that's weakening the rules that were put in place back by the McGreevey administration. We see an administrative order holding up the

water quality planning rule changes that would pull back areas that are environmentally sensitive out of sewer service areas around this Bay. And that's on hold right now. And if that doesn't happen, we're going to see a lot more nonpoint pollution coming into Barnegat Bay, destroying the Bay, because we're not going to be protecting those environmentally sensitive areas.

So this bill is important because of what's happening at the local level, what's happening at the County level, and the threats at the State level of stormwater. So I hope this bill gets out of Committee today.

Thank you very much. (applause)

ASSEMBLYMAN McKEON: Thank you, Jeff.

Please, everyone.

Jeff, thank you.

I've got two other individuals who'd like to testify in opposition to the bill and about 50 in favor. Let's pull the two up against it who both said they'd be brief.

Either Dave Brogan or Mike Egerton, from the NJBIA and the Chamber.

You guys can go "boo" and "hiss" as the two of them come up. (laughter) I'm just kidding.

These two gentlemen are professional and always have learned-- I'm teasing them both.

DAVID BROGAN: Thank you very much, Mr. Chairman.

My name is David Brogan. I'm Vice President of Environmental Policy at the New Jersey Business and Industry Association.

NJBIA represents about 22,000 companies statewide in New Jersey, from Fortune 100 companies all the way down to mom and pop shops.

First of all, I just want to recognize and acknowledge the issues that you're trying to face are difficult, and I do understand that. I also respect those who make their livelihoods off the Bay and who want to use the Bay for recreation.

Our concern really is about the fees in both bills. And I'd just like to take the liberty of addressing both bills. I'll be brief. Right now, companies already pay corporate business taxes, they pay property taxes, they pay fees, DEP fees, they have to have mandates and regulatory requirements that are very costly. The gentleman just mentioned other impact fees.

Now, on top of that, we would have this new assessment. From our perspective, it's just adding another unnecessary burden to the difficulties facing businesses in the State of New Jersey.

SENATOR SMITH: Are you on the stormwater utility bill?

MR. BROGAN: I'm on both bills. Both bills-- I just wanted to very briefly -- that way I'll--

ASSEMBLYMAN McKEON: It's fine. Thank you.

MR. BROGAN: Basically, that, again, is an added burden.

The other thing I'd just like to mention is, many companies already have stormwater permits, whether it be a general permit or an individual permit. If it's an individual permit, it gets renewed every five years. They have to do mitigation. There is oversight and the oversight

fees associated with that. So this is an ongoing payment that they're making to the State.

From our perspective, it's -- if you want to call it *double fees* or *double taxation*. Again, it places what we feel is a difficult burden on companies that are facing a very difficult fiscal environment.

So, in short, our concern really focuses on the fees. And we would ask you to reconsider allowing a fee if you're going to move either pieces of legislation forward.

Thank you.

ASSEMBLYMAN McKEON: David, thank you.

Mike.

And I know that Senator Beck has a question that she wanted to ask. But please, go ahead.

MICHAEL EGENTON: Sure.

I would just echo and bring a little fiscal reality to our current economic climate. And I would add to -- for the Committee -- the Joint Committee to look at all the policy decisions that we're making on the State level.

For instance, Senator Lesniak spent a lot of time trying to resolve the fees that developers pay with regard to COAH, Council on Affordable Housing, and that hasn't been resolved yet. So we have the same concerns -- what kind of fiscal impact, what kind of message does that send?

And, obviously, as I've said before this Committee many, many times, all things drive to the State budget. I'm sure you all know that we have a structural deficit going into the next budget cycle. So that's our

concern when we assess a fee like that -- what kind of impact will it have on the economic development community?

Thank you, Chairman.

ASSEMBLYMAN McKEON: We appreciate it from both of you.

Senator Beck has a question.

I just note, if it hasn't already been said, Barnegat Bay, on an annual basis, is worth \$3.3 billion to the local economy, to the State's economy. That's what we're looking to protect here.

Senator.

SENATOR BECK: Two things: First, to Jeff Tittel's comments before-- I live in the Borough of Red Bank, on the Navesink River, which faces many of the same challenges -- certainly not as severe as Barnegat Bay, but certainly we have a lot of environmental challenges there too. So I appreciate the actions we're taking today. I think they're very important.

The question I had for the folks from the business community-- And we do hear from small business, certainly at this point in time, with the number of private sector bankruptcies growing -- our foreclosure rates are going up 40 percent a year in Monmouth County alone since 2006. But if it was not--

You're trying to suggest that it's a duplicative fee, that they already pay a fee. So is it your suggestion to amend it so there is only one versus two?

MR. BROGAN: I would suggest that there-- Honestly, we cannot support a fee, from our perspective. If you're paying property taxes, if you're paying corporate business taxes, or if you're a sole proprietorship,

or paying income taxes, if you're paying fees right now-- There are companies that are getting letters from the DEP regarding their general stormwater permits -- having to pay a fee on that.

The other fear we have is -- and Mike mentioned the difficult fiscal times -- this money goes into an undedicated pot -- or--

MR. EGENTON: General fund.

MR. BROGAN: --or general fund. It could be taken for other purposes. I mean, in my town-- I live in Mount Laurel, and property taxes are going up significantly.

So now you have-- And I get calls a lot of times from smaller companies.

ASSEMBLYMAN McKEON: I'm sorry to interrupt you. You realize it's only Ocean County.

MR. BROGAN: I do understand that, Assemblyman, and I appreciate that.

From our perspective, we're very concerned that even a bill that deals with one county could be expanded. And as I said, I recognize the importance of the Bay and significance it has on both recreation and businesses. But, again, we're seeing significant property tax increases. The sole proprietorships -- a lot of people having small businesses. That's a big impact on their bottom line. And then to add an additional fee--

The other thing is -- and I didn't see any changes. But the way in which the fee would be created is of concern to us too, in terms of how the DEP would go about establishing a formula -- whether that would go through the Administrative Procedures Act. But I apologize. I don't want to give focus on that.

From our perspective, the fee is really-- We cannot support a fee.

SENATOR BECK: If I could just, through the Chair, follow up. The fee is intended to tie those who are damaging the environment to remediating. And that is a scheme that New Jersey uses often. And so I don't find that the fee is inappropriate. But I do raise a question. If there's already a fee being paid, and we're adding a second fee, I think that's something that we, as a Committee, may want to take a closer look at.

MR. BROGAN: Thank you, Senator.

If you're a manufacturing facility, many times -- or an industrial facility -- you will have individual stormwater permits. You're paying annual fees, you're paying for the DEP's oversight, you're paying for the mitigation.

SENATOR BECK: It's something we need to look at.

MR. BROGAN: It's something that we're very concerned about.

ASSEMBLYMAN McKEON: Thank you, both.

The last witness in opposition is Bill Wolfe.

I ask you to be brief, Bill.

MR. WOLFE: Thank you.

Bill Wolfe, Director of New Jersey PEER.

It's with great reluctance that I would oppose a bill like this, particularly with all the environmental support and all the public support that's here today. But in good conscience and in honesty-- Number one, I am not a lobbyist, and I'm not bound by any, what I would consider, lobbying antics. And I think accuracy, and truth, and advocacy is my

mission here. And I think the testimony of the Ocean County representative you just heard is the compelling evidence as to why the fundamental approach of the bill is unworkable, fatally flawed. Because it relies upon the good-faith efforts of a bill that enables and authorizes a county and a county planning board to proceed in good faith and aggressively implement the provisions of the bill.

And I think what you heard for quite some time was testimony that says, "Everything we're doing in Ocean County is wonderful. Everything is working appropriately. And thank you very much." So given that that is the attitude of the County, given that the bill relies upon the County to implement it -- that it's enabling -- it isn't going to work.

Furthermore, there are tools right now under the Clean Water Act that DEP has that this bill bypasses, and becomes an excuse and thereby undermines Clean Water Act requirements. And the bill itself uses terminology from the Clean Water Act: impairment of the aquatic life uses. That is a statutory and regulatory term of art. The Department is not enforcing existing standards, they're not enforcing existing requirements. (applause)

And you should use an approach that is demonstrated to work, and look to the experience-- If you want to get outside New Jersey, just look to the approach of the Chesapeake, where it was a coming to (indiscernible). There was no honesty -- where EPA finally had to acknowledge that they were misrepresenting the performance of the program, they were forced and dragged before Congress to acknowledge that. And growing out of that, the Obama administration -- Lisa Jackson -- designated--

ASSEMBLYMAN McKEON: Please, Bill, wrap up.

MR. WOLFE: Okay. If you want to make the Bay sustainable and healthy, use the tools that are already in law under the Clean Water Act. Direct the Department to proceed and enforce the current law.

This bill, as going forward, is unworkable.

Senator Smith, I worked with you on the Highlands Act. If there was a bill enabling the Morris County Planning Department to develop a regional management plan for the Highlands, you know it would not have been worked -- you know it would have been unworkable. And the Forest Service report found that the existing zoning scheme, and the build-out onto the existing municipal planning and zoning scheme, was monstrous and was not sustainable. And we have the same conditions here. The landuse pattern is not sustainable, and this bill does not address any of that.

Thank you.

ASSEMBLYMAN McKEON: Thank you, Bill.

We have, give or take, about 20 individuals signed up in support. I'm going to acknowledge you. And if you feel compelled to testify, please come up.

Dave Pringle.

Dave, are you good? I see you waving in the back. Are you good?

D A V I D P R I N G L E: (speaking from audience) We support the bill, although I think Bill raises a very good point that given today's testimony (indiscernible) question how well the movement--

ASSEMBLYMAN McKEON: Everybody is allowed to say what they want, but I have no question of the integrity of the Ocean County Freeholder Board and elected officials to comply with what will be the law. I think maybe there's just some frustration because, notwithstanding diligent efforts, the results haven't been what we all want to see. They recognize there's an issue. You have to be a fool not to. And I know they'll work within the confines of this additional tool to help.

Mike Pisauero, NJEL.

Mike, are you good?

MICHAEL L. PISAURO JR., ESQ.: No need to testify.

ASSEMBLYMAN McKEON: Okay.

John Weber, Surfrider Foundation.

It's just such a cool name. (laughter)

JOHN WEBER: Thanks, Assemblyman.

I will be brief. I'm just speaking because I think I probably have something to say that most other people aren't saying. And the point is that this is not just an environmental issue.

On both these stormwater bills -- putting them together -- it's not just about a nice environment, or healthy ecosystem, or fish and wildlife, it's also a public health issue. The Surfrider Foundation -- the members -- know about stormwater pollution all too well. It's manifesting itself as people are getting sick. Chapter volunteers noticed this, and they set up a Website with a simple survey to collect information on people who are getting sick from going in the ocean. It's found at njoceanillness.org. They launched this in April. They did a little bit of promotion and advertising on no budget -- all volunteer.

And just in the last four months, they've gotten surveys from 33 people who say they got sick from going in the ocean. Of those 33, 16 of those people said it's happened to them multiple times. So we've got scores of other incidences. And of those 33 people, 14 of them went to the doctor. And of those 14, four of them had MRSA infections. I hope some of you are on the Health Committee so I don't have to pronounce or explain what a MRSA infection is. But suffice it to say, it's a drug-resistant form of a staph infection. It's pretty nasty.

We were stunned by these findings. Admittedly, we're only collecting this on people who are going in the ocean. We are not looking at people going in Barnegat Bay. But I would be shocked if people are not getting sick from going in Barnegat Bay. And we're not collecting that information. We obviously don't have sewage treatment plants spewing raw sewage into the oceans and bays anymore. So this is clearly a function of stormwater.

We're going to continue to collect this information. And maybe we will look into getting this on -- going in Barnegat Bay. But I just wanted to impress upon you that this is -- you're taking some good, first baby steps here, but it's not just a matter of a clean environment. This is actually a public health issue. So I appreciate what you're doing. There are a lot of people in this room who care about Barnegat Bay. Surfrider has a great resource at a Website called knowyourh2o, which is K-N-O-Wyourh2o.org. There's a great little film there. If everybody in the room goes and shows that to a hundred of their friends, we'll be on our way to helping Barnegat Bay out.

I appreciate your time. Thanks very much.

ASSEMBLYMAN McKEON: Thank you very much.

Kelly Mooij, New Jersey Audubon, has submitted written testimony to the entire panel, no need to testify in favor.

Kelly, thank you.

Doug O'Malley, Environment New Jersey.

Doug, do you want to testify, or just--

MR. O'MALLEY: In support of the bill.

ASSEMBLYMAN McKEON: Thank you.

Sal -- and if I'm mispronouncing your name I'm sorry -- it looks like Sorce.

SAL SORCE: Yes.

ASSEMBLYMAN McKEON: Sal, would you like to testify?

MR. SORCE: I'll just be very brief.

ASSEMBLYMAN McKEON: Please come up, Mr. Sorce.

MR. SORCE: It's good to see you, John. It's been eight years. West Orange resident.

ASSEMBLYMAN McKEON: Oh, it's nice to see you, Sal. I didn't recognize you with the--

MR. SORCE: I know. Everybody says that.

I'm here to speak briefly on both for and against. In fact, Mr. Wolfe stole a little bit of my wind.

Many people don't realize it, but Ocean County has been owned and operated by -- and I don't want to turn this into a political joust -- but it's been owned and operated by Republicans. The 3rd District was owned and operated by Republicans for 126 years. Congressman Adler won

that -- what an incredible win. And I'm proud of him, because I think he stepped up.

One thing that is very -- I've been very conscience of, having moved down to Stafford and also Surf City-- I own two homes, one of which, in Surf City, is strictly gravel -- a very small amount of gravel, all natural plants and trees -- incredible. Manahawkin -- I refuse to put in any lawn. I get notices to cut my noxious, natural weeds, etc.

But what I'm here to speak about specifically is-- Being 34 years in pharmaceutical, everything was based on performance. And what I would have to say-- If the Bay is in so much trouble, and it's been under the care and stewardship of several organizations, the last thing we need -- and I hate to be insulting, but I've always been against the Freeholder form of government, because I think the State does not need another form any more than we need this commission. But the authority that I'm looking for has to be strict. Because in Stafford -- while the developer did pay certain things in developing and remediating the Stafford landfill, he got 50 percent tax relief for upwards of 15 to 35 years. Many of the residents never even heard of that. I speak constantly to people in town, and they're unaware. You should make an amendment. Any charges toward the developer -- any builder -- it should be included that no waiver, no abatement in the form of taxes-- Because what you folks do at the State level to help us is taken away by the municipality.

Thank you. (applause)

ASSEMBLYMAN McKEON: Thank you, sir.

I'm just going to go, again, through the list. And if anyone feels compelled to testify they're welcome to, of course.

Kathleen Gasienica, American Littoral Society, in favor.

Kathleen, we're good?

KATHLEEN GASIENICA: No need to testify.

ASSEMBLYMAN McKEON: Thank you, Kathleen.

Christopher Leitner, Borough of Point Pleasant, no organization.

Chris, thank you for being here and supporting.

Tom Mahedy, of the genesisfarm.org.

Are you coming up to testify, Tom?

TOM MAHEDY: Yes, please.

ASSEMBLYMAN McKEON: I'm sorry I didn't recognize you.

MR. MAHEDY: Sit?

SENATOR SMITH: So they can get you on record with the other microphone.

MR. MAHEDY: It's a pleasure to be here today with all the great people here who are the prophets of our time, who are speaking for Earth and all her species.

I wanted to first point out the symbol of the Lenni Lenape here, who are up on the wall. And, of course, they're well known for trying to live in harmony with Earth.

The scientists have spoken very clearly. All scientists today know that all is interconnected. All species are needed for the health of Earth.

There's a movement called the Earth Charter, and there's also a thing called *Earth jurisprudence*, which says humans have rights, but also Earth has rights, mountains have rights, bays have rights to live. And

actually there is a movement called *Earth jurisprudence*, which is putting this into law. The country of Bolivia just put into their constitution that Earth has a right to live, as does every form of life within the country -- the waters, every species, every tree, every bird.

I thank you all for considering all the bills today.

I'm also a member of Pax Christi New Jersey, which is part of the International Catholic Movement. And we work a lot on environmental issues as well. And I also mention Genesis Farm. And I ask you to check out their Website because they are an example of a CSA, community supported agriculture, and they're a working model of what can be.

So we're actually in favor of all of the bills today, and we thank you for all your great work.

ASSEMBLYMAN McKEON: Tom, thank you for your testimony.

Christi Campbell showing favor of all four bills; Susan Gato, Nurse Gato, in favor of all four bills; Tom Fagan and family -- and it's nice to see the family here -- in favor of all four bills, from Manahawkin; Clare Fagan, of Manahawkin, in favor of all four bills; Cliff Lindholm, former mayor of Montclair -- Mayor, welcome -- in favor of all four bills.

I'm sure you found a gentler life somewhere down here in Ocean County, perhaps. It's nice to see you, Mayor.

Jayne Moormann, Chairperson of the Beachwood Environmental Commission. I know the Mayor was here earlier in favor. And Britta Wenzel, of Lavallette, in favor of all four bills.

Thank you, all. That's a compilation of all those who signed up to testify.

Senator Smith.

SENATOR SMITH: Just one quick comment. The bill that's before you is -- and sometimes the testimony was a little mixed. The bill that's before you is the bill that says that when there is new development around the Bay, the Ocean County Planning Board, developing a master plan of what needs to be fixed, is able to collect from a developer for off-site improvements. They're limited in what they can do now. This gives them a new tool to acquire funding for those repairs. Some of the other testimony was on a different bill.

So I hope we'll move forward with the bill as it's -- in terms of what it actually contains.

ASSEMBLYMAN McKEON: We will. And if we can, Senator Smith, we'll move it first on the Assembly side.

SENATOR SMITH: Go for it.

ASSEMBLYMAN McKEON: On the Assembly side, do we have a motion to accept the bill, 2606.

ASSEMBLYMAN GUSCIORA: So moved.

UNIDENTIFIED MEMBER OF COMMITTEE: Second.

ASSEMBLYMAN McKEON: Moved and seconded.

SENATOR SMITH: And that's with amendments or not? It's with amendments.

ASSEMBLYMAN McKEON: The amendments have been distributed, and I believe the members are familiar with them.

MS. HOROWITZ: On Assembly Bill 2606 with Assembly Committee amendments, Assemblyman Rudder.

ASSEMBLYMAN McKEON: I'm just going to stop for one second. All of my Assembly colleagues who represent incredibly hardworking individuals -- some of whom are on vacation and they're here to give their time today -- if you now want to speak on the merits of this particular bill, I want you all feel free to do so. You've all been incredibly patient throughout the process.

You can call it. I'm sorry. I just wanted to--

MS. HOROWITZ: Assemblyman Rudder.

ASSEMBLYMAN RUDDER: Yes.

MS. HOROWITZ: Assemblywoman Coyle.

ASSEMBLYWOMAN COYLE: Yes.

MS. HOROWITZ: Assemblyman Mainor.

ASSEMBLYMAN MAINOR: Yes.

MS. HOROWITZ: Assemblywoman Lampitt.

ASSEMBLYWOMAN LAMPITT: Yes.

MS. HOROWITZ: Assemblyman Barnes.

ASSEMBLYMAN BARNES: Yes.

MS. HOROWITZ: Assemblyman Gusciora.

ASSEMBLYMAN GUSCIORA: Yes.

MS. HOROWITZ: Assemblyman McKeon.

ASSEMBLYMAN McKEON: Yes.

MS. HOROWITZ: The bill is released.

SENATOR SMITH: Okay. And on the-- (applause) On the Senate side--

SENATOR BATEMAN: Mr. Chairman, I move it with the amendments.

SENATOR SMITH: Senator Bateman has moved the bill with amendments.

SENATOR GORDON: I'll second it.

SENATOR SMITH: Senator Gordon has seconded.

Take a roll call vote.

MS. HOROWITZ: On Senate Bill 1856 with Senate Committee amendments; Senator Beck.

SENATOR BECK: Yes.

MS. HOROWITZ: Senator Bateman.

SENATOR BATEMAN: Yes.

MS. HOROWITZ: Senator Beach.

SENATOR BEACH: Yes.

MS. HOROWITZ: Senator Gordon.

SENATOR GORDON: Yes.

MS. HOROWITZ: Senator Smith.

SENATOR SMITH: Yes.

The bill is released unanimously.

Our next bill will be Senate 1815 and Assembly Bill--

ASSEMBLYMAN McKEON: It's 2257 (*sic*).

SENATOR SMITH: --2257 (*sic*) -- 2157 (*sic*)? It's the stormwater utility bill.

By way of background, the problem always in American government is having funding to make necessary improvements. In this case we're talking about the death of the Barnegat Bay and trying to turn that around. Many other states in the United States of America have chosen stormwater utilities as a way to do that.

Our first witness is an expert witness, and that's Mr. David Bulova from Virginia -- the state of Virginia. Mr. Bulova, in addition to being a nationally recognized expert on stormwater utilities, is also a member of the Virginia House of Delegates.

You've been pummeled by the political process. And as you can see, this is an exciting topic.

If you would, Mr. Bulova, just tell us a little bit about your background. And then we'd like to hear what you can tell us about stormwater utilities.

DELEGATE DAVID L. BULOVA: Thank you very much, Mr. Chairman and members of the Committee.

I appreciate the opportunity to come out here today, come up to New Jersey, to talk a little bit about our experiences with stormwater utilities.

Again, my name is David Bulova. I work for a company called AMEC Earth and Environmental, and I've worked with stormwater utilities primarily helping local governments to implement and put together stormwater utilities for about eight years, primarily in Maryland and Virginia, although AMEC itself has done this kind of work nationally, including assisting the county of New Castle, Delaware, with their stormwater utility.

As mentioned, I actually come from a background in Virginia with the Virginia House of Delegates. I've been in the House of Delegates since 2006, representing an area outside of Washington, D.C., the City of Fairfax and Fairfax County, that is going through the exact same kinds of issues that we're hearing here. And actually it's a little bit refreshing and

certainly nice to hear that other folks are going through these same kinds of pressures. The Chesapeake Bay was mentioned, but we're also dealing with the Potomac River as well.

Before I was in the House of Delegates, I was actually an elected member of the Northern Virginia Soil and Water Conservation District Board. And so it's great to see so many folks from the conservation districts out here.

Let me say that when staff first asked if I would come up here and talk, I was excited, number one, because I do have some roots in New Jersey. I lived up in Neptune Township for a couple of years growing up. But also staff went ahead and mentioned that this was a retreat.

And I will tell you, Mr. Chairman, that we have a little bit of a different idea of what a retreat is down in Virginia. (laughter)

Nonetheless, it's great to be here. I'm glad to be part of this. And it's nice to see such a big crowd here.

Since I have a relatively limited amount of time, what I'd like to do is talk just very briefly about our experiences with stormwater utilities in Maryland and Virginia, and why those have been such an absolutely critical part of our water quality protection efforts.

By way of comparison to your bill, Mr. Chairman, Maryland's authority is very broad. It's actually just one simple paragraph that says localities can go ahead and do this. Virginia's relatively prescriptive. However, I think although -- while they're set up differently, the thing I want to make sure I stress is that almost every other state in the United States gives this kind of authority to their local governments to set up a utility. And whether that is by enabling legislation or through home rule

authority, we've literally worked with hundreds of localities across Virginia who've gone ahead and used this as a way to go ahead and meet their stormwater management needs. Indeed, there are a thousand stormwater utilities nationwide on record and up to speed to date.

Virginia has 16 stormwater utility systems which came on line mostly in the early 1990s. And if I get too technical for you, please stop me. Because I have a habit of spouting off acronyms. But this is in response, in the early 1990s, to new stormwater management requirements that were mandated by the Federal Clean Water Act under the NPDES Phase I municipal separate storm sewer system program. And I believe most of New Jersey is either covered under Phase 1 or Phase 2 of that program. And so these localities realized that they needed to make sure that they kept ahead of the game in terms of being able to maintain and manage their stormwater system given these new requirements. And so Virginia has actually had an enabling authority since 1991.

Recently there's been renewed interest in stormwater utilities because of Chesapeake Bay restoration efforts. And it is very, very true that the EPA has basically come in and sat down with all the stakeholders -- Virginia, Maryland, Delaware, New York, Pennsylvania -- and said, "You know what? We know you've been working very hard, but it hasn't done what you needed to do in order to clean up the Chesapeake Bay." And so they've gone ahead, and sat down, and said, "We're going to give you some targets that you have to meet. By 2017 you have to get 60 percent of the way there. By 2025 we've got to get 100 percent of the way to cleaning up that Chesapeake Bay." And so we're very proud of what we've

accomplished, but in no means are we resting on our laurels in terms of where we need to go.

The EPA is even getting more aggressive than that. In my home locality, they've actually set up -- and if you don't know what this means, I'd be happy to explain it -- total maximum daily loads. And that is basically a process where you decide how much pollution a storm -- or a system -- a water quality body can go ahead and take. They've actually implemented the very first flow TMDL in the country in my backyard. And what that basically means is that the EPA has declared it's not sediment, it's not bacteria that is the problem, it is impervious cover that is the problem. And they've said that impervious cover is actually the pollutant that they're getting to.

The purpose -- the point of all this is that it's going to shift a focus from simply preventing pollution during new development, which is very, very important. And it's important to partner with the development community on this. But I think more importantly, it's going to require us actually going back into our communities and doing significant retrofit of places that have -- that were developed without the benefit of those practices. And there's going to be a significant cost to that.

EPA is now writing into it's permits language that says cost is no longer an excuse. And so it's very important that we go ahead and arm our localities, our municipalities, our counties with the ability to rise to that challenge.

Aside from the regulatory aspects of this, one of the things that we always hear during the processes that we put together isn't so much about the regulatory compliance. Most people's eyes glaze over on that,

quite frankly. But it has a lot more to do with the public health and safety issues that were mentioned a little bit earlier in terms of flood control, in terms of maintaining the system that you already have. And so when we look at these programs, you'll see just an enormous backlog of projects in terms of underfunded infrastructure and capital -- anything from undersized pipes to deteriorating infrastructure.

I don't know if you all have the problem of corrugated metal pipes like we do in Virginia. But they were very popular in the '50s, and '60s, and '70s. They're only designed to last for 30 years, and they're very dramatic when they decide to go ahead and collapse underneath a parking lot. Even concrete pipes, which are meant to last 75 to 100 years, still require that maintenance in order to go ahead and make sure that you're using that infrastructure efficiently.

And so I bring that up just to go ahead and say, the most important part of your utility, and I think the most important part about what you're doing here today, is getting a handle on what your program should look like. You've got an enormous challenge ahead of you. But the thing is, you've got to figure out what your program is going to go ahead and look like. And that said, once you've decided that it's important to protect the environment, it's important to go ahead and maintain what you already have, and it's important to put in new infrastructure -- those things aren't going to change. You're committed to those. The most important part of that stormwater utility is: How do you pay, and who pays?

When dealing with large capital costs and maintenance costs, you really have only two options. You have real property tax and you have a stormwater utility. With your existing utilities, it would be absolutely

unheard of if you were to charge water or sanitary sewer services based on a person's property value. We know that there is not a link between how much water someone uses or how much somebody flushes that toilet with how much their property is worth.

The same is true with stormwater management. Unlike other services that are provided generally, stormwater services -- in terms of the volume managed and the pollutants controlled -- are directly related to the amount of impervious surface on that person's property. And so if you had two neighboring properties worth just the same in every manner, but one had 100 percent impervious cover and one had 20 percent impervious cover, what's the more equitable way of charging for those services: the property value or basing it on the actual contributions to that system?

Three key areas that I just want to hit on really, really quick in terms of why Virginia localities and Maryland localities are turning more and more to the stormwater utility system: The first one is equitability. Your contribution is based on impervious cover. And so it's not just how much is paid, but also who pays. In Virginia -- and I imagine New Jersey is the same way -- there's a lot of property out there that is exempt from real property taxes. The Federal government is a great example of large amounts of property that is exempt. They place a burden on the stormwater management system, but they don't pay into that system. Under a utility, it is a fee for service. Everybody pays. The Clean Water Act supports that. And if you were listening in terms of President Obama's executive directive with regard to the Chesapeake Bay-- Obama and his administration also believe that. And so that is an untapped source of revenue that your communities can use.

Second: It provides a stable source of long-term planning. Let's face it-- And as an elected official, I know this just as much as you all. Stormwater doesn't compete as well with a lot of other services such as education and public safety. As a result, it becomes very, very difficult to do long-term planning for your system. And as a result of that, you wind up planning by emergency, or you put in just when you're able to go ahead and afford it. And what that does is it winds up costing your communities in the long-term.

The third and last point I want to go ahead and make is: It can be used to encourage the reduction of unnecessary impervious surfaces and encourage voluntary practices through market forces. Basically you're giving folks an incentive -- you're giving developers an incentive, you're giving property owners an incentive -- to take matters into their own hands and be able to reduce impervious surface and reduce their charge. Almost all states also allow for a credit. Actually, Virginia mandates that you get a credit for things that you do on site. So the gentleman beforehand who was talking about redundancy in terms of permit fees-- In Virginia, most localities actually give a credit to a permit holder -- an industrial permit holder for doing what they're doing. And so it becomes a way to go ahead and encourage folks to go ahead and do the right thing.

In fairness, there are some challenges with putting together a stormwater utility. There are going to be people who don't like it and people who wind up paying a little bit more. They're going to be a lot more vocal than those who are going to be paying less. But when it comes down to it, it's about a fairness, and it is an equity issue, and how are you going to go ahead and pay for it.

Public input is the critical component of this, and I can't stress that enough. And that's why I'm so glad there are so many people here today. Because if your leaders and your businesses don't understand a compelling case, and they don't understand why this is a more equitable way of funding stormwater -- things you're going to have to do anyway -- then ultimately the program will fail.

But 9 times out of 10, in dozens of processes that I've been involved in -- and no two are alike in terms of how they come out -- folks will come to the conclusion that if you want to be able to go ahead and make a difference in protecting water quality, this is the best way to go about doing that.

Like I said, no two processes are the same. But what I can say with absolute certainty is that having a utility available as a tool to localities -- giving those municipalities, your counties the option of being able to go ahead and use that -- is an absolutely vital component of water quality protection.

Anyway, I could go into much more detail about the ins and outs of stormwater utilities. I don't know that that's what you want to hear. But I'm certainly willing to go ahead and stick around for any questions you might have.

SENATOR SMITH: One question, sir: You kind of indicated in your remarks that we're behind the curve in New Jersey. How successful have these stormwater utilities been in cleaning up some of these problematic water bodies?

DELEGATE BULOVA: They've been essential in terms of providing the stability of funding necessary to go ahead and do what you

need to do. And that's exactly the problem we've had in the Chesapeake Bay watershed -- is that when times are good, we'll go ahead and put a couple million dollars into the bucket, we'll go ahead and do some great things. But I think we all have recognized, as stakeholders, that you need to consistently fund these programs in order to go ahead and make sure that you're using them efficiently and to effectuate change in the long-term.

SENATOR SMITH: Are there other questions for Mr. Bulova?
Senator Beck.

SENATOR BECK: Just simply, if we could get some more information about the credit system that's used for businesses that are acting with the right interest-- Because I think the Business and Industry Association-- If there is a fee that's duplicative, I don't think that's our intent. But we'd be curious to look at what Virginia is doing.

DELEGATE BULOVA: And I'd be happy to do that. I've written several local ordinances to implement those. And I can go ahead and pass those on so you can see what kind of credits are provided and to what extent those kinds of credits are provided.

SENATOR BECK: Great.

SENATOR SMITH: Mr. Bulova, did you prepare written remarks, or was it basically (indiscernible)?

DELEGATE BULOVA: Mr. Chairman, I do have written remarks. But in typical fashion, as I was listening, I scribbled all over them. (laughter) And I will be more than happy to go ahead and submit those for the record once I have a chance to clean those up.

SENATOR SMITH: That would be great. We'd appreciate it.
Any other questions on either side? (no response)

Thank you.

Freeholder John Bartlett, Ocean County Freeholder, in opposition.

F R E E H O L D E R J O H N C . B A R T L E T T J R .: Good afternoon.

SENATOR SMITH: Good afternoon.

FREEHOLDER BARTLETT: You've heard earlier from Freeholder Little, who outlined a number of the achievements of the County of Ocean over the last 30 years in the protection of our environment -- the stewardship that we take very importantly.

I would like to remind the Committee that in the year 2006, Governor Corzine awarded to me -- and I was happy to accept it -- the Governor's Environmental Excellence Award for land conservation, given the overwhelming success of our natural lands trust program. And two years later that was followed up with another award from the Governor. Again, the Governor's Environmental Excellence Award for our stormwater management practices in regard to storm drains and keeping materials out of those.

I am here, however, specifically to speak about Senate Bill 1815, which is titled "The Ocean County Stormwater Management System Demonstration Act." Now, I am the senior member of the Ocean County Board of Chosen Freeholders, and I would prefer really to not have to be here today, but it's my duty to be here to respond to some of the things in this "Demonstration Act."

Incredibly, no input has been asked for from the Board of Chosen Freeholders with regard to this bill -- no input whatsoever, at all.

In fact, Senator Smith--

SENATOR SMITH: Actually, Freeholder, that's incorrect.

FREEHOLDER BARTLETT: That is not incorrect.

SENATOR SMITH: Yes, it is. We met with your Business Administrator and your County Engineer, and they indicated the Ocean County Board of Freeholders wanted no part of it. (applause)

FREEHOLDER BARTLETT: I do believe, sir, that that meeting took place in the last session of the Legislature, and this is a new Bill 1815, which is not the one that was discussed before. You have never communicated directly with the Board of Freeholders. In fact, in January of this year I wrote you a letter inviting you to meet with us, and you have so far ignored that. So let the facts remain as they are. (applause)

Incredibly then--

SENATOR SMITH: Hold on, Mr. Freeholder. If you throw it out, you have to defend it. You have a whole series of correspondence from me to the Board of Freeholders, and your response and another Freeholder's response to the issues concerning the Barnegat Bay. And in all cases, those letters say, "We have it under control. Thank you, but no thank you for your help." And I'll be happy to share that correspondence with the press. In fact, if the Gannett papers--

FREEHOLDER BARTLETT: You already have.

SENATOR SMITH: Yes, if the Gannett papers are here, they already have copies of it.

Listen, we're not-- Just to put things in perspective, we're not here to be adversarial to the Ocean County Board of Freeholders. We think you have a tough job. We also think you have the second worst bay in

America in terms of eutrophication. And we're trying to give you tools. (applause) Honest to God, we're only here to give you tools to help clean up the Bay. We don't want to be adversarial to you. We want to be working with you to clean up our Bay.

FREEHOLDER BARTLETT: Well, I'm glad you have adopted the proper terminology with regard to the Bay, because you did call it the second worst polluted bay in the United States. And I would remind you that there is not one bay beach in Ocean County, from Memorial Day to this point in time, that has been closed due to pollution. It is rather our--

UNIDENTIFIED SPEAKER FROM AUDIENCE: Beachwood.

FREEHOLDER BARTLETT: Beachwood is on the Toms River.

SENATOR SMITH: Curb your enthusiasm.

UNIDENTIFIED SPEAKER FROM AUDIENCE:
(indiscernible)

SENATOR SMITH: First of all, let's be fair.

FREEHOLDER BARTLETT: I'm trying to.

SENATOR SMITH: We want to be courteous to everybody. I would appreciate it if no one would show any enthusiasm one way or the other. Let's let our Freeholder get his comments on the record.

Sir, please continue.

FREEHOLDER BARTLETT: Thank you very much, sir.

Essentially, this bill labels Ocean County "a convenient laboratory," and authorizes Ocean County to test pilot a countywide stormwater management utility as a demonstration project so that the State could judge the statewide feasibility of such an activity. Astonishingly, not one dime of State support is proposed to support such a utility.

Instead, this utility -- the Ocean County Board of Freeholders is empowered to create such a utility that would have the power to collect fees and other charges on the owners or occupants, or both, of any real property in Ocean County. And to add insult to injury, you then want to take 5 percent of that take for yourselves back to Trenton. I think this is kind of an incredible way to do business. This is a brand new tax on the people -- or would be a brand new tax on the people of Ocean County.

Ladies and gentlemen of the Committee, as the senior Freeholder, and speaking for my colleagues, I can tell you in no uncertain terms that the Board of Chosen Freeholders is not in any position, and will not create a new tax or new fees on the people of Ocean County who are taxed enough. All we have to do is listen to what the general public is saying, "We've had enough." They don't want any more taxes. We are in the midst of a recession. I don't have to remind you of that. We have 10 percent unemployment in this area, and roughly in this state. Our seniors in Ocean County -- which are roughly one-quarter of the population of this county -- our seniors have lost \$1,002 in senior property tax rebates that are not forthcoming from the State. So on top of essentially a \$1,200 tax increase on our seniors, on top of 10 percent unemployment, we want to create another tax in these environments. And I can tell you point blank we are not going to do that.

UNIDENTIFIED SPEAKER FROM AUDIENCE: You may have to.

UNIDENTIFIED SPEAKER FROM AUDIENCE: I'm a senior, I'm retired, and I will pay a tax for a utility. (applause)

SENATOR SMITH: Let me ask everybody again, please curb your enthusiasm. We want to have a frank exchange of views, and when you interrupt the speaker, that doesn't happen.

Freeholder, I apologize.

FREEHOLDER BARTLETT: No problem.

SENATOR SMITH: By the way, just one question. Do you understand the way this bill is structure? It's absolutely permissive. You don't have to adopt the utility.

FREEHOLDER BARTLETT: Yes, sir.

SENATOR SMITH: And the reason we do that is if you go forward with it, the Ocean County Board of Freeholders can structure it any way you want. So, for example, you could say homeowners -- unless they have impervious cover above a certain limit -- would be exempt. And you would then be going to the large office parks that have a lot of asphalt and the large shopping centers that have a lot of asphalt and asking them for assistance. You would also set the amounts. So it's totally in your control.

FREEHOLDER BARTLETT: Well, it is not.

SENATOR SMITH: You would have the help of the DEP. But it is permissive. This bill doesn't mandate that you do it.

FREEHOLDER BARTLETT: That's what I was getting to next, sir. Because as I recently-- As I just said, we're not going to create a new utility, we're not going to create a new bureaucracy, we are not going to create a new level of government to tax people more than they're already being taxed.

However, there is a solution to this problem, and that is the fact -- if this Committee and if this Legislature truly believes that this needs

to be done, mandate it. You pay for it. Barnegat Bay is a State resource. (applause) What you are asking us to do in Ocean County is to tax our people in huge amounts. We're not talking about a couple million dollars a year. We're talking about a program that would run into the tens if not hundreds of millions of dollars a year to finally effectuate.

So I'm saying to you: This is a State problem. Let's have a State fix of this problem. Mandate it. And why won't you mandate it? Because of State mandate, State pay? Let me tell you, if you mandate it, the Board of Freeholders will certainly, with your money, be happy to carry this out. But we will not tax Ocean County people who are already being taxed enough and who are telling us that every day. That is the way we're going to handle it.

I thank you very much for the pleasure of being able to address you and to address this very important issue for Ocean County.

SENATOR SMITH: Thank you, Freeholder.

Our next witness will be Jeff Tittel from the Sierra Club.

MR. TITTEL: Thank you.

I originally came up here to say I support the bill. But now, listening to Ocean County, maybe we need to set up a Barnegat Bay commission similar to what we've done in Lake George and other places. Because if the government of the area that's in charge of giving resources and protecting this Bay doesn't want to do it, we may have to look at another construct.

And the reason I say that is, quite frankly, this Bay is going to die. We all know that. And that's why we're here today. Between sea nettles, and nitrogen in the Bay, and so many other things, we need to do

these retrofits. Without it, this Bay is going to die. Stormwater utilities have worked around the country, not only in places like Virginia. I just came back from California. It is a critical way that they're protecting their beaches and their economy. In the city of Santa Monica, they take their stormwater, they clean it up, and they use it for irrigation in their parks and for people to use on their lawns. In other places, they're recharging it back into ground water to protect potable water sources from saltwater intrusion. This legislation is actually the most critical piece of legislation we have. Because if we don't go back and retrofit the problems of the past, whatever we do in the future, we're still going to lose the Bay, and we're going to lose other parts of the state as well. This bill is absolutely critical.

And I really believe that if we don't go forward and come up with a way of cleaning up this Bay by retrofitting areas where there are stormwater problems, we're going to lose the Bay. And so we support this bill. But we may also want to think about trying to maybe have a regional planning commission or some other construct if the County is that much of an obstructionist to something that's so important for their own vitality and their own life blood.

When I hear them talking about taxes, there's a hundred billion dollars worth of ratables on this Bay. If this Bay dies, people lose their investments, they lose their homes, they lose the hard work that they put into buying their homes, or their small businesses and their shops that depend on the \$4 billion a year tourism industry.

This bill is vital to protect the economy as well as the environment.

Thank you. (applause)

SENATOR SMITH: Thank you.

All right, I'm going to note for the record the positions of various parties. And unless they have a compelling need to get up--

Britta Forsberg Wenzel, in favor of all four bills; Jayne Moormann, Chairperson, Beachwood Environmental, in favor of all four bills; Clifford Lindholm, former Mayor of Montclair, in favor of all bills; Clare Fagan, from Manahawkin, citizen, in favor of all bills; Tom Fagan and family, Manahawkin, in favor of all bills; Susan P. Gato, registered nurse, Americans with Disabilities, in favor of all bills; Christi Campbell, citizen from Brick, in favor of all bills; Tom Mahedy, Pax Christi, Genesis Farm, in favor of all bills; Kelly Mooij, New Jersey Audubon, in favor of all bills, no need to testify; Doug O'Malley, Environment New Jersey, in favor of the bill; Kathleen Gasienica, American Littoral Society, in favor of all four bills; Christopher Leitner, Borough of Point Pleasant, in favor of all four bills; Sal Sorce, in favor of all four bills.

In opposition: Conor Fennessy, New Jersey Apartment Association -- actually not opposed, an amendment request.

Mr. Fennessy.

C O N O R G. F E N N E S S Y: Thank you, Mr. Chairman.

Hopefully, we'll be as colorful.

We appreciate the opportunity to testify this morning.

I'd like to thank staff for sharing the amendments with me.

We appreciate the fact that the sponsors are deleting sections 11 and 15. We also appreciate your changes to Section 4, and we certainly hope to have an opportunity to sit with you and the other stakeholders to perhaps tweak that section as well, moving forward.

It is an important issue. We'd like to be part of the process. I did not actually check off opposed. We are just simply seeking some amendments today.

Thank you, Chairman.

SENATOR SMITH: Thank you.

Stefanie Riehl, Tony DiLodovico, New Jersey Builders Association in support with additional amendments.

MS. RIEHL: Good afternoon, Mr. Chairman, members of the Committee.

Again, Stefanie Riehl, from the New Jersey Builders Association.

We have historically, as an Association, been supportive of the creation of stormwater utility systems.

And we've been working with you, Senator Smith, for probably close to three years on the creation of such systems.

But what we have to stress is that we really believe that if these systems are going to succeed through this legislation, through statewide legislation, there needs to be a provision in the legislation which provides that counties or authorities will accept and have the responsibility to accept the management of basins.

And with me today is Tony DiLodovico, Vice President of the Birdsall Services Group, which is an environmental engineering firm, to further discuss our position.

T O N Y D i L O D O V I C O: I'd just like to emphasize -- and I know you had the expert from Virginia and Maryland talk about their experience with utilities. And if we're going to create either a county or separate utility

for the Barnegat Bay-- To require that they look at existing runoff, to require that new runoff pay for part of the past problems, but then to also require new development to build new facilities -- and then that not be part of this utility authority -- would just then lead to -- 20 years from now -- another authority would have to be created to manage those facilities that weren't properly maintained.

SENATOR SMITH: The two bills go in tandem.

MR. DiLODOVICO: Right. And you would need to have some way of -- any new facilities that get built would have to be part of the utility authority in order for it to properly work.

We would like to see some way the language makes sure that new facilities aren't mandated and then there's no operation and maintenance of those facilities.

SENATOR SMITH: Thank you.

Ralph Henninger, Fisher and Son Construction, in opposition.

Mr. Henninger, are you here? (no response)

Scot Mackey, Garden State Seafood Association, in favor, no need to testify; Dr. Judy Shaw, from Rutgers University, in favor.

Dr. Shaw, did you want to provide any testimony?

J U D Y S H A W, Ph.D.: Thank you. In support.

SENATOR SMITH: Okay.

Mike Pisauo, New Jersey Environmental Lobby, in favor.

MR. PISAURO: No need to testify.

SENATOR SMITH: Gerry Pizzi.

G E R R Y P I Z Z I: In favor.

SENATOR SMITH: Okay. And Gerry, you identify yourself as a citizen, senior, retired, from Toms River, New Jersey.

And I think you also jumped up a little earlier with your enthusiastic support. (laughter)

And finally -- I don't know if it's finally -- David Pringle, New Jersey Environmental Federation, recorded in the affirmative.

And we have a couple of notes here, and we're not quite sure where they stand: Steve Kirby, Brick Resident.

Mr. Kirby, are you here in favor, opposed?

S T E V E K I R B Y: I'm fine.

SENATOR SMITH: You're good.

He's an in-favor guy.

Larry Reid, Brick resident.

Mr. Reid, are you here? (affirmative response)

L A R R Y R E I D: Yes, thank you.

I hope I can have the same amount of time some of the other people have had who have testified to you.

First of all, I'm opposed to creating a new authority. I think we have enough.

SENATOR SMITH: By the way, just FYI, the bill allows you to use your existing. So if you have an existing sewer authority or water authority, you don't have to do a new bureaucracy -- just use the existing authorities that are in your county now.

MR. REID: Okay. Well that is the case here in Ocean County.

I'm sure some of the people in the room know that there is the Ocean County Utilities Authority. And at the top of their Website, when

you go in, they have a logo, the name of the Authority, and then they have this line -- I'm quoting from it: Helping to preserve the water resources of Ocean and Southern Monmouth Counties. So that is their tag line.

And then in their mission statement -- I'll read the first line of the mission statement to you. "The Ocean County Utility Authority was founded for the purpose of protecting and preserving our area's vital environment for current and future generations and, by so doing, ensure a healthy ecology, a robust economy, and a high quality of life for our citizens." So obviously they've been working hard to protect the Bay. I say that sarcastically, because I don't know what they've done to protect the Bay other than create these sewer authorities which keeps the sewage out. But they've done nothing for stormwater.

So there is a Utility Authority already in existence. It has a \$74 million budget, 262 employees. And since most of Barnegat Bay is in Ocean County, there's one utility right there that should be tackling this problem of stormwater management.

The second group we have -- and I happen to agree and disagree with the Freeholders who have testified -- is we have Ocean County government. Ocean County government has a \$348 million budget, as you know. Everybody pays taxes for that who are homeowners here.

And since the other people have given you their background -- I've been coming down to Barnegat Bay since 1955, and have been here every summer, and have lived here full-time for the last three years. So I'm not unfamiliar with Barnegat Bay.

My problem with the County is that they need to reprioritize what they're spending \$348 million on. As Mr. Bartlett testified, they did

cut the budget, but they are -- Freeholder Bartlett testified -- they are cutting the budget, but they're not reprioritizing things. They're not spending enough on stormwater management on the Bay.

I'll give you a specific example. In the capital budget, on Page 38, B1, there's a line item for Project No. 2010-3, stormwater management. Out of their \$348 million budget, they've allocated \$500,000 for stormwater management. That's less than two-tenths of 1 percent of the budget. They indicate that the total amount they need to -- over five years -- to do this stormwater management is \$3 million. So they've set aside for future funding \$2.5 million. This is not a priority for the County. The County has not made stormwater management in Barnegat Bay a priority. And I wish more of the people in the room here from Ocean County would go to some of the Freeholder meetings and voice their opinion. Because without the input from the citizens of Ocean County, the priorities in funding go to other priorities, namely the employees of Ocean County. (laughter) (applause)

This current budget that was approved in March had a line item for insurance for employee health insurance, which was -- \$28 million was spent last year. This year, since health insurance costs went up to \$33 million (indiscernible), an additional \$5,465,123 was going to have to be raised to pay for 100 percent free health care for the employees. So this is what we're facing with all the authorities that are created. We're looking at 2,000 county employees, and the first priority is making sure they have free health care. Whereas cleaning up the Bay only got \$500,000. So what we have here is all these authorities that have salaries, benefits, pensions, all sorts of things that have been created, and nothing is getting done.

Here's another example of what our authorities are doing. The Ocean County Utility Authority proudly is serving the following participants -- and it lists 26 towns and 11 authorities, most of which are municipal utility authorities like Brick and Toms River and/or sewer authorities. So we have so many authorities, and so many employees, and so many benefits. But nobody is prioritizing stormwater management for the Bay. I don't know how we can accomplish that, but that's what needs to be done.

Thank you.

SENATOR SMITH: Senator Beck, did you have a question?

SENATOR BECK: No.

SENATOR SMITH: For the record, a number of individuals wanted to be listed in support: Lois Jacobson, Climate Action Committee of Point Pleasant -- and they're in favor of all bills; Anthony Bucci -- I hope I'm saying that properly -- a student from Stafford Township, in support of all bills.

Sir, do you want to come up? (affirmative response) Mr. Bucci.

A N T H O N Y B U C C I: Hello. I am a lifelong resident of Stafford Township, and I'm a rising senior at the Marine Academy of Technology and Environmental Science in Manahawkin.

I'm here to represent the, so far, unrepresented youth. And basically I appreciate everything that's been done. I'm in support of Barnegat Bay.

Everyone is bringing up money and stuff. Me, personally, I believe: What is the price on a life -- all of these lives that are being affected? It not only affects the environment and the species in the Bay,

but also us. I enjoy the Bay both recreationally and as a source of study. So it's very important to me.

I'm in support of the Bay. We can really do a lot here. It's an example-- Not only could we set the example for the state, but also for the nation.

Thank you for your support of the Bay and everything -- all of your efforts. (applause)

SENATOR BATEMAN: Well said.

SENATOR SMITH: Thank you, sir.

Kevin Knutsen, citizen from Pine Beach, in support of all four bills; Craig Mclean, President of Point Pleasant Rotary, in support of all four bills; Denni Logue, environmental educator, citizen of Brick Township, in support of all four bills; Ralph Coscia, Citizens' Right to Access Beaches - - the organization is called CRAB -- in support of all four bills; Linda Schumann, citizen, in favor of all four bills; Larry Reid -- Mr. Reid didn't indicate in favor or in opposition.

Mr. Reid, are you here?

MR. REID: I just testified.

SENATOR SMITH: Oh, you just testified. I'm sorry, Mr. Reid. Got it.

And then Bob Gordon -- not Bob Gordon the Senator, but Bob Gordon the Brick resident. It doesn't indicate whether you're in favor or opposed.

Mr. Gordon, are you here? (no response)

And then Mary A. -- and Mary, I can't read your handwriting -- is it B-A-G-E-A-C, citizen from Toms River, in favor, I think, with

reservations? And State DOT must meet correct regulatory obligations, which we agree -- and the issues are State issues, not just local issues, which we also agree.

Mary, do you feel the need to testify, or does that do the trick?

Mary, did you want to testify? (affirmative response) Come on up.

MARY A. BAGEAC, M.D.: Thank you for the opportunity to address the Committee and for your effort at providing further legislation.

My concerns here -- and some of the frustration that you've heard on the part of many -- is that -- my sense is that there is plenty of legislation that's been enacted previously that's not been adequately upheld on the State level as well as locally. I think that the Freeholder's point was that the State DOT and DEP have not been maintaining the waterways that they are responsible for in the manner in which Ocean County Freeholders feel they have.

I'm not as well versed in their budgets as the previous speaker. I'm sure there are many areas of deficiency there, as there are many areas of deficiency in the State and Federal budgets.

Legislation, to me, means you're providing largely another means of funding work that 20 years of research tells us needs to be done. Providing funding on the basis of future development, as has been proposed, is really just aggravating a problem, in that overdevelopment is pointed as part of the problem. You want to fund the solution on the back of development when development and overdevelopment in the expansion of the townships is part of the problem -- part of that impervious soil. So you're asking us to fund something. And, in truth, the funding can't be

there, because the development can't really continue at the rate at which it's been going for the last 20 or 30 years. So it's a bit of a no-win.

SENATOR SMITH: Actually, Mary, this bill is to ask the corporate citizens and citizens of Ocean County to step up to the plate to restore the stormwater basins. The stormwater utility would be based on impervious coverage already existing.

The other bill about new construction -- that was the bill we did earlier -- is with regard to if there is any future development in the Ocean County area -- that the builders would have not just the responsibility for on-site but also for off-site improvements with regard to the Bay. So this bill is actually the reverse of what you're saying. This is the one bill that covers that difference.

DR. BAGEAC: In terms of going after current commercial ratables and whatnot to address the stormwater system repairs that are needed -- that is where I'm in full agreement with the Freeholders in so far as I do see this issue as largely a State issue. The Barnegat Bay, and the estuaries, and the watershed areas are State resources. This is not just an Ocean County issue. The Raritan Bay has been in similar straits, the Chesapeake Bay and those areas of the Chesapeake watershed that are part of New Jersey-- Those are State issues. It's not just Ocean County. And while I appreciate that you feel Ocean County can be a testing area and that we may lead the way, this is a relatively small state overall. We have a lot of watershed area in the State of New Jersey. It is the State of New Jersey that needs to be taking the lead and not put it strictly on the backs of the one segment of this state.

SENATOR SMITH: Mary, we appreciate your comments. And I think it's only fair to say the State of New Jersey does have a major role in this as well.

DR. BAGEAC: Absolutely.

SENATOR SMITH: I think the comments about the State DOT has truth in it. And one of the things that Chairman McKeon and I are planning to do at a subsequent meeting is to pass a resolution to our Department of Transportation to find out what outfalls they have in Barnegat Bay -- and that they should start taking responsibility for correcting those. There is none of us without sin in this. And we all have to be partners in cleaning up the Bay.

But thank you for your comments. Most appreciated.
(applause)

Our last witness is Mayor Ron Jones, from Beachwood, in favor.
Mayor Jones.

MAYOR RONALD W. JONES: Thank you, Senator. It's nice to be in your presence.

Assemblyman McKeon, it's nice to see you again. It's an honor for me to appear here today.

I would just like to say that the comments of all the parties, pro and con, were done in a decent and respectful manner, and I think we all can appreciate that.

I'm the Mayor of Beachwood, New Jersey. When you come into Beachwood, there's a sign that says, "Welcome to Beachwood. Keep our community clean," and we try to do that. Unfortunately, our waterway is a questionable aspect of our community.

In 2007, the National Resource Defense Council came up with a report that Beachwood, New Jersey's beach was the dirtiest in the entire United States. You really think of that when you're going over the Verrazano Bridge -- that Beachwood has the worst waters. It's quite shameful. In 2008, we were the worst in New Jersey. And in 2009, again, the worst in New Jersey. That's a distinction that I do not want to be maintained for my community. I don't think any mayor, any legislator -- any legislator would require the same for themselves.

I do support the bill. I think it's a step in the right direction. Something has to be done. We've had stormwater management plans that we've submitted to the State. In fact, in Beachwood we have to submit it to the Pinelands Commission. But we still have polluted water. We know what the issues are. We know about overdevelopment, we know about fertilizers, we know these things are in existence. We now need to take the bull by the horn and do something.

The way that this will be successful -- and only will be successful on the County level -- is, in fact, if jurisdiction is given to the Ocean County Utilities Authority. We are not creating a utility. They have a mission. They just need to expand that mission in order to handle stormwater management.

Some people have said that they've seen little that the Ocean County Utilities Authority has done for the benefit of the public. That's not true. I was first elected 31 years ago. And at that time, we were just in the beginning of the Clean Water Act. And the Clean Water Act was proposed for safe drinking water and for safe water that we swim in.

That Act required that municipalities install potable water systems which would exceed their ability to bond. The statute put to limit of 3 percent of your assessed valuation in order to bond for the improvements. That would mean that if you wanted to build a school, you couldn't put in the water system. So that's why we created all these utilities -- so these utilities could have their own 3 percent bonding. On the local level, these utilities are no longer needed except in those communities where development is still an option. In Beachwood, we're not completely built out.

So what did the Ocean County Utilities Authority do? All those septic tanks -- in Beachwood, 3,500 septic tanks went away. If those septic tanks continued today -- we're now going into a sewer system -- you, in fact, would even have a worse situation in the Barnegat Bay and a serious public health hazard. You don't, because you have the Utilities Authority.

What I'm saying here today is that we do not need any new commission like the Pinelands Commission, the Highlands Commission. We have a commission for everything. And all that comes is restrictions on peoples' ability to use their properties.

Senator, you're going in the right direction. We do need control of the Bay. And saying -- because some people yelled out Beachwood when the Freeholder said that no bay and beach was closed. Saying that the Bay and the River are separate is like saying that your brain and your heart function separately. They don't. (applause)

The point is: Action has to be taken. I've lived here my entire life, and I've said at previous appearances that fish we were able to extract from the Bay in the 1960s -- blowfish, etc. -- no longer exist. All I know is

the statistics are there. Something has to be done. And I compliment the Committee for coming to Ocean County, which is the finest county in the State of New Jersey, to do the right thing. (applause)

SENATOR SMITH: Let me turn this over to Chairman McKeon for his side of the meeting today.

ASSEMBLYMAN McKEON: I think the testimony is now completed. We're going to be in a position -- presuming I have a motion to move and second it with amendments that have been distributed -- to move on this bill.

And, again, any member of the legislative panel who would like to comment before casting their vote -- of course it goes without saying, feel free to do so.

Do I have a motion to release as amended?

ASSEMBLYMAN MAINOR: I make a motion.

ASSEMBLYMAN GUSCIORA: Second.

ASSEMBLYMAN McKEON: Moved and seconded.

Roll call.

MS. HOROWITZ: On Assembly Bill No. 2577, with Assembly Committee amendments, Assemblyman Rudder.

ASSEMBLYMAN RUDDER: Yes.

MS. HOROWITZ: Assemblywoman Coyle.

ASSEMBLYWOMAN COYLE: Yes.

MS. HOROWITZ: Assemblyman Mainor.

ASSEMBLYMAN MAINOR: Yes.

MS. HOROWITZ: Assemblywoman Lampitt.

ASSEMBLYWOMAN LAMPITT: Yes.

MS. HOROWITZ: Assemblyman Barnes. (no response)
Assemblyman Gusciora.

ASSEMBLYMAN GUSCIORA: Yes.

MS. HOROWITZ: Assemblyman McKeon.

ASSEMBLYMAN McKEON: Yes.

SENATOR SMITH: Thank you, Chairman. (applause)

On the Senate side, can I have motion to release S-1815?

Well, first, is there any discussion?

SENATOR BATEMAN: We have a question, Mr. Chairman,
from Senator Beck.

SENATOR SMITH: I'm sorry, go ahead.

SENATOR BECK: Just a quick comment, which is: I'm certainly supportive, as I think we're going to find most of the folks up here are. But I think from the testimony there are a couple of take-aways that I do think we should examine. I appreciate the point about the fact that the State of New Jersey is a contributor to the pollutants that are going into this Bay, and yet we are not putting any resources -- not a nickel -- toward the cleanup. And I think that's not fair to the residents of Ocean County. (applause)

And I think, secondarily, when you look at Section 5b, which talks about the 5 percent -- that 5 percent of the annual fees that are collected here in Ocean will be transferred to the Department of Environmental Protection to fund program planning implementation and coordination activities related to stormwater utilities and stormwater management systems. I assume that that perspective is a statewide perspective. So I think we need to narrow that a little bit, because Ocean

County shouldn't fund DEP's planning statewide. (applause) That's, obviously, something that's-- I don't think that's fair. And maybe I misunderstand it, and it just means that this language needs to be tightened up a little bit. But I think we have to be careful about that.

I have spent a lot of time in Ocean.

To the gentleman from the Surfrider Foundation, I have spent some time in Sea Bright. And when there's a lot of rain, and New York City's systems overflow, I've had to jump out of the water as well. So there is no question that we have a serious, pressing issue when it comes to contamination of our water, and certainly, to Bill's point, to our error.

So I am supporting this bill today, but I think we have some refinements here, that make a lot of sense, to make this a fair public policy as it relates to Ocean.

And with that, I move the bill.

SENATOR SMITH: I think that's a second, right -- second to the bill?

SENATOR BECK: Second.

SENATOR SMITH: And FYI, Senator Beck, I've just discussed that same point. You made a great point about the 5 percent. That will be-- We're going to amend it on the floor to narrow it Ocean County only.

SENATOR BECK: Okay.

SENATOR BATEMAN: Good.

SENATOR SMITH: Okay. We have a motion and second.

Ms. Horowitz, if you could call a vote on the bill as amended.

MS. HOROWITZ: On Senate Bill 1815, with Senate Committee amendments; Senator Beck.

SENATOR BECK: Yes.

MS. HOROWITZ: Senator Bateman.

SENATOR BATEMAN: Yes.

MS. HOROWITZ: Senator Beach.

SENATOR BEACH: Yes.

MS. HOROWITZ: Senator Gordon.

SENATOR GORDON: Yes.

MS. HOROWITZ: Senator Smith.

SENATOR SMITH: Yes. The bill is released unanimously.

(applause)

The next item of business is the main event, the fertilizer bill.

And Chairman McKeon has graciously offered to handle all the various witnesses on this. I have to go out and put money in the meter. I will be right back.

ASSEMBLYMAN McKEON: Oh, that's a good point -- before the meter -- unless that's a euphemism to mean to go to the boy's room. (laughter) You just reminded me. The Mayor -- and thanks to the Mayor of Toms River -- has let us all know that if you're parked at a meter, don't worry about it. You won't get a ticket. (applause)

SENATOR SMITH: All right, then I'm going to leave for a different purpose.

ASSEMBLYMAN McKEON: All right. I will tell you what. My first order of business is to take a five-minute break so everybody can stretch. And then we're going to get going-- We will start it at five minutes to 1:00.

(RECESS)

AFTER RECESS:

ASSEMBLYMAN McKEON: I'm going to start by noting all of the incredibly hard work of the Committee; and beyond the Committee the staff members, both partisan and nonpartisan, many of whom are here today.

As you all know, Bob started off by saying we were here a year ago knowing that this particular issue -- as it relates to fertilizer, its application, and overall regulation, including composition and labeling -- was something that would be a big component of the solution in dealing with the Bay and the long-term health of that great body of water.

This is a culmination of a year's worth of work. Senator Smith and I sat just about two or three weeks ago with a room not quite this big -- but maybe about half its size -- that, once again, included all of the stakeholders as we tried to get to a point where everybody reasonably compromised.

The interesting thing about all of this -- again, that the state is so ecologically diverse that, at one end, the industry needs one standard for the State of New Jersey -- right? That only makes sense, that's fair, and that's business friendly. On the other end of it, what might work in the Highlands, where the soil is in one particular type of composition, might not work here around Barnegat Bay, where the soil is much more porous.

So, again, this represents a compilation of a lot of hard work by a lot of people, by a lot of varying views from the science of it -- both

political science as well as natural science. And while we think we're now at a point where we can move this through the process, I want everybody to remember this: This isn't the last day. The Governor, although he's here enjoying Island Beach State Park and this wonderful Bay, isn't going to be presented this tonight at a barbeque to sign it. There's a whole additional process that will go on. There will be continued meetings. We'll be working with our leadership as it relates to further tweaking, based on some of the things people will say today. And then, of course, hopefully we'll get it to the Governor's desk in the early fall.

So, again, understanding that today isn't the be all and end all, keep that in mind with your testimony. Also, understand that a lot of us have heard much of this already. Try not to read your testimony. Under any circumstances, please keep it under five minutes. And let's have respect for each other; and be pretty knowledgeable about these issues, up to this point, having worked something that's pretty close to getting us to the goal line.

So with that, I announced him before -- although another colleague has joined us, Mayor George Nebel-- Am I correct, Mayor Nebel?

MAYOR GEORGE NEBEL: I say Nebel. (indicating pronunciation)

ASSEMBLYMAN McKEON: Mayor Nebel, from Mantoloking. He promised me if I go more than 25 miles an hour on 35, I could use his name just once. (laughter) To wit, he said I will get a second ticket if I use his name. (laughter)

So from one mayor to the other, I understand that, Mayor. Thank you for being here.

We're going to call everybody again, asking you to limit your comments, as we suggested.

First is Mayor Jason Varano, of Berkeley, who is in favor.

Mayor, would you like to say a few words? You're very welcome to. (no response)

The Mayor has absented himself for his other responsibilities.

Council of Point Pleasant Borough, John McHugh. We acknowledged you before. Would you like to testify, John? (negative response) This is going well so far. (laughter)

Mayor James (*sic*), you testified earlier, and we all have great respect for you. Not Mayor James, Mayor Jones. Would you care to testify Ron? (affirmative response)

Welcome back.

MAYOR JONES: Assemblyman, asking Mayor Jones not to speak is like having a priest not pass the collection plate. (laughter)

I'm going to try to approach this from a lighter side.

As I mentioned in my previous testimony, Beachwood sadly has the distinction of being the most polluted beach in the State of New Jersey. In fact, the Ocean County Health Department just created a new program called Nettles Alert, and they actually-- It's like the warning after 9/11, where orange, red, and different colors-- We actually have that now so that people know not to jump in the water and get bitten.

And I believe, based on scientific evidence, there are several contributing factors. And one happens to be the infiltration of fertilizers into our waterways. But I think that may not be the case throughout the United States. I think we have quite different dynamics. In fact, what may

be a bay in New Jersey may not be the same bay in Maryland. I mean, it's almost like my mother and my aunt cooking Italian gravy and one puts meat in it, and one puts something else in. It's gravy, but it's different. And I think our dynamics are a little bit different.

I'm not here to pin the blame on anyone. But I believe the fact that we have discharge of elevated temperatures of water coming out of Oyster Creek -- a facility that functions without cooling towers -- adds to this mix and creates a greater effect of the fertilizers that are infiltrating into our waterways; which, as we know, affects algae, affects plant growth. The plants don't know whether it's-- I'm sorry, the fertilizers -- they affect grass the same way they affect the sea growth. So that, I think, is a contributing factor.

I believe some limitations on the type and use of fertilizers, pesticides, and chemicals is necessary near our waterways. In our own community -- when we apply any kind of chemical -- we notify the public so that they know. I believe that in our community -- and maybe the State should consider this, but I think on a local level we can address this -- that when commercial vendors do apply these products, they apply either for a permit -- a fee permit -- so that we have a handle on what's going into our waterways.

But the point is this, just to summarize here, fertilizers do contribute. I'm not a scientist, but I do read. We have the Internet. We can provide information on this that would substantiate this. But the point is, we need to change the composition of what's going into our waterways. And any regulations that could save the Barnegat Bay, our rivers, or any other waterway in New Jersey is necessary and should be looked at.

You're right, Assemblyman. This is only the beginning. And I'm sure this will be addressed in later meetings.

But again, when we get to the end of the tunnel and we see the light, the light should be public policy and public health first.

Thank you.

ASSEMBLYMAN McKEON: Mayor, thanks for your leadership as an environmentalist.

Senator Gordon had a comment to make.

SENATOR GORDON: Yes, thank you, Mr. Chairman.

The Mayor makes an important point about the Oyster Creek nuclear facility. When we were in Lacey Township a year ago, we heard about the impact of that plant.

I don't mean to be flip, but Oyster Creek sucks. (laughter) (applause) That's not a pejorative comments, it's descriptive. It sucks about a billion gallons of water a day for its cooling system. That is not the most up-to-date approach to cooling nuclear plants. There are things called *closed loop systems* that use cooling towers which have a much less adverse affect on the environment.

Senator Smith has introduced legislation requiring cooling towers for nuclear plants. I have introduced a separate bill -- somewhat more stringent -- S-630. I understand the issue is in litigation now. But I hope this Committee does not forget about the impact of Oyster Creek on Barnegat Bay. As I remember the testimony, this facility sucks approximately the whole water volume of Barnegat Bay during the course of 365 days. And that has a profound impact on the marine biology. So I

hope we will-- If the courts don't resolve this issue, I hope that we will do so legislatively.

ASSEMBLYMAN McKEON: Senator, thank you. I thought it was Jeff Tittel speaking when you made that sound bite there. (laughter)

I know, because I'm very proud of them, Assemblyman Gusciora and Assemblywoman Lampitt had cosponsored a similar bill to yours, and I believe it came out of our Committee. It's our understanding -- Senator Smith and I, having met with Commissioner Martin, who has taken a pretty strong stance on the cooling tower in the administration -- that there are ongoing discussions. So we purposely didn't deal with that component of part of the solution today, as it's been identified and is in the process of being worked through and, hopefully, will certainly be a big part of the solution that we'll hear about over the next number of months.

I should have done this before -- very briefly, if it will save some time -- in effect, as it relates to the bill, we all know the science of the phosphorous and nitrogen going into the Bay, and dealing with the algae blooms, and the fancy term *eutrophication*. What this does is deal with, number one, the composition of the fertilizer itself that runs off in the Bay, whether through stormwater or through leaching. And phosphorous is going to be prohibited, period. I congratulate the industry who is doing a lot of that around the country now, recognizing the problem. You should be proud of yourselves, and we are of you.

We have-- Right now, the bill sits with 30 percent slow-release component of nitrogen to go into the fertilizer. And there's also a limit per thousand square feet, I guess, currently, of .75 pounds. And that's one component of the bill.

Another component of it is how it gets applied. We've reached -- and it will be up to the members of the Legislature to vote today -- but Senator Smith, the sponsor, and I have reached what we think is a real good compromise on 10 feet from water if it's applied -- kind of where it gets spread out when your applying fertilizer; or five feet from any water body if it's done with a pointed type of application. We've allowed municipalities, as part of the compromise, to go as high as 25 feet to 10 feet -- we want to do that on a local basis. And as much as we wanted to get continuity, that was of something that was acceptable to everyone.

The other component is when you can put fertilizer out. We know it shouldn't go out, and won't, when the ground is frozen. We know it shouldn't happen, and won't, when there's heavy rains. We're dealing with the dates. Right now, as far as we're going forward with today -- today's purposes -- we're dealing with March 1 and November 15 as the window within which you can continue to apply fertilizer. I know many in the application industry wish that that November 15 date was kicked a little further. We'll hear what you have to say and continue to take it under consideration. But for today, that's where we're at.

And I think that's the major components of the bill that we're going to go through with today.

SENATOR BATEMAN: Mr. Chairman, if I may, did you address the penalty provisions at all? I've had some--

ASSEMBLYMAN McKEON: Senator Bateman, I'm trying to remember off the top-- I think it's \$5,000--

SENATOR SMITH: And \$2,500.

ASSEMBLYMAN McKEON: --\$2,500 and \$5,000. I know there have been some issues about that being duly punitive. And, again, this being a work in progress -- something that we will consider to take on under consideration.

SENATOR BATEMAN: Thank you.

ASSEMBLYMAN McKEON: So with that, George Wittmann, of Toms River Township Council.

Try to show courtesy. (cell phone ringing)

George, if you'd like to-- Councilman Wittmann, thank you for your courtesies today in having us here as guests.

C O U N C I L M A N G E O R G E W I T T M A N N: You're welcome.

I'm in favor of the bill. I've lived in Toms River for about 20 years. My kids grew up in the Green Island section of town, and were able to swim in the bay. And it's deteriorated to the point now where you can't even jump into the water without getting stung by a sea nettle. So something has to be done, and I think this is a good first step.

Also, earlier when you had the stormwater regulations -- I'm in favor of establishing an authority, whether it's done by the Township or the County -- because I think it's important. The maintenance of some of these basins are really in bad shape. They really haven't been attended to, and I think this is a good way to go.

But in terms of this bill -- I'm in favor of it; I think it's something that needs to be done. We were going to try and do it on a local level, and it didn't really make any sense. I think the fact that the State is looking into it, and doing it across the board, I think will make it a lot more

simple to put in. Because if we try and do it locally or by the County, what you're going to have is, the labels are going to read as the price tag on the fertilizer, and you're not going to really encourage anyone to use the slow-release fertilizer. So I think this bill goes a long way towards evening the playing field and preventing folks from North Jersey bringing fertilizer from other areas down to Toms River or to Ocean County and applying it at a different rate. So I think this is a good bill, and I fully support it. Thank you.

ASSEMBLYMAN McKEON: Councilman, we won't bring our fertilizer, but as long as we keep coming down with our money, I know (indiscernible) not so bad. (laughter)

One other component -- and thank you, you reminded me that a bigger component of this is an education piece, where-- And I know a lot of local businesses and local advocacy groups are doing wonderfully. You can go into bakeries and wherever it might be and they have notes up reminding people of individual steps that they could take to keep run-off from non-point, going in and dealing with fertilizer. So education is going to be also a big part of it, and labeling part of that on the fertilizer product, in and of itself.

Part of the group, that's a very important group in New Jersey, that will be doing the education piece, as well as the certification of the industry applicators, are the New Jersey Agricultural Experiment Station -- Brad Hillman, Jim Murphy, and Stephanie Murphy are here. Are you prepared to testify?

B R A D L E Y I. H I L L M A N Ph.D.: Thank very much, Assemblyman and Committee. We really appreciate the opportunity to be here again.

My name is Brad Hillman, Director for the Agriculture Experiment Station at Rutgers, and we've had a lot to do with advising on the legislation as we've gone along. We're in general support of the legislation, with a few minor tweaks. I'm not going to get into details today, but we'll be glad to answer questions that you might have.

The thing that I want to speak to especially, I guess, is the training and certification aspect, which you mentioned. We're willing to do that. We do that in several areas as well, with noise pollution and air pollution -- we do both training and certification. With pesticides, we do training; we do not do certification in pesticides. The DEP does certification there.

The things I want to make sure to point out -- and, by the way, we will provide written comments, and we'll provide some written details on other aspects, as well as written comments about this -- is enforcement: we don't do enforcement. We're in no position to do enforcement at all, so however that goes, it will have to be separate from the training and certification. So we can do training; we can provide certification numbers that somebody has taken that training, but enforcement will have to be something else entirely.

That said -- we also note in the bill that we're allowed to recover reasonable costs for doing that training and certification; so under that model, we're willing to do it. We certainly cannot do it without that in

place. We have no funds to do a training and certification program that is not a self-sustaining program.

And finally, the way we probably envision that type of training and certification program -- whether we did a classroom-type training, followed by an online certification, or whether it was entirely online -- we haven't worked out details of that, specifically, because we don't know the final constitution of the bill. But we've looked at both models for doing that; we've done both of those things successfully in other areas, but at some level there will be an online component to the certification process.

So with that, I'll be glad to take any questions.

ASSEMBLYMAN McKEON: Ms. Murphy, or Mr. Murphy, do you have any--

J A M E S A. M U R P H Y, Ph.D.: I'm here strictly for answering questions.

ASSEMBLYMAN McKEON: Okay. And questions from the members?

SENATOR BECK: I do.

SENATOR GORDON: I do.

ASSEMBLYMAN McKEON: Who was first?

SENATOR GORDON: I defer to my colleague from Red Bank.

ASSEMBLYMAN McKEON: Senator Beck.

SENATOR BECK: Thank you, Chairman.

Just curious: Did you attend the Rutgers turf summit?

DR. HILLMAN: I did. We organized it. We organized it, essentially. It was organized from my office; Dr. Murphy is the one who put all the work into doing it.

SENATOR BECK: Great, thank you.

Could you clarify for me some information that we have received about the requirement that 30 percent of fertilizer is of a slow-release nitrogen content standard? Because we have some that assert that this concept was fully vetted over the last two years, including at your recent Rutgers turf summit, and they suggest that scientists from across the country unanimously stated that the percent slow-release concept is flawed. So you can tell me: Is that true? Did the summit address that issue and determine that it was flawed?

DR. HILLMAN: I'll let Jim speak to that a little bit more. My take on that was, that was not the take-away message. First of all, that was a-- I hate to put it this way, but I will: It was a bipartisan, a multi-partisan group that was there -- that was the whole idea. It was to get scientists from across the spectrum -- not just scientists -- from others from across the spectrum to speak at that summit. And so I would say that there was pretty much nothing that was unanimous there. And certainly the slow-release piece-- I think there's certainly arguments, both ways, for that. There are good arguments for slow-release nitrogen component; there are also good arguments for if you can deliver nitrogen in a very slow water soluble form, then in some circumstances there are arguments for doing it that way as well.

SENATOR BECK: Was there any analysis, through the Chair, about the percentage? Because the biggest issue seems to be that the 30 percent number is a number that people question -- whether or not they can meet. So did you actually take a look, at the summit, as to what is an appropriate percentage, or not appropriate percentage, doable, not doable?

MR. HILLMAN: I don't remember that piece -- I'll turn it over to Jim who can speak to that.

DR. MURPHY: The issue of the specific percentage is this: In terms of the scientific knowledge we have, if you use slow-release fertilizer, it's one tactic at trying to reduce nitrate leeching moving into the water. However, there aren't specific studies that look at exact numbers comparing 30 percent, to 40 percent, to 10 percent, and knowing which ones are actually better than another. So we don't know the information to that degree of resolution; we do know that it is an effective strategy of -- one strategy -- of trying to minimize the problem. So that's where I think the comment *flawed* may be originating from -- is to pick a number -- a specific number -- and say, "This is the magic number." We don't have that detail in our information.

SENATOR BECK: Okay. Well, that's, I think, helpful for the Committee, because sure, we've all heard a lot about the 30 percent number. And I appreciate your testimony. Thank you.

ASSEMBLYMAN McKEON: Thank you, Senator.

If I can, I think there's a fair way of putting it: The studies that I've read have gone up as high as 70 percent, I think -- maybe that was out of Maryland -- and as low as, maybe, 20 percent. There was a whole array, going as high as 70, and as low as, I think, as 20 from different states, with different recommendations.

Senator.

SENATOR GORDON: Great minds work alike -- I had the very same question. I think it's been addressed.

ASSEMBLYMAN McKEON: Assemblywoman.

ASSEMBLYWOMAN COYLE: Thank you.

On the 30 percent, Doctor, but perhaps from a little bit of a different angle. When we use 30 percent -- when it's a slow-release percent in the retail portion for consumers, will this be effective fertilizer? As someone who's a gardener, when they're using a 30 percent, will they get the result that they're accustomed to getting? Could you just comment on that?

DR. MUPRHY: That would be one of the concerns of a specific formulation. In many cases, that formulation will be adequate; but in some cases, it will not be adequate to supply for plant needs in a timely fashion. Over the long run, it may be sufficient if applied for many, many years in a row. But on a short-term basis, a matter of months, in some cases it may not be enough supply, fast enough for the plants. But there will be situations where it will be adequate. So it's one of these -- the answer is it depends on the circumstances: the soil conditions that it's applied to, and the plants that you're trying to manage.

ASSEMBLYWOMAN COYLE: When will it be adequate? Are there factual-- Or data, is there data around when it would be sufficient and when it wouldn't be sufficient?

DR. MURPHY: There would be some data that would give us indications. For example: The previous testimony on the previous bills talked a lot about soil conditions, soil compaction. Under ideal soil conditions, this formulation probably is going to be effective. Under non-ideal soil conditions it will, at some point, become ineffective or less effective as a fertilizer.

ASSEMBLYWOMAN COYLE: And then if it's ineffective, what do you see consumers doing?

DR. MUPRHY: Well, one of the unintended consequences is, a savvy lawn and garden person will recognize that the fertilizer product may not be giving them the response that they expect and see, and they may decide to apply more fertilizer than what is stated on the bag to apply, to compensate for it; or more frequently than maybe what we currently recommend be applied.

ASSEMBLYWOMAN COYLE: Right. So then the consumer, when they're not getting the results as you were saying, they'll either use more fertilizer right then, or they'll do another application at some other point.

DR MURPHY: That is a possibility.

ASSEMBLYWOMAN COYLE: Thank you.

DR. MUPRHY: That's one of our concerns.

UNIDENTIFIED MEMBER OF COMMITTEE: Or probably go to Pennsylvania (indiscernible).

ASSEMBLYMAN McKEON: The industry might be in favor of this now. It's a good thing. (laughter) If they use more, the industry might go with this -- you'll be to 50 if they know you can double it.

ASSEMBLYWOMAN COYLE: Well, that kind of defeats the purpose of the bill.

ASSEMBLYMAN McKEON: Assemblyman Rudder.

ASSEMBLYMAN RUDDER: Thank you, Mr. Chairman.

With regard to the provisions in the bill -- there's one standard that's for general consumers, and there's one for professional applicators of

fertilizer. And there are different standards different levels, of the nitrogen that would be applied. What are your thoughts on that, having two different standards?

DR. MURPHY: In terms of two different standards: Both of the standards comply with our best management practices. One is more restrictive than the other standard, and that presents a difficulty from an education standpoint, to get across to people and try to rationalize why there are two different standards. So from our perspective as people who are going to be doing certification, training, education to the general public, there is a bit of conflict there with having two different standards -- to try to get across to people.

ASSEMBLYMAN RUDDER: Okay, that's fine.

ASSEMBLYMAN McKEON: Any other questions?

ASSEMBLYWOMAN COYLE: I have another one, if I may, Mr. Chairman.

I'd just like to talk to you about the dates. Right now we're looking at an end-date for applications as November 15. We've received significant correspondence from the manufacturers of fertilizer, and, quite frankly, from many lawn care companies -- medium, small, large -- that this date is early, especially in some parts of the state. Perhaps this date is adequate in the northernmost parts of the state -- Sussex, Warren County -- but in the central part of the state, and in the other parts of the state, often lawn applications are after November 15, or have been. Could you comment on whether there could be some more flexibility of the date? Should we look at the dates differently in the northern part of the state

than the southern part of the state? Should they be more weather-based? Could you comment on that?

DR. MURPHY: In terms of the date, the model that was selected, based on some of the DEP stakeholder work with the early phosphorous model ordinance regulations -- or the model ordinance, it wasn't actually a regulation -- the approach there was to divide the state up based into three distinct regions, and pick the date based on the plant hardiness zone across the state. So that's why some of the original approach was to try to recognize that there could be some variations across the state.

When it came, though-- When it moved out of the phosphorous aspect and into the nitrogen aspect, we tried to go into the research literature to find out what we should be recommending from a best-management standpoint, trying to balance both the agronomics, horticultural aspects, as well as the environmental aspects. There is some limited data, and that's one of the criticisms of this information -- is that's limited. It suggests that the later we put down nitrogen fertilizers, the more risk there is for nitrogen to get into the water. And leeching really from lawns, landscapes, is largely a wintertime issue. So because of that, since our charge was to try to come up with balance, we have suggested mid-November as being a good date to balance the agronomics and the horticultural aspects with the environmental aspects. Now, that doesn't mean that there aren't some problems with that. One example that's recently been brought to light is there's a bit of a conflict with the Soil Erosion and Sediment Control Act, which requires new development to stabilize the soil with vegetation.

ASSEMBLYWOMAN COYLE: Right.

DR. MURPHY: And we all know that certain projects get extended well beyond mid-November, and there would be a conflict with what is being proposed in this legislation with that legislation. They should be trying to stabilize that soil, which often involves applying fertilizer. And if a contractor is finishing a project in December, January, or February, and they to stabilize that soil, there would be this potential conflict. So that's just one example where we think, as a general rule, this is a best-management practice, but we also recognize there will be some pragmatic conflicts with that -- people trying to get jobs done or the jobs gets extended for a period of time and they need to finish it up.

ASSEMBLYWOMAN COYLE: Right. And I think we all, when we're drafting legislation -- and I know Chairman McKeon certainly is this way -- and I certainly appreciate the amendment for the new construction that we received yesterday. I think what we try to avoid is unintended consequences. I want someone whose project ran late -- for whatever reasons they happen to be -- I want them to stabilize the ground around that building. I don't want it left all through a winter and into a spring season until they can to get that. And I would encourage the Chairman -- I know I was very encouraged to hear your early comments that you'll have some flexibility on this. Maybe it's something that we should look at doing.

ASSEMBLYMAN McKEON: I appreciate your thoughts on that regard and, at the end of the day, failure isn't an option. So whatever we have to do to get the majority of us on board, we'll make happen.

Are you finished, Assemblywoman?

ASSEMBLYWOMAN COYLE: Yes, thank you. And thank you, Dr. Murphy.

ASSEMBLYMAN McKEON: Assemblywoman.

ASSEMBLYWOMAN LAMPITT: I just have a quick question.

Given the fact that New Jersey is surrounded -- the waterways, specifically -- we border other states that also contribute: What are the neighboring states doing in terms of fertilizer control? Have they done more, have they done less? Where are we in comparison?

DR. MURPHY: This is a topic that's being hotly debated in other areas. Currently only a few states have legislation on the books regulating fertilizers. As I interpret what I know of across the country, compared to what I've seen in the bill, this bill would reflect the most restrictive rules of anywhere in the country. But others states, our neighboring states, are discussing this -- where they're going to go, exactly, is a little unclear. I know that New York just has moved some legislation forward; Pennsylvania-- I just got a call from my colleague in Pennsylvania. They're talking about it, and likely to pursue it as well.

ASSEMBLYWOMAN LAMPITT: So unless the tri-state area and northeast corridor sort of buy into making these changes to their laws, we, New Jersey, could still be impacted, regardless of our continued efforts to be on the forefront of this particular issue, correct?

DR. MURPHY: Right.

ASSEMBLYWOMAN LAMPITT: Right.

DR. MURPHY: Yes.

ASSEMBLYWOMAN LAMPITT: In conjunction with that, given the fact that we're talking about close to the waterways, specifically--

You know, we know that there are different types of grass seeds that can be placed now. Is there one particular type of grass that requires less fertilization, where we should be focusing on talking to some of our neighboring communities that border some of these waterways -- you know, being more suggestive about different types of grasses that are being applied, as opposed to just arbitrary?

DR. MURPHY: That is part of our best-management practices, to try to encourage people to consider lawn grasses that will require less inputs. A little bit of that, though, is predicated on if the soil conditions that they're growing in would be adequate for their growth. So, as I mentioned earlier, I think that these other bill issues that have been discussed today are certainly very much related to the ability of people to use some of these grasses. Because some of them are very effective, but they have to have reasonably good conditions of soil to grow in for them to be useful on lawns.

ASSEMBLYWOMAN LAMPITT: And just to follow up on Assemblywoman Coyle's comment about the reapplication if somebody is not getting success on the application: Truth be told, if I don't like how paper towels absorb the water off my counter, I'll go and find another paper towel company to see whether or not it absorbs better. Wouldn't this be the same sort of thought -- that if somebody doesn't get the right results from their fertilizer, they'll just move from one company to another company to another company, to try and see if they get better results?

DR. MURPHY: That's certainly a possible consequence.

ASSEMBLYWOMAN LAMPITT: In which case, they could be doing a reapplication, but they could also be thinking that it could be

another chemical. In which case, is there a problem when you talk about different chemical companies out there, and their makeup of their fertilizer -- is there going to be a problem when an application, or reapplication, or multiple applications are being done by a different company? I'm just--

DR. MURPHY: I guess I'm not exactly following the question; if you could restate it.

ASSEMBLYWOMAN LAMPITT: My comment is that even though we're structuring what the fertilizer makeup is -- okay? -- you choose to go to a fertilizer company because you feel like this particular one performs better, so each one might be slightly different in its composition. My concern is that when you take a composition of one company's fertilizer, and now because somebody's not getting the results, they're going to a different company's fertilizer -- do you think we'll have a different compounding problem when they're now taking-- It's like putting ammonia on bleach, is what my question is.

DR. MURPHY: Right. It's certainly feasible that some kind of behavior like that would result -- especially if people realize that, or they have expectation of a product working a certain way and now it's changed; and they're very much into lawn and gardens -- and a lot of people are enthusiasts -- and they'll figure out quickly that something's different and want to react to it.

ASSEMBLYWOMAN LAMPITT: Thank you.

ASSEMBLYMAN McKEON: Thank you, Assemblywoman.

Senator Beach.

SENATOR BEACH: Through the Chair, just a question: I'm interested in your comments on the potential for exemptions to this bill.

And what I'm thinking about is, for example, golf courses. A golf course owner-- Is there much in the way of difference between a golf course and some of the other fertilizing opportunities that are out there, and is November 15 a realistic date for someone whose livelihood depends on the turf?

DR. MURPHY: Golf courses are going to be much different in the way fertilizers are applied and managed than a lawn situation. And golf courses have highly skilled professionals who are well-trained in how to apply fertilizers, and they understand how to correctly use both from an agronomic, horticultural standpoint, as well as an environmental standpoint -- how to use water soluble materials. And one of the best environmentally correct ways, as well as ergonomically correct ways, to use those materials is in very light, frequent applications. And there's research that shows if you apply it that way, you actually have to use less total product. So that's a big difference between golf courses and home lawns. Homeowners are not going to adopt that strategy as a general rule to maintain their landscapes -- it's too much time and energy, too much work to do it. However, at the professional level, I get a golf course-- They will adopt those types of practices, and have. And this has been occurring quite significantly over the last 10 to 20 years, to move to that kind of approach.

SENATOR BEACH: Well, I would say then: Is November 15 so restrictive because they would not be permitted for three-and-a-half months to fertilize?

DR. MURPHY: The majority of cases, the 15th of November will not be too restrictive. However, there will be situations where it will cause certain golf courses to have a problem with that. And as one example

-- I'm not going to bore you with numerous examples -- but as one example, if you have a public golf course that has tremendous amount of use and play, especially if the use goes late into the season they may have similar to what I mentioned about the closure of a construction project -- they may have to deal with some turf issues late in the season because of the extended play of that year, that they have to address to try to get the turf to recover and ready for next year. Now, that won't be every golf course that has that problem, but there will be a certain number that have that issue.

SENATOR BEACH: Thank you.

ASSEMBLYMAN McKEON: Thank you, Senator.

Any other questions for this learned group? And I'm sorry I said *Mr.* Murphy -- I meant to say *Doctor* before. You were unpretentious in the way you signed up. (laughter)

Okay, thank you all very much. I know-- I think that Brad has a need to get out of here by 2 p.m., but I don't know if Dr. Murphy, Mrs. Murphy, if you--

DR. MURPHY: We'll hang around.

ASSEMBLYMAN McKEON: If you're going to hang around, that would be great.

MR. MILLMAN: Thanks again for the time.

ASSEMBLYMAN McKEON: Thank you very much.

Stan Hales of Barnegat Bay Partnership.

The Mayor just slipped me a note, from Toms River, and he said if we don't get out of here by 3 p.m., he's going to start giving out parking tickets again. (laughter)

SENATOR GORDON: We may have to cut some more aid.

(laughter)

L. S T A N T O N H A L E S Jr., Ph.D.: Thank you for the opportunity to speak.

I'm Dr. Stan Hales with Barnegat Bay Partnership, which is a partnership of Federal, State, local agencies, academic institutions, non-governmental organizations, businesses, and the public.

I think we're seeing the complexity of dealing with this issue. There is one additional provision that the Partnership would like to see in the bill, and that is an iterative requirement that we're doing this to protect quality. And no matter what the starting point is on this bill, we need to review impairments to the state's coastal waters, look at the impairments, and if we're not doing a good enough job, if water quality is not getting better, that we tighten up or consider tightening up various provisions.

Now, I know everybody's concerned about the cost these days. Right now, the New Jersey Department of Environmental Protection is required to generate what is called a 303(d) list -- the list of the state's impaired water -- every other year. So if we had an iterative requirement every four years, they could simply look at the list, see if the impairments are improving, and if there's a need then further tighten up whatever restrictions are in place.

ASSEMBLYMAN McKEON: Dr. Hales, thank you very much. I appreciate that suggestion.

Any questions? (no response)

Seeing none, I will thank you, and ask Tim Dillingham with American Littoral Society to please come up.

TIM DILLINGHAM: Mr. Chairman, thank you very much. Members of the Committee -- first, really, thank you for spending so much time this morning, and mostly for providing this opportunity. I think the members of the public you see turning out here is pent-up demand to see the leadership in this State take action to help save this Bay. And it's been a long time coming. And I didn't testify on any of the other bills this morning, but I really do appreciate the fact that you have moved those. They are all interrelated elements of what we need to do to restore this Bay.

I will be fairly short. With me is Dr. Stephen Souza from Princeton Hydro, who is one of the state's leading experts on nonpoint source pollution. He can speak much more credibly than I can to the technical aspects of this bill.

But I think, fundamentally, what you have before you is a piece of legislation that moves us away from the status quo. We know that what we're doing now, particularly as it pertains to lawn fertilizers in this day and in this state, is causing unacceptable water quality. And so, the provisions that are in there -- what I heard Dr. Murphy and others say, is that they are reasonably grounded in science, to the extent that we know that science. On the slow-release proportions, on the application timing -- I can tell you that we did survey other agriculture schools, the literature that's out there. There is a range, and there clearly is a debate, about how aggressive to be. We're urging you to be aggressive to clean up Barnegat Bay. And I think that the compromises that have been shaped through this bill represent that. I think that they respond to the realistic expectations about what might happen when this all goes into effect. And we hope that it will make a difference for Barnegat Bay. But clearly, continuing to fertilize our lawn

in the way we do now, the products that we use now, is not acceptable because you only have to look out at the Bay, to look at the algae that's growing there, to look at the loss of the environmental resources, to understand what those consequences are.

So I urge you all to move this bill today, and obviously we're in this for the long haul and we'll keep engaged.

I'd like to ask Dr. Souza if he could just speak to the bill itself.

S T E P H E N J. S O U Z A, Ph.D.: Again, thank you for having us here this afternoon, and I'll try to be brief as possible.

As you're all aware, Barnegat Bay is in trouble. And the problems with the water quality and ecological issues that are brought up time and time again are definitely the negative consequences of the eutrophication. And call it what you want, eutrophication is a form of pollution. It's clearly established in the scientific literature that, whether you're discussing Barnegat Bay or any other coastal embayment or estuary, that eutrophication and the negative consequences that result from eutrophication are directly linked and are accelerated by land development activities. So as you get an increase in land development, you get an increase in the generation of pollutants in the form of nitrogen, phosphorus, sediment -- that all leads to an accelerated rate of eutrophication, and that, in turn, has led to the algae blooms, the intensity of those algae blooms, loss of submerged aquatic vegetation, impacts to fish and shellfish, etc., and a decrease in the recreational attributes and the esthetics of the Bay.

For coastal systems, when we talk about controlling eutrophication what it really boils down to is controlling the amount of nitrogen that is entering those systems. Nitrogen is recognized to be the

limiting nutrient in estuarine environments, so if you're going to control eutrophication, you need to control the amount of nitrogen that is entering those systems. And this is why we're fully in support of this bill, as well as the other environmental bills that have been discussed here this morning.

Instituting regulatory control over the amount of nitrogen applied and the formulation of nitrogen in lawn fertilizers is perhaps -- it's not obviously popular with everyone, particularly the fertilizer manufacturers, but it's especially meaningful to everyone who is involved in the care, the restoration, and the management of Barnegat Bay. This is why we're supporting the slow-release requirement of 30 percent and the total application limit of 0.75 pounds per thousand square feet, as currently specified in the legislation before you.

So why do we fixate on fertilizer controls? Well, first off, at the most basic level we can agree that nitrogen enters Barnegat Bay as a result of a variety of different sources: We have groundwater sources, we have atmospheric deposition, we have stormwater. And if you look at these various sources, stormwater run-off and the run-off that's generated from urban and suburban land development were among the most significant; and also they tend to be what perhaps could be called the most feasibly managed sources of nitrogen loading into the Bay.

So we have that basic concept in hand -- that a lot of this nitrogen loading that we're looking to control is coming in with stormwater. And the majority of that is associated with urban and suburban development.

Then we need to look for ways to reduce that loading. And although we do have on the books provisions in place -- rules that manage

stormwater, and there are performance scales that are associated with how BMPs need to be constructed-- As you all know, that applies to new development -- things that have gone before. However, if you even look at those provisions, right now the way the State rules are written for stormwater management, the only performance standard deals with total suspended solids, not with nutrients. Furthermore, if you go into the New Jersey BMP Manual, the stormwater best management practices Manual, you'll see that even if there were provisions in place for nutrient controls, about the best that you can do with BMPs -- stormwater BMPs -- is going to be about 30 percent nitrogen reduction, and that only applies to new developments.

So now we have new development that we can only limit at about 30 percent with our best BMPs. But what happens to all the remaining development -- urban, suburban development -- where we're having nitrogen loading coming in? We have no means of really controlling that. So we have to-- Although we want to promote sound and the best type of standards and provisions to reduce nitrogen loading via these BMPs, we also to have in place measures that really get to the source, and source control measures that actually limit the amount of nitrogen that's entering the Bay. And this is where this provision -- this fertilizer bill -- plays so much into the overall protection of the Bay over time.

We also recognize that along with controlling nitrogen loading, we also have to have good soil health. It's another one of the bills that's before you that we're also supporting. Those two things go hand-in-hand. But the root cause of the problem is nitrogen loading, and we have to do something to correct that.

So there are definitely positive benefits. And all you have to do is step back from coastal environments -- go into the freshwater environments and you can see where nutrient controls, fertilizer ordinances that have been put in place, in those cases dealing with phosphorous limitations, have had positive benefits. The lake communities have recognized for a number of years that there is a direct linkage between lake eutrophication and phosphorous loading, because in a freshwater environment, it's phosphorous that drives all the algae blooms, etc. In those cases, they've actually passed ordinances that ban phosphorous for use in many communities in New Jersey. And there is a positive benefit. Research that we just completed in the Lake Hopatcong watershed showed that lawns that were treated with non-phosphorous containing fertilizers versus phosphorous-containing fertilizers -- there was a one-hundred-fold difference in the amount of nutrients running off of those lawns. We can do the same thing with these provisions in the coastal environment through the passage of this bill.

So what I'm asking to do is, take a look at this from a standpoint -- as a very serious and profoundly positive measure that could be put into place in terms of source control: actually going in and reducing the amount of nitrogen entering the Bay not only from future development or from existing development. And, again, plenty of research has been done. We know from modeling the Bay ecosystem that a lot of the problems are not associated with new development, but with existing development. And those are the sources that we really need to be clamping down on.

So in closing, I just want to, again, emphasize the need for this fertilizer bill, and that it works hand-in-hand with the other bills that you are considering. Thank you very much. (applause)

ASSEMBLYMAN McKEON: Senator Beck, a question?

Doctor, thank you.

Senator Beck.

SENATOR BECK: Doctor, thank you. Your testimony was excellent. And as a co-prime sponsor on this legislation I, of course, agree wholeheartedly with you, and with the steps we're taking today.

There are some questions raised about some of the details of the bill -- and it's not the effort, and I'm not interested in doing what's popular, I'm interested in doing what's effective.

And so my question is back to the 30 percent requirement for the slow-release. And I think Assemblywoman Coyle had sort of hit on, I think, the concern that I have as well, which is: I don't care if we require 70 percent, but if 70 percent means that someone is just going put it on their lawn five times, then we really haven't fixed it -- we really haven't got into all the issues you just outlined. And so I guess I just feel like I need more information: Why is it 30? Why isn't it 15? Why isn't it 20? What is the logic to 30? And do you have any concern, as I think I have, that if 30 isn't -- it ends up not really fertilizing someone's lawn, and they go back and apply it two more times, that we've actually added to the problem and not resolved the issue. And I have that fear.

DR. SOUZA: I think it's a very good fear to have -- I think it's a reasonable fear. And as Dr. Murphy pointed out, the scientific literature on slow-release nitrogen components in fertilizers does cover a wide gambit.

I mean, you're talking about some studies are showing 15 percent is acceptable, in other cases 70 percent. And, as Dr. Murphy pointed out, there are a lot of other factors that go into how much of that nitrogen is being taken up, (indiscernible) soil health, the type of turf cultivar -- there's a variety of different issues, even the slope of the land, etc. The 30 percent seems to be, I would say, sort of like the middle of the road, but yet on the lower end of that middle of the road in value. And so from the standpoint of reducing nitrogen loading, we feel that the 30 percent is a viable value to have in this legislation. Your concerns about over-application-- Again, I've dealt with lake communities going back into the 1970s, when I was doing my research at Rutgers as a Master's degree student. Yes, that is human nature, and that happens right now -- regardless of how much a product contains nitrogen or phosphorous, if somebody doesn't see enough greening of their lawn they're going to add a little bit more, a little bit more. So that happens right now, even with the type of formulations that we have in play.

This is why, hand-in-hand with the restrictions on the amount of phosphorous, comes the education component. DEP has been doing a lot through their various programs, trying to educate people in terms of how to properly apply fertilizer in general, what not to do, what to do. But I think you're always going to have, probably, let's call it the bad apple segment that's going to say, "Well, I'm not really seeing what I want to see, and I'm going to apply more." But on the flip-side of the coin, you're going to have the far majority of the people who are taking care of the lawns -- who are using professional services or doing it on their own -- that with this legislation in place, we are going to see a decrease in nitrogen loading.

So though you may still have a few of the bad actors out there, for the most part you're going to have the majority of the populous that is going to be doing the right thing. And having the right type of product at hand is going to make that that much easier for them to do.

SENATOR BECK: If I could, through the Chair: One of the things that occurred to me, but may be too complicated to be doable is: Since you need less nitrogen with soil that's more receptive, if the percentage should be tied to that. In other words, if you have soil that is impacted, maybe you can use 15 percent. But maybe if you have soil that's very receptive, you have to use 70 percent, rather than sort of the hammer that applies to all. It may just be simply too complicated to actually implement something like that. But it seems to me that what I've heard you say is there's different kinds of soil.

DR. SOUZA: Right.

SENATOR BECK: And sometimes it works; and I think Dr. Murphy said, sometimes it works, sometimes it doesn't.

DR. SOUZA: You're absolutely correct. And I think right now, Rutgers does have processes in place, programs in place where something as simple as soil testing to evaluate the acidity and whether a lawn needs to be limed -- because that increases how receptive that soil is going to be for those nutrients to remain. Those programs are in place. Some people take advantage of that, some people don't. It's something that we promote, because it's a simple thing to do. But again it gets back to, I think, with the legislation and having the 30 percent limitation. For the most part, the general populace is going to be satisfied with what they're seeing, and

they're going to follow those application rates and do the right thing for the Bay, as well as for the lawn.

ASSEMBLYMAN McKEON: Any further questions for the Doctor? (no response)

Doctor, again, you've been very helpful. If you're being mindful of your time, if you're around, there might be additional questions--

DR. SOUZA: Certainly.

ASSEMBLYMAN McKEON: --that come up that you might be uniquely fitted to answer.

DR. SOUZA: Thank you, Mr. Chairman.

ASSEMBLYMAN McKEON: The next panel to come up is a whole array of individuals from New Jersey landscape contractors -- Stephanie Pizzoferrato with Scotts, Keith Kubik from New Jersey Turfgrass, John Holub from Retail Merchants, Mark Borst from New Jersey Landscape Contractors, and finally Bill Murray from GCSANJ. You guys are all signed up together, so I didn't-- I'm calling you collectively.

I just note -- as you take your places here and then we'll take your testimony -- you know we should all keep in mind: the law is the law. If people don't comply with it and decide to dump double the amount of fertilizer-- People don't recycle, people take motor oil and dump it in the storm sewer. You can't always deal with people who aren't going to obey the law as the reason not to go forward with reasonable regulation.

Whenever you'd like to start off.

S T E P H A N I E P I Z Z O F E R R A T O: I'll start off. Good afternoon, Chairman Smith, Chairman McKeon, members of the Assembly and of the Senate.

My name is Stephanie Pizzoferrato. I'm Manager of Government Affairs at The Scotts Miracle-Gro Company. I'll keep this brief.

We're supportive of efforts to protect and enhance water quality. The legislation you're considering is important to the entire fertilizer industry, and will have significant impact on Scotts and other companies. The bill includes strong regulations -- the strongest in the United States, as others have spoken. (applause) This will protect all of New Jersey's waterways. New Jersey will be the first state in the region to implement legislation limiting nitrogen in lawn fertilizer. The only other state to take this action to set both phosphorous and nitrogen limits has been Florida.

Although we are supportive of efforts to protect water quality, because of the unreasonable amendment setting 30 percent slow-release standards and the application dates, we have to oppose the legislation.

Chairman, The Scotts Miracle-Gro Company has a long history of working with stakeholders across the country on water quality issues, from our partnerships with the Chesapeake Bay Foundation to our work with the Alliance for the Great Lakes. Our company is committed to doing our part to protect these important resources. Participating in these efforts in New Jersey is another piece of these efforts across the country.

In closing, our industry is science-based. We have invested decades in the promotion of science, agronomic and environmental

technologies. We have expansive research and development programs that span facilities across the world and have developed new technologies over the years that reduce use rates, improve efficiency, and protect our resources.

Members of the Committee, Chairmen -- we urge you not to abandon the science. Please listen to the experts in academia, research, industry, and the state. The legislation will be strong and defensible only if it's on facts and science. It will serve as a model for the Eastern region of the United States.

Thank you for your time. And with that, I'm going to pass the microphone over to John Holub of the Research -- Retail Merchants Association.

J O H N H O L U B: Thank you, Chairman Smith, Chairman McKeon, and members of the Committees

I'm John Holub, President of the New Jersey Retail Merchants Association. I'll be very brief in my comments.

Our main concern with this issue is with regard to the burden that we've placed on retailers. If you read the legislation you'll see that there is a prohibition on the sale of fertilizer unless you know the intended use of that product. Obviously this places a significant administrative burden on retailers for us to have to police this. Does that mean, when somebody comes up to purchase one of these products, that we're going to need to have a list of questions to ask them -- are they starting a new lawn, or are they repairing their lawn -- things of that nature? So obviously it's very difficult for us to police this situation.

Also to further complicate it: As probably many of you are aware, several of my members have self-checkout. So are we going to have to put a point-of-sale prompt in there to stop the sale for this product, and then somebody's going to have to come over and then read that list of questions? So obviously this raises many concerns for us, not to mention with, too, you're going to have several grades of fertilizer. So again, this is further complicated. You're going to have a professional and a residential. Are we going to have to quiz the person on who they are and how they're going to use it?

So again, we're very concerned with this legislation, and we just ask that you please consider the burden that will be placed on the retailers, and reconsider how this initiative is policed. Thank you very much.

J O S H W I L L E Y: Good morning, Chairman Smith, Chairman McKeon, and members of the Senate and Assembly Committees. My name is Josh Willey, I'm the general manager for Scotts LawnService here in New Jersey.

I've been in the industry most of my adult life, know what's best for turfgrass very well. This legislation is creating strong regulatory requirements in our entire industry. We're not opposing this -- in fact, we're supportive of regulations that establish specific standards, product content, requirements, and fertilizer use restrictions and mandates. Please remember our industry is a very minor contributor to the water quality issues in the Bay, but we are committed to doing our part and have proactively started to do this.

First, the application dates in this legislation are of great concern to our professional business. In the State of New Jersey, the

growing season -- the agronomic growing season -- has been nine-and-half months -- from March through December. The provision that limits the application of fertilizer from November 15 to March 1 will remove four weeks from the typical growing season, and this represents 10 percent of our business, of our year -- 10 percent of the taxable revenues that are gone, as well as the revenues to our business. On top of that, specifically in my business, we've been able to keep full-time, year-round employees -- 60 in the State of New Jersey. This bill make that impossible for us, because 30 percent of the year we will not be able to work. So that will put that burden on unemployment and will also change the lives of those families that work for us in the state.

The cut-off date, we believe, should be December 15; we're willing to compromise on December 1. New York passed its own fertilizer regulations earlier this year, and, like New Jersey, they've eliminated the phosphorous from lawn maintenance products. They established December 1 as the last date for fertilizer application. Why would we, as a more southern state, go two weeks earlier than them?

And our decisions need to be science-based and realistic. In creating legislation just for the sake of change -- it's not appropriate in this case.

Second, a standard of 0.75 of percent total nitrogen for consumer products is extreme, and not backed by any research on turfgrass in the United States. Two different product standards would also create a huge amount of confusion for retailers, professionals, and consumers. A lot of professionals buy product in local retail stores, and like was mentioned earlier, how would we know the difference? How would we

tell the difference between someone applying it for consumer, or professionally?

The nitrogen range should be set at 0.7 pounds per thousand square feet, with a one-pound application limit for both consumers and professionals.

Thank you for your time. I'd be happy to answer any questions you might have.

SENATOR SMITH: Just one comment for John from the Retail Merchants: I think you're misreading the bill. Retailers don't have the responsibility that you believe they have. I'd appreciate it if you'd sit with Kevil when the panel is finished -- they'll show the specific language. I think your issue is not an issue -- okay?

MR. HOLUB: I mean the language-- I apologize if we misread it, but the language was--

SENATOR SMITH: It's okay.

MR. HOLUB: It prohibits the sale unless the intended use -- and left the open question of, how to do you determine the intended use?

SENATOR SMITH: You're not going to be the police officer on this.

MR. HOLUB: Okay, great.

SENATOR SMITH: Take a look with Kevil.

MR. HOLUB: Okay, great. We appreciate that.

B I L L M U R R A Y: Good afternoon. My name is Bill Murray, and I'm here representing, as their President, the Golf Course Superintendents Association of New Jersey.

I have been in the golf course business for over 25 years, and I think of our members as stewards of their land, which is their golf courses. Everyone of our members is very well-trained in turf management, including fertilizer and pesticide use. For those who are applying pesticides, all individuals have taken State exams and have been certified to apply these products.

As golf course superintendents, we follow the best management practices defined by our State University guidelines, but they are not etched in stone. The slow-release nitrogen and the soluble nitrogen with a one-pound limit makes no sense because it is not supported by University research. The 4.25 (*sic*) pounds of nitrogen per thousand square feet is just an arbitrary number that does not consider specific needs for all our areas of high maintenance.

As for the application dates, this State is so diverse from North to South, I do not see why November 15 was picked as the cut-off date. These requirements will handicap golf course superintendents in being able to provide quality golf course playing conditions, which impact golf tourism in the state.

Thank you for your time, but the Golf Course Superintendents Association of New Jersey opposes the amendments of S-1411 and A-2290.

K E I T H K U B I K: Thank you, Committee members. My name is Keith Kubik; I'm the President of the New Jersey Turfgrass Association.

At the NJTA, we strongly urge you to use sound science as the basis for your legislation. As part of that sound science, the NJTA is in support of the Rutgers' BMPs, and we make a strong effort to make them available to our members already.

In addition to the agronomic impact, we are concerned about the economic impact that this legislation, as it is written, may have. I would encourage you to consider the economic impact study that I believe you all received in your packets, detailing the turf industry -- valued at \$3.2 billion -- and providing over 54,000 jobs to this state.

The NJTA is prepared to support a fertilizer preemption bill that is based on science, considering some of the amendments that were recently made. We feel that that's not the case and, at this point, the New Jersey Turfgrass Association opposes the bills. Thank you.

ASSEMBLYMAN McKEON: Any questions? I'm sorry, did you want to finish up?

MS. PIZZOFERRATO: No, that's what I was going to ask you. Thank you for your time. Do you have any questions for any of us on the panel?

ASSEMBLYMAN McKEON: Thank you all; we appreciate your advocacy for you respective points.

Please-- Yes.

ASSEMBLYMAN RUDDER: Okay, thank you, Mr. Chairman. I didn't know what that meant -- so, yes. (laughter)

ASSEMBLYMAN McKEON: I didn't know which of the two of you wanted to speak, so -- you were both kind of waving.

ASSEMBLYMAN RUDDER: All right.

ASSEMBLYWOMAN COYLE: Okay.

ASSEMBLYMAN RUDDER: Would you--

ASSEMBLYWOMAN COYLE: No, you go ahead.

ASSEMBLYMAN RUDDER: Well, I did look at the economic impact and I have-- That's a big concern. And one of the issues that we try and face -- particularly on this Committee, but there's a host of others -- where you have well-intended ideas that look towards solving a particular problem -- the unintended consequences.

So we discussed what the 30 percent might be with additional application. The concern that I have -- and I have talked to folks in the industry and I've talked to folks in the environmental sector, and I've talked to the folks at Rutgers, and I still don't have a clear picture. And I'd like for you to expand a little bit: Sir, you mentioned, very briefly, the economic impact -- and we have it in our packets -- but if you could just share just more in detail. We're talking about you shortening by almost a month-- What kind of jobs are we talking about? John, with regards to retail-- I mean, if we are getting into the position where we have a supply that doesn't work; we have all these restrictions associated with it; we have two different types of standards, one for the professional, and one for the homeowner -- what kind of impact is that going to have on retail sales? Is that significant? And I'd like to hear a little bit more about that.

Because at the end of the day -- and I've talked to the Chairman about it -- we want to have balance, we want to make sure that we're doing the right thing for the environment, and we also don't want to have a negative impact with regard to jobs or retail sales.

MR. KUBIK: Sure. I don't know that I can speak fully on the question that you've asked, and I would encourage you to, perhaps, ask it again to some lawn care operators who are coming up to speak following me. But in general, the time in a year to get everything done that's needed

to keep a lawn healthy is short. And that if it is allowed to interfere with things such as leaf drop and leaf cleanup, and getting that last application out, and how many full-time employees you employ as a land care operator, specifically -- because of a cut-off date, if you're forced to pull your spreaders in on November 15 it may cause some hardship on that matter. But, more specifically, I would encourage you to perhaps ask that to some land care operators.

ASSEMBLYMAN RUDDER: And I guess, John, if this product does not exist, and although the implementation dates are a year-plus from now, what do we see? I know that you're talking retail, but maybe it's more of a manufacturer question. What kind of challenges--

MR. HOLUB: It probably isn't. And I apologize -- we don't have any facts and figures of the immediate impact it would have on retail. But I think it's a very safe assumption that if you're shortening the window of when you can apply the products, most likely you'll be selling less of it. Now, there were comments made earlier, too, about these products may be inferior, and they may be selling more of it -- that's not a concern of ours. Ours actually would be, with an inferior product, guess who the consumer is going to complain to first? And that's going to be the retailer. The manufacturer might get some phone calls, but I would bet that most folks, if they place a product on their lawn and it doesn't work, they're going to come back to us and complain about the product that we sold them. And that could be a loss of a potential sale down the road, as well. So there are several different aspects of this where I think it could impact, have a direct impact on sales.

MS. PIZZOFERRATO: I'm going to add to that, on the retail side, a lot of retail stores also sell professional products and consumer products. So when someone comes in the store, how is a salesperson at Lowe's, or Wal-Mart, or one of the smaller stores going to know if that person is buying a professional product or a consumer product -- if you have two different standards?

Are there any other questions for us?

ASSEMBLYMAN McKEON: Assemblywoman, I think you were first. And then Senator Beach, and then Assemblywoman--

ASSEMBLYWOMAN COYLE: First, you have made comments that Florida has enacted -- is it similar legislation, or really close?

MS. PIZZOFERRATO: I've got another colleague who is coming up behind me who has worked very hard in Florida on the legislation, so I'm going to leave that for Mr. Wible when he comes up.

ASSEMBLYWOMAN COYLE: Mr. who?

MS. PIZZOFERRATO: His name is Chris Wible.

ASSEMBLYWOMAN COYLE: Chris Wible. That would be great.

MS. PIZZOFERRATO: Florida's legislation is similar in what you've done for the professional standards.

ASSEMBLYWOMAN COYLE: Okay.

MS. PIZZOFERRATO: In the 0.7 pounds per thousand square feet, limiting the total application rate to one pound per thousand square feet.

ASSEMBLYWOMAN COYLE: (Indiscernible) I will save my question for Mr. Wible.

And then, just to ask one of you: With the additional burden on the manufacturer, and since we'll be the only state that will require this, due to the manufacturing burden and distribution channel burdens you're going to have to produce a product differently -- will the cost of fertilizer increase in New Jersey?

MS. PIZZOFERRATO: Most likely, yes. You're going to be producing a bag of fertilizer for one state, when no other states have imposed legislation like this.

ASSEMBLYWOMAN COYLE: Have you looked at any estimates of how much it will increase?

MS. PIZZOFERRATO: Tens of millions of dollars for the slow-release side of it.

ASSEMBLYWOMAN COYLE: And that translate to what? Ten percent on a bag of fertilizer -- 25 percent? What does that translate to? Could you break it down to a consumer?

MS. PIZZOFERRATO: I'd have to do more research on that and get back to you.

ASSEMBLYWOMAN COYLE: Thank you.

ASSEMBLYMAN McKEON: Senator Beach, and then Assemblywoman Lampitt.

SENATOR BEACH: Sir, I apologize, I didn't catch your name, but I would hope-- Maybe you could explain to us what your typical fertilizing season looks like on a golf course. And I'm a former high school golf coach, so I have some real interest in this. (laughter)

MR. MURRAY: Well, my name is Bill Murray.

SENATOR BEACH: Thank you, Mr. Murray.

MR. MURRAY: Not the actor, (indiscernible) (laughter)

ASSEMBLYMAN McKEON: Assistant greenskeeper -- very nice. (laughter)

SENATOR BEACH: How do you handle gophers? (laughter)

MR. MURRAY: Well, in this state the fertilizing window differs a bit, because you have up north where it will stay cooler much later into the spring; where down in the south, near Cape May area, which is actually pretty close to Baltimore, Maryland -- so you'd be pretty early season.

SENATOR BEACH: Cape May National.

MR. MURRAY: Yes. So it could go anywhere from, well, it will go from March 1 until whenever you say we're going to have--

SENATOR BEACH: I guess my question is: What do you do now, prior to this potential legislation?

MR. MURRAY: I'm in the middle of the state, in central, and we probably go out with our first fertilizer, probably sometime in -- it could be late March, early April; and our last one will probably be sometime-- Well, this year, who knows? The weather is staying hot and hot. We could probably go to sometime in late November, depending on the weather.

SENATOR BEACH: But you don't close the course for three and a half months?

MR. MURRAY: No, the course is open year-round.

SENATOR BEACH: Thank God. (laughter)

MR. MURRAY: Not all of (indiscernible).

SENATOR BEACH: Thank you, Mr. Murray.

MR. MURRAY: You're welcome.

MR. KUBIK: Could I just add to that, real quickly?

Sorry, in my professional life I do a lot of consulting at golf courses, and the other thing that I think has to be emphasized is that--

SENATOR BEACH: I'm envious. (laughter) A golf course consultant.

MR. KUBIK: The golf course construction which occurs -- not only brand-new golf courses being built, but also in redesigned holes to make the club more attractive to a future membership -- that goes on year-round. And for that purpose, much to Dr. Murphy's comments about erosion control -- same premise -- to try to get that turf cover, you are typically forced to fertilize outside of the proposed windows.

SENATOR BEACH: Thank you.

ASSEMBLYMAN McKEON: Thank you, Senator.

Assemblywoman.

ASSEMBLYWOMAN LAMPITT: I just have two points, actually. If phosphorous and nitrogen are in fertilizer for the benefit of fertilizing, but we're saying that it could be removed -- why then is there phosphorous and nitrogen in fertilizer? If not phosphorous and nitrogen, then what? The reason why I bring this up is because obviously -- and my friends at the Chemistry Council know this-- Bisphenol A and hard plastic -- we have found that BPA does not need to be in hard plastic, but yet it continues to be in hard plastic. So I ask that sort of "what if" question, and why.

My second question is this -- is that I work at a very large institution that determines whether or not the heat is turned on or the air conditioning is turned on based upon consecutive days of above-average or

below-average heat or frigidness. Wouldn't that be the same sort of consideration that we would want to apply here? That consecutive days of low temperatures would freeze the ground -- that could happen in November, it can happen December, it can happen in January. With the way that we're facing the worst winter last year with 50 inches of snow, this summer with excessive amount of heat -- wouldn't we want to use a different type of -- not the Farmer's Almanac; I don't think that they're 100 percent accurate either -- but wouldn't we want to use a different level of consecutive days below a temperature range to stop the application dates? Those are my two points.

MR. WILLEY: I think as far as the date side of it, I think it makes a lot of sense. Because we talk about frozen ground, don't want to be applying fertilizer on that. We wouldn't go out and apply fertilizer on frozen ground if it was October 15.

ASSEMBLYWOMAN LAMPITT: Because it doesn't benefit you.

MR. WILLEY: Right, but whereas last year it was warm all the way up until Christmas, and this year may be completely different. For instance, there was snow on the ground until the 20th of March this year as well. So I think looking at it that way makes a lot of sense, from a professional perspective of lawn care applicators, versus setting a date parameter that one year may be way too late, but revenue pressures pushing and encouraging, maybe, businesses to go that way, even though the ground is frozen. And then the other way just makes more sense.

MR. KUBIK: You'd asked the question about fertilizer components and-- Much of the industry has already taken the phosphorous

out of the fertilizer, and that is because in New Jersey we do have a good amount of fertilizer tied up in soils. The trick is to release them through manipulating pHs. A soil test can tell you how to do that. But that's something that we're able to withdraw, perhaps, from the soils that are already there. Nitrogen is something that -- unfortunately, it is fleeting: It either gets taken up by the plant or it goes away. So that if it's not tied up in, say, an organic form of a material that can break down over time, perhaps that's not something that's so readily available. So the plant does need constant applications of nitrogen to keep it growing healthy.

ASSEMBLYMAN McKEON: Any other questions for this learned panel?

SENATOR BECK: Chairman, if you would indulge me one last time.

ASSEMBLYMAN McKEON: Assemblywoman.

SENATOR BECK: Or at least one more time.

In each of your testimonies, almost to a *T*, you referenced that the amendments are not based on science. And I assume you're talking about the 30 percent -- I'm making that assumption. So does that mean that you have science? I think Dr. Murphy and the other Doctor came up and said, "Well, you know, there's really just not a lot of data out there. We're kind of guessing." So do you have anything you can share with the Committee that's a recommendation -- either based on science, or knowledge, or experience -- that we should be aware of? Because I do think that 30 percent is kind of what the Doctor from Princeton said: We're sort of at the lower end of the scale, and we figured that that's a reasonable standard. But if I'm hearing you say it's not based on science, and it's not a

reasonable standard, then can you speak to that a little bit, about what is a reasonable standard and why is it? Do you have data?

MR. KUBIK: Well, I would refer back to that nutrient summit that was held back in Bordentown, and one of the themes that came up again and again is how much research gaps there are. And there is a fear at my Association -- New Jersey Turfgrass Association -- that we might legislate before we understand the truth about those gaps; and that we would encourage that perhaps there is the ability to make changes to this as we learn through science. And if given time, I think that science would be able to fill in the gaps, specifically.

Fertilizer is a food, and it's no different than you and I eating food; and perhaps for somebody who has high metabolism, eating a lot of carbohydrates doesn't hurt them. But for somebody who might specifically have issues-- Perhaps they have to have a high protein diet. It's just something that is too complicated to put neatly into one sentence, one line in the bill.

SENATOR BECK: So what is your recommendation: That we ask the DEP to research it over a series of months and make a recommendation? Or that we leave it open-ended -- that the percentage changes as we have more scientific evidence? How do you suggest we address it?

MR. KUBIK: Ideally what I would like to see would be the opportunity for science to fill in those gaps, and then replicate them again, and then come up with, perhaps, changes to the Rutgers BMPs. Again, that's something that we use as our guide, as professionals, and would

encourage that opportunity for it to grow and develop and fill in where we need to fill in answers.

ASSEMBLYMAN McKEON: Any other questions? I'm sorry--
(no response)

Seeing none, thank you very much.

The next panel-- People didn't sign up this way, but I'm going to have you come up -- Dr. Michael Kennish of Rutgers, Jennifer Buck of the University of Pennsylvania Engineering faculty and Mantoloking Environmental Commission, Jennifer Coffey of the Stony Brook-Millstone Watershed Association, and perhaps Peter Weeks of Save Barnegat Bay. And that should kind of fill up the table for now.

And just state your name before speaking, because we have an audio record. And I'm going to ask everyone again -- it's been us with the very good questions that have been posed, but try to expedite your testimony. We have at least 100 people left to testify.

M I C H A E L J. K E N N I S H, Ph.D.: Mike Kennish. I'm a research professor at Rutgers University, and I'm coming in from a different angle. My expertise is to assess conditions in the estuary and responses of aquatic biomes to nutrient inputs. And I just want to add that over the course of time the estuary has responded in a generally declining ecological -- essentially insidious ecological decline to increasing nutrient inputs through time. We now have two-thirds of the total nitrogen load coming from surface run-off. And someone had mentioned earlier that the nitrogen inputs really come in during wintertime. But our data indicates that total nitrogen load is twice as great in the summer months than it is during the winter months, which makes a lot of sense because we have 1.4 million

people living in Ocean County during the summer months, as opposed to about 575,000 people year-round. So there's more human activity at that time.

I don't want to belabor that point. The point is that nutrients are coming in, and nitrogen's coming in. And a significant component -- the dissolved inorganic nitrogen that is part of the fertilizer component -- that's the component that we're mainly concerned about, because the algae pick that up and assimilate that much more quickly than dissolved organic nitrogen, which comprises about 10 times more of the nutrient of total nitrogen in the estuary during the summer months. But really, it's the dissolved inorganic nitrogen which the algae picks up much more rapidly than the organic nitrogen. So we have to target that.

And so I'm really in complete agreement with Dr. Souza that the prudent thing to do is to get at least 30 percent slow-release nitrogen into the composition of the fertilizer use, because the algae in this system responds so quickly to the inorganic form that comes in. And if we're going to be taking a conservative route and the prudent route here, we have to be really targeting that rapid-release nitrogen that's coming in.

ASSEMBLYMAN McKEON: Thank you.

JENNIFER BUCK: My name is Jennie Buck. I would like to outline a little bit differently who I am here representing.

I am a member of the Mantoloking Environmental Commission. And for the sake of full disclosure, which I think is very important in academia, I did teach until just this past spring -- I taught for four years at the University of Pennsylvania. I teach problem solving to

graduate students in integrated product design and engineering. But I am on my way out into industry now -- just so that everyone is aware of that.

The main reason that I'm here is that-- First of all, I want to say that I have an awful lot of respect for fertilizer companies. I'm a gardener myself; I know that there is a business need out there. I know that there is a need on the part of homeowners. What I want to express here, though, is that we have an emergency, locally. And that at the point where you have an emergency, you do have to pull back a couple of places, okay?

I am not convinced that 30 percent is enough slow-release -- hey, if I had my choice, I'd like to see 70 percent -- fast and easy. Go ahead and try something extreme. But you know what? I can live with the 30 percent because I know something needs to be done now. We can't sit here and argue over the little pieces -- back and forth -- for another six months, and get nothing done on this. (applause)

I know this is a tiny piece, and I know that this isn't going to fix what is going on in that Bay. But we have to find every single, tiny piece we can, and attempt to do something about this at the moment. I don't want to see this bill any more watered down, but you know what? I can live with it just for the sake of some movement forward here. I have lived 45 years on the Bay, much of it full-time. I come from a family that had a number of pretty serious swimmers. My father swam every single day for the majority of his life. I have not swum for the last eight or nine years -- is it eight or nine? How many years have we had jellyfish? (laughter) It's recent that we've had those sea nettles. It's not something that we've had long-term. I really haven't swum because of the sea nettles, but you know what? I finally gave up and I started swimming again this year. Okay, so

you get stung -- big deal. The piece that bothers me more is each time that I've swum in that Bay -- and I've gotten stung every single time -- I wind up with eye infections. And I don't understand what's going on there. And nobody's giving me a clear answer on it.

I do hope-- I understand your position; I know you guys have to go through a lot of other things that we can't see here. But I do hope that you will consider going over to Island Beach State Park and talking to the Governor on our behalf. This is something we do need now -- we don't need later on.

Thank you all for all of your help on this. (applause)

ASSEMBLYMAN McKEON: Thank you very much.

JENNIFER COFFEY: Chairman, Committee members -- thank you for holding this hearing today. My name is Jennifer Coffey; I'm the Policy Director for the Stony Brook-Millstone Watershed Association.

The Watershed Association is in central New Jersey, and we are looking to protect and restore 265-square-miles of freshwater systems. So we're not a coastal group -- there are five counties in our Watershed: Monmouth, Middlesex, Mercer, Hunterdon, and Somerset. So you might ask yourself: Why is someone who spends her time trying to protect and restore freshwater systems here at this hearing today on the coast? Because I wanted to let you know how critically important this bill is for all of New Jersey's waterways.

Our freshwater systems are choking on the nutrients. We produced a report earlier this year called *The State of the Watersheds*, so it's the state of our watershed in central New Jersey. And we used DEP's data as well as our StreamWatch data. We've got our StreamWatch monitoring

program that we've had in place for more than 16 years now, and all of our policies and procedures have been reviewed and accepted by the DEP, and we submit our data to the DEP. Twenty-nine out of 31 sites that we monitor for nutrients violate New Jersey's water quality standards for phosphorous -- that's 29 out of 31 sites. Using just the DEP data alone, 3 out of the 4 sites that they monitor in our watershed violate water quality standards for phosphorous. So the phosphorous component of this bill is incredibly important to freshwater systems. And I want to say that we support that enthusiastically and wholeheartedly.

We are big supporters of this bill. Is it as strong as I would like to see? Probably not; there's one specific section on the buffers -- applying fertilizer to the edge of streams and buffer (indiscernible). And I think there's a 10-foot buffer now. All the existing science shows that you really need a good, strong, 100-foot buffer to protect streams from nutrients and total suspended solids. So ultimately I would love to see a 100-foot buffer rather than a 10-foot buffer. At a minimum, I think it would be great to make this bill match the DEP riparian buffer stream regulations and look to a 50-foot buffer.

But, except for that, we wholeheartedly support the 30 percent slow-release nitrogen and the no-phosphorous components of this bill, and we are due to vote on it and move forward with this.

So thank you.

ASSEMBLYMAN McKEON: Thank you very, very much.

Peter Weeks -- I called earlier.

W I L L I A M D e C A M P Jr.: Mr. Chairman, I'm with Save Barnegat Bay. Peter Weeks is not here. I could speak now--

ASSEMBLYMAN McKEON: You're welcome to come up now. I have you on the list, too, but that's okay.

MR. DeCAMP: Okay, thank you.

UNIDENTIFIED MEMBER OF AUDIENCE: Go, Willie!
(laughter) (applause)

ASSEMBLYMAN McKEON: I was going to save it for the end, Willie.

MR. DeCAMP: Well, we might all be asleep at the end, Assemblyman. (laughter)

Thank you very much, Assemblyman McKeon and Senator Smith, and Senator Beck for sponsoring this bill, and thank you to the Committee for hearing it. We are extremely pleased. Save Barnegat Bay is a not-for-profit organization based in Lavallette.

This is a proud day for us because most of the basic concepts mentioned in the bills started -- I think I can honestly say, without too much of conceit -- in our office. The 30 percent started in our office; the idea of another standard, a more lenient standard for industry and professional applicators started in our office; the idea of banning for sale what is banned for use started in our office.

The things that I have to say have become less and less, because I'm not going to repeat. I'm going to try very hard not to repeat what others have said. So brevity just becomes easier and easier as the day goes by.

I would like to call your attention, though, to my testimony and the attachments, which you either have or have the opportunity to have. I wrote it carefully; it's five pages, and it's really what I think you

need to know. The first page is just usual bloviation, but as soon as you start page 2, this really is a succinct discussion of where this fits in an overview of things, and then what's going on with the essential issues.

Just one quick little note: This does not apply to gardens -- this applies to lawns only.

The 30 percent figure -- the much-talked about 30 percent figure -- we came up with, and we came up with it because we looked at what was happening elsewhere. And at that time, Florida was the place. So Florida's at 30 percent, or at least if you looked at the volumes they were recommending in their labeling law, it was 30 percent slow-release. Maybe that's just for the *de facto* -- I can't remember whether they legislated 30 percent. And what's interesting to me about that is: When they were achieving 30 percent slow-release by means of a labeling law, you did not hear the current chorus of, "no science, no science." It was general silence on that subject. It's only when it became a content requirement for sale that the allegation that "there's no science" started to arise. And I think, as Senator Beck elicited in one of her questions earlier, if there's -- maybe there's limited science for the 30 percent, that there's limited science for any alternative that they may come up with.

Why else did we choose 30 percent? Because we went on the Internet. And one of the attachments to my testimony is just one Web page each from five agricultural schools. And I very much call your attention to that, because just in going through them in the order in which you have them, the first -- Penn State University, which is an eminent agricultural school. And they say a guarantee that 30 percent or more of the total nitrogen is water insoluble, or controlled-release nitrogen, indicates

a quality turfgrass fertilizer. So if we're to take that, then we're not doing anything Draconian; we're saying it's got to be quality. Then the University of Maryland -- if you flip the page -- their standard is at least 40 percent recommended -- not required -- this is to the homeowner. And, I grant you, there are-- Everything is an individual case. You can go down any street -- every home is another individual case. And that might frustrate agronomists, but we're not trying to turn the people of New Jersey into 8 million agronomists.

Then Cornell-- In one of their places, says a 50-50 or a 70-30 mix of slow-release to quick-release is less risky to the environment. So Cornell is going as high as 70 percent.

The University of Florida is interesting. They recommend 30 percent -- that's the lowest one, the one we took -- and when the University-- But in what the University of Florida has written, this is the most environmentally safe and cost-effective method and requires fewer applications. And I'm not trying to impute any motives, but I've often wondered: Is the interest, maybe-- It would be human nature if the industry's reservation is that one nickel comes out of their pocket because slow-release costs a little more, and another nickel comes out of their pocket because people are going to have to fertilize less. It's that water soluble that gives the green pop; it's the slow-release that keeps things green over the long term. And I'm starting to sound like a scientist, so I should say right now: I am not one. And I should also say I do have a lawn.

And the last page is Virginia Tech, and they divide things up into above and below 50 percent slow-release.

So basically, if you're going to say that there's no science for 30 percent slow-release, the way I see it, you've got to say one of two things: either all five of these great agricultural schools are blowing smoke and that they've got it wrong, or you've got to say that our rivers, our lakes, our estuaries are not fed by groundwater -- which is a thought that no one is introducing. And so I think this is a sort of forest for the trees situation here, because I'm no scientist, that's just how I break it down. And I think it's an accessible way that we non-scientists can approach the situation in our effort to create sound public policy.

And I think that's just-- Every other thing I've heard I think will come out in the wash if those main points are grasped. And so I think I'll stop there, and I just beseech you again to read our testimony which we worked on very hard, and very late. (laughter) (applause)

ASSEMBLYMAN McKEON: Thank you for your hard work.

SENATOR BECK: Chairman, could I just say a thank you for that, through you, for that clarification. That really is very helpful. I don't know-- We have so much paper up here right now, I didn't find your copy, but I certainly would like to get a copy of that, and I do appreciate that clarification. That makes a big difference. Thank you.

MR. DeCAMP: Thank you.

ASSEMBLYMAN McKEON: Thank you very much.

I have two larger panels signed up, relative to in opposition--

ASSEMBLYWOMAN COYLE: Whoa.

ASSEMBLYMAN McKEON: Were there more questions?

ASSEMBLYWOMAN COYLE: Can I just have one quick question?

ASSEMBLYMAN McKEON: Of course you can.

ASSEMBLYWOMAN COYLE: Your testimony was really, basically, regarding the 30 percent release and (indiscernible) about the multiple application or less application, really in direct conflict with Dr. Murphy's testimony, who is a scientist. So could you just explain it to me, what you said, that actually--

ASSEMBLYMAN McKEON: I'm sorry; let's make it easy. I don't want to interrupt you.

ASSEMBLYMAN COYLE: --why is fine?

ASSEMBLYMAN McKEON: Is Dr. Murphy still here?

Come on up, because I didn't think that was in direct conflict with your testimony.

ASSEMBLYWOMAN COYLE: So maybe you could explain that? Well, not direct conflict -- maybe that was too much of a legal term, on my part.

ASSEMBLYMAN McKEON: I just-- You know, if he's here--

ASSEMBLYWOMAN COYLE: I just need to understand this.

Thank you.

Dr. Murphy, when you were testifying, and I was asking if any individual did not get the response that they were accustomed to, what do you think they would do-- And one of the things that I think is human nature is they'll apply more -- they'll either apply more of the fertilizer, or they'll apply more right down, or they'll apply it more frequently -- they'll apply more applications.

And if I understood your testimony correctly, you're saying that isn't what's going to happen. You're saying that the slow-release is actually more effective and you get that -- you used the term -- *green pop*.

MR. DeCAMP: When I speak about this whole subject, I give (indiscernible) general impressions. One of my general impressions is that I didn't think I heard a contradiction between the testimony of Dr. Murphy and myself. I think I'd rather have Jim speak first, and then--

ASSEMBLYWOMAN COYLE: That would be great.

MR. DeCAMP: And then perhaps I will, or perhaps I won't.

ASSEMBLYWOMAN COYLE: Thank you.

DR. MURPHY: There's a little confusion here. I think there's a lot more similarities between what we're saying; it's just the perspective that we're bringing. We do recommend slow-release fertilizers. The comment that we discussed when I was up here was, is it possible that this is too restrictive? And my general answer is that, in many cases, it won't be, but in some cases it will be. And so Willie's correct: If these products that he summarized are used correctly -- they're used at the right rates, the soil conditions are good -- these products will behave well, both from an agronomic and environmental standpoint. However, as written in the bill, the restrictions are pretty stringent, and I wouldn't deny that -- and for obvious reasons: to protect environmental water quality issues. However, there is some data that suggests with the rates that are capped at 0.75 of a pound, and 30 percent of that being slow-release, there will be some situations where that product won't behave in the way that the customer who buys it wants it to behave. And so I don't know this for sure, but it's just sort of human nature that people will say. "Hey, that didn't work the

way I wanted it to.” They’ll either go get another product or apply more of it -- that’s a potential consequence to it.

We recommend slow-release materials, and, basically, a lot of what Willie summarized in his statements fall within our BMPs. And the issue really comes down to: Do we know -- what we commented earlier, I think Jennifer Beck asked me the question: Do we know what percentage will give us the best protection of water quality? And the general answer is, no we don’t know a specific percentage. But we do know that slow-release, when used correctly both from an agronomic and an environmental standpoint, will be effective as a strategy -- or tactic.

ASSEMBLYWOMAN COYLE: Thank you, and thank you for waiting -- for staying here.

ASSEMBLYMAN McKEON: Okay. I think we’re good.

Here’s what I’ve decided -- what we’re going to do: I have two full panels against. I have, again, 75 people, literally, sitting here to testify for it. I’m going to try, when I say limit it, I’m just going to call up about an equal number also for it, to come up and say a few words. After that, I’m just going to call out every name in a row, and I’m going to leave it to those names I call to say, “I have something to say that no one has said already.” And if you have something, then come up and say it. If not, being differential to all of us, everybody here, let’s try to get through this as quickly as we can.

So the next panel I’m going to call up against or opposing, is Dom Mondri of NJNLA; John Pope, Anderson’s; Keith Haines of Reed and Perrine; Ed Waters from SSA; Bill Maer; and David Pease from the Golf Course Superintendents.

UNIDENTIFIED MEMBER OF AUDIENCE: Mr. Chairman.

ASSEMBLYMAN McKEON: Yes.

UNIDENTIFIED MEMBER OF AUDIENCE: If you're only calling one panel up., would you send the Nancy Sadlon panel up? They've more information that's (indiscernible).

ASSEMBLYMAN McKEON: The next panel I have has Nancy Sadlon; Chris Wible, Scotts; Mickey Stachowski; Dan Becker, and--

UNIDENTIFIED MEMBER OF COMMITTEE: We suggest you bring both panels and you can ask questions. We'll just do a couple of presenters to save you time.

ASSEMBLYMAN McKEON: Yes, listen: I'm trying to give you deference. So if you want to self-limit, then--

UNIDENTIFIED MEMBER OF COMMITTEE: We'll just stand here and we'll be available for questions, or we'll just have--

ASSEMBLYMAN McKEON: Okay, that would be fine. We all appreciate that. But please, if there is something in addition you want us to hear, I don't want to limit it.

UNIDENTIFIED MEMBER OF AUDIENCE: Okay, I'll start.
Thank you.

ASSEMBLYMAN McKEON: And I hate to be a pain in the neck, because the logistics here are such that you do have to sit--

UNIDENTIFIED MEMBER OF AUDIENCE: --when you're speaking.

N A N C Y S A D L O N: My name is Nancy Sadlon, the Executive Director of the New Jersey Green Industry Council. I have surrounding me experts and representatives from various sectors of the Green Industry. I

have Chris Wible from Scotts, who is really here to address any content issues and talk about the impact to manufacturers and products. I have with me John Pope from Anderson's, who is a New Jersey businessman who can talk about the impact to his company. I have with me Keith Hanes from Reed and Perrine, another important business in this state that will be impacted by this 30 percent and a number of the amendments. I have with me, from the golf industry, Dave Pease, who is from this County, in terms of the Golf Course Superintendents. I also have David Crow, representing RISE -- Responsible Industry for a Sound Environment; Mickey Stachowski, Golf Course Superintendents legislative affairs person -- from the Golf Course Superintendents Association of New Jersey; Dan Becker from Becker Hardware; and Bill Lafield from Consumer Specialty Products; and Ewald Altstadt from the Lawn Doctor franchises.

I will just say, very briefly: I really wanted to point out, or remind some of you who already know, about the large amount of proactive efforts that this industry has already done to protect water quality in the State of New Jersey. I think that that's lost -- we get looked at as the bad guys with the big arrow, and we have done a lot already to protect water quality. I appreciate Assemblyman McKeon's recognizing that in the beginning, so I won't belabor the point. But I will reference to all of our buttons -- the Healthy Lawn, Healthy Environment initiative that many of the players standing here before you were part of. That initiative, which was voluntary -- which many people in the audience don't recognize -- resulted in the reduction of 70 percent of phosphorous in products already. We should be applauded for the efforts that have already been accomplished by this industry.

I also just want to note that we received the Governor's Award for that -- we were recognized by DEP at the last stakeholder meeting for all of the positive efforts that we have done. And we are really the people here driving hard for real solutions, and we mean it when we say we need the science base. It's a very confusing subject, and we have spent a lot of time -- thank you, Senator Smith, for all the stakeholder meetings that have allowed us to sit and educate DEP, educate Barnegat Bay people about what we do, how we do it, and how we are stewards of the environment.

With that, I'd like to turn the microphone over to Chris Wible.

(applause)

C H R I S W I B L E : Thank you, Chairman Smith and Chairman McKeon.

You were correct, at the beginning, when you said that this will be the most stringent regulation in the United States. And that is without the current amendment added -- this will be the most stringent regulation in the United States. We've heard it -- there are other states that have passed phosphorous legislation. New Jersey's accomplished that without legislation -- we are over 80 percent phosphorous reduction at this point.

In regards to nitrogen, the only other state that has regulated nitrogen has been Florida. And they did not set a 30 percent standard in Florida. The state of Florida summarily rejected a fixed, arbitrary percent, as well as did the Tampa Bay Estuary Program. The state of Florida limited the amount of soluble nitrogen to 0.7 pounds, and then limited the total nitrogen to 1.0 pounds. So if you're at the maximum rate, you would be at a 30 percent product.

In the state of Florida, they approached it the same way that this legislation is doing it. It's not a labeling law, it's content. Florida regulated the content in the bag. You could only have so much soluble nitrogen in the bag; you could only have so much total nitrogen in the bag. So the consumer, when they use that product, they're using less nitrogen. The state of Florida, by enacting that legislation, anticipated a 30 percent reduction in nitrogen across the state. They've surpassed that. We've shared our sales data with the work group that's been a multi-stakeholder work group -- the Littoral Society, Barnegat Bay Estuary Program, DEP, Department of Agriculture, the list goes on -- they're all named in the Governor's Award. But we've reduced nitrogen in the State of New Jersey by over 21 percent already, because some of those products that are sold in Florida are also sold in New Jersey. When this legislation passes-- In the current form, without this last amendment, we would see additional reductions in nitrogen in the State of New Jersey. So the total-- By limiting that total amount of nitrogen, you're going to reduce the amount of nitrogen, and by setting a soluble limit, you'll also change the mix.

So what we-- This amendment created a number of problems. One: the way that slow-release nitrogen is defined, it ignored the national standards, and the national standards-setting board, which members from every state sit on, including the State of New Jersey. There's not a single technology out there today that meets the definition of slow-release that's in this legislation.

There's a-- The standard for 30 percent slow-release--

ASSEMBLYMAN McKEON: Move the microphone closer to your mouth so you can be heard.

MR. WIBLE: Yes, I'm sorry.

The definition of slow-release in the legislation -- no technology on the market meets that. The requirement for 30 percent slow-release and a 0.75 limit? There is almost zero products on the market that meet that. There may be more like a chicken litter product -- may meet that standard -- but it wouldn't meet the phosphorous standard.

What that standard does is, it creates an inferior, substandard product that is not going to function when used as directed. And that's the last thing we want to do -- is encourage and design a product that will not work whenever it's used as directed.

The issue-- I think what was missing here when we talked about the 30 percent concept, and the reason Florida rejected the 30 percent concept -- and Senator Beck, I'm the one who sent you the letter that said at the Turf Summit that was unanimously determined to be an invalid concept -- it's because 30 percent of what? It depends on the rate, and that's what everyone here, when they talk, that's what they fail to say -- it's the application rate. Thirty percent of what? The Rutgers BMP that says you should use 50 percent slow-release -- that's if you're putting down a pound-and-a-half of nitrogen. When Florida says you should use 30 percent slow-release, that's when you're putting down a pound of nitrogen. So if you're only putting down half a pound or three-quarters of a pound, that changes. So it's a sliding scale. As your nitrogen rate goes up, the amount of slow-release nitrogen goes up. So what matters is how much soluble nitrogen is on the ground -- that which can leech. So you limit how much can leech, and everything above that you say that has to be slow-release.

We offered an alternate proposal that did just that. And it agrees-- It's based largely, or very much based on the arguments provided to you in that April document by the Clean Ocean Action. And you'll see in there -- there's a chart that shows a zero percent slow-release and a 15 percent slow-release product. And whenever--

UNIDENTIFIED MEMBER OF AUDIENCE: (Indiscernible)
screwed up.

MR. WIBLE: In the arguments that they--

ASSEMBLYMAN McKEON: I'm sorry, let me just get control here.

What's the issue? Is it-- We're okay?

UNIDENTIFIED MEMBER OF AUDIENCE: (Indiscernible)

ASSEMBLYMAN McKEON: Just do your best to keep that close to you--

MR. WIBLE: Okay.

ASSEMBLYMAN McKEON: --and everybody -- I know it's late. Everybody conduct themselves the right way, please.

MR. WIBLE: We put forth a proposal that is in-line with the arguments and the data cited by Clean Ocean Action. And this proposal, per their data which has been shared with the members, would result in a 90 percent reduction in leeching potential. We think that's a reasonable position. And what it does is, it says all products will have some slow-release in them. And as your rate goes up, whenever you get up to that 1.0 pound maximum, you have to be at 30 percent there. But if you're only putting down a little bit, you don't need as much slow-release. And that's the issue, and that's why the products would not work for the consumer. If

I have a product that's designed for the summertime, that puts down a little bit of nitrogen, I have much less slow-release in there. If I were required to have 30 percent slow-release in there, I would put more nitrogen in it. And that product that I'm going to apply in the spring, or in the fall, that has a higher amount of nitrogen, I've got to put more slow-release in that. So it's a sliding scale.

So the proposal agrees with the data from Clean Ocean Action. And what's more interesting is, with Barnegat Bay's data on the loading to the Bay, the 465,000 kilograms of nitrogen that goes through the Bay every year, the Clean Ocean Action estimate is that the fertilizer will contribute less than 2 percent to that loading. I can share that information with you as well.

So in the document that Clean Ocean Action provided to you and gave a number for the load into the Bay -- and the Barnegat Bay Estuary Program has a total annual loading of 465,000 kilograms. So it equates to less than 2 percent.

So we've been working in good faith. We've had a very broad coalition -- from the Littoral Society to Barnegat Bay Estuary Program, DEP, Rutgers -- and what is being proposed prior to these amendments is going to be the most restrictive, most progressive legislation in the country. But, more importantly, it's going to be protective of water quality and it's going to achieve the use reductions that we're seeking. If we deviate from that with this other proposal, we're not going to achieve either the water quality or the reductions.

J O H N P O P E: Thank you for having me. And I'll make my comments brief.

I represent the Andersons.

ASSEMBLYMAN McKEON: Identify yourself, okay?

MR. POPE: John Pope from the Andersons.

The Andersons Turf and Specialty Group has been doing business in the specialty fertilizer area, both consumer and professional, for over 40 years. We do business nationally, as well as internationally, and we're involved in many of these conversations in the EU, as well as other places that are more restrictive than New Jersey.

But I have to sit here this afternoon and oppose this legislation, based on three things: One of the things that I'm really concerned about is this 30 percent nitrogen. Chris summarized it very well. But what that does, one of the things in that statement of 30 percent slow-release nitrogen -- does not really allow for new technologies that are coming very quickly. Some person testified a little earlier who indicated that this is an emergency situation. I agree with that; however, the bill is short-sighted because they don't realize that the industry works very hard on new technologies to help protect the environment and the consumers. And that's been one of the focuses the Andersons have taken over the last 15 years. We just, two years ago, won a \$5 million research grant from the EPA to study ways to reduce the exposure of fertilizer in the environment with different technologies. And we're on track to commercialize two of those for the first time in the next two years. And we have also increased the efficiency with some granule technology that we commercialized four years ago.

So I think it's very important for the panel to realize the industry is working towards solutions for these particular situations in the

environment. We haven't sat back on our haunches and said, "Hey, we're not sensitive to this."

The next thing I want to represent is small business folks. There's going to be several of us talking about this, but I want to limit it to one industry -- the landscape distributor industry. And those folks are basically suppliers, information providers; they're the folks who interact with a landscaper who's trying to make a living. And I'm going to use-- There are 57 of those particular businesses here in the state. There are nine companies with multiple outlets, just to give you an idea of the sole proprietors source of the business.

I want to reference Levitt's Plant Food in Parsippany, New Jersey. He's a distributor of mine; we've worked with these folks for a number of years. And Barry was kind enough to share some information that I think you'll find interesting.

By the way, Barry's business is a family business. He's been in business since 1928. He's second generation. He's very green-oriented. He solarized his building here in this past year. Again, the green industry is the green industry.

Last but not least -- if we were to have a shortening of the season to November 15, the effect of the proposal would be that he would lose approximately 15 days of business. And so, on that basis, he would lose about 18 percent of his total sales for the year, which would be about \$200,000. And this would effect, of course, the State of New Jersey in tax and business taxes. He also keeps his staff of nine year-round -- that's folks that work in the building, deliver product. He said to me that he'd probably have to lay some of those folks off. And so, in general,

Assemblyman Rudder asked about a cost, and in the case of these 57 businesses in the state, \$14 million. I know it doesn't sound like a lot of money, but if you're a small business fellow and break it out individually, it's quite a bit of money,

So with that said, I think that we need to consider where we're going with this; look forward as well as where we've been. And hopefully you'll agree with me that I think that we've worked towards, as the green industry worked towards, good environmental stewardship. And I want to thank you for your time again, and have a good afternoon.

KEITH HAINES: Thank you.

My name is Keith Haines. I represent Reed and Perrine, a small manufacturer of fertilizer in Monmouth County. I'm here today to talk about what we believe the economic impact would be on our specific business.

I've been in the green industry for over 30 years. I started out as an applicator, became an owner operator, then worked for a national distributor, and now work for a local manufacturer distributor. We believe that this amendment will send economic ripples throughout the entire green industry.

As I said, our company, Reed and Perrine, is a small, New Jersey-based business that manufactures specific fertilizer blends, and provides retail services and distributions. It is anticipated that almost all of our annual revenue comes from the lawn and landscaping industry, with over 60 percent of our business accounting for straight NPK fertilizers alone. We're very concerned with fallout and the economic impact that this will have on our company.

The amendment to the bill to limit nitrogen to a forced 30 percent slow-release and a cap at three-quarters of a pound of (indiscernible) creates all types of concerns for our business. The law, if enacted, will require us to reformulate almost every single fertilizer blend that we now produce, which will require costly new State registrations for each blend.

It will also require us, depending on when the implementation of the law is -- a loss of inventory of pre-printed bags; and limit our production season, which would more than likely require forced layoffs at our plant, and possibly in our office.

The forced 30 percent slow-release will increase fertilizer costs in an already tough economic environment. Higher costs, we believe, will lead to less sales for us and for our customers. It will require us to carry two lines of fertilizer -- one for the professionals and one for the consumers. There are economic impacts associated with asking our retailers to carry both lines. More important, I feel that the forced legislation will require us to offer an inferior New Jersey blend. We feel that once this is known, that retail customers who live on bordering states will go elsewhere to get their fertilizer.

This law could seriously hurt my companies and potentially put me out of work. So we ask you to please re-look at what you think you're fixing. We don't agree that it holds up under scientific review, and it will have a significant impact on the small businesses of the state.

Thank you for your time.

D A N B E C K E R: Chairman Smith, members of the Committee, thank you for the opportunity to testify today.

My name is Dan Becker. I help manage Becker Hardware in Colts Neck, along with my father and brother. My family has owned and operated this business for 107 years, and we're proud to be in a business that helps our fellow neighbors maintain and improve the conditions of their homes and communities.

I have degrees in environmental science, public health and law, and have worked for public interest organizations. But I'd like to use these few, brief minutes to discuss what the impact of these amendments will be on my small business and my employees, for your consideration.

Fertilizer sales are an important component for our business. We offer high quality, hard-to-find products and great advice to our customers. Our philosophy has always been to encourage people to see that high quality varieties are more naturally disease-and insect-resistant; and to feed their lawns well, but not to overfeed them. A well-fed lawn contributes tremendously to a beneficial environmental situation. One of the hardest parts of my job is actually to convince my customers not to buy fertilizer, or not to buy herbicides -- I don't think they're necessary. I do get into arguments with my customers over this.

Now, once my customers-- They come from all over to talk to me, to talk to my dad, to talk to my brother, to buy our unique products. Once they walk through the door to buy fertilizer, they also buy lawn rollers, barbecues, garden hoses, and other products that affect our bottom line. Fertilizer sales are a very important driver to our business.

While I support this Committee's efforts to protect water quality, I oppose this bill in its current state because I don't think it allows businesses enough time to adapt to changes in the marketplace that the law

will create. Virtually all the lawn and garden products that I sell will be affected by the changes proposed in the latest version of this bill. This means that almost every single item on my floor will have to be reformulated, remanufactured, and resubmitted for approvals, dramatically increasing my wholesale costs.

Under the timeline proposed by the bill, manufacturers will not be able to respond to the changes in time to have products available for sale. And when they do, they may not work to the customers' satisfaction, damaging my reputation, which we worked for over 100 years to build up. Furthermore, I place fertilizer orders far in advance of the selling season. In fact, in four weeks I'm going to Nevada to a trade show to place my orders for fertilizer for 2011. I fully expect, in this terrible economy, much of that inventory will carry over into 2012.

Now, what do I buy, and who do I buy it from? I don't know. In fact, my suppliers also buy their raw materials far in advance to counter volatility and uncertainty in the commodities markets. So how are they supposed to prepare for the future?

This is a hardship to the small retailers like me. The majority of my operating income will be sacrificed. The proposed effective date, in my opinion, is an arbitrary threat to my business and to New Jersey's economy. It can easily be extended to allow businesses time to adapt.

With a few manufacturers-- And we can adapt if given the opportunity. We've been in business for over 100 years, and if you weren't able to adapt, we would have gone out of business a long time ago. With few manufacturers able to meet the deadline and requirements, demand will

far outstrip supply, creating an artificial price bubble for retailers and consumers, further diminishing sales.

I know my customers will still want to use these products. Will they irresponsibly just spray garden fertilizer that's highly water soluble on their lawns? Will they go to agricultural dealers? Will they go to other stores in other states, or UPS their orders? My loyal customers will be confused about what to do, and I may not be able to help them or get the products they need. I will also not be able to present amenable choices to the consumers, and differentiate myself in the marketplace and remain a destination spot.

However, I do expect sales of herbicides and fungicides to increase because lawns will not be as well-fed and healthy. However, that is much to my dismay, because I try to recommend them as little as possible to my customers.

If I don't have anything to sell, I can't employ anyone. A reasonable business like ours cannot remain open long without the strong spring sales which are also being affected by the truncated application schedule. My long-term employees who receive health benefits will lose their jobs, and my business would be in jeopardy. If the deadline is not changed, I can expect to lay off at least 25 percent of my workforce within the first year or two after the effective date, and more later. My own job is also at risk -- which I enjoy. Nothing gives me more satisfaction than helping people achieve their dreams of home ownership, and living in a beautiful house that's safe for them and their family.

I won't be able to pay taxes, and my employees, if they go out of work, they'll be on the unemployment rolls as well. In these challenges

economic times, I support thoroughly evaluating the economic impacts of the proposed laws. It's also important to let businesses have time to plan and adapt. We survived two World Wars, the Great Depression, Sears, Home Channel, Rickel, Builder's Square, Walmart, Lowe's, and Home Depot. It would be a shame to be legislated out of business, and not be able to help many of the customers that I've known since I was a little kid. We've also had productive and honest relationships with some of our suppliers for 40 to 70 years. Why should they be sacrificed?

I think I've made clear how important this issue is to the future of my business, and to potentially the difference between being open and closed.

Based on all these reasons, I respectfully oppose the bill, and ask the Committee to do the same until a workable, enforceable, and reasonable compromise is reached. If we all work together, we can find a solution that can allow us to adapt to meet the demands of the populace and the environment. The easiest and least costly way is to extend the effective date at least three to five years, and to phase the requirements into place to let manufacturers enough time to engineer their solutions.

The economy is terrible, and businesses cannot afford two or three years of losses waiting for the marketplace to catch up to arbitrary legislative demands, which science may or may not support. New Jersey is already a very difficult place to run a business, even in a good economy. Business people like myself have already made too many personal and financial sacrifices to have their businesses legislated away. Please work with us, and we can all adapt if given the opportunity.

Thank you for your attention, and I'd be happy to answer any questions.

SENATOR BECK: Chairman, could I--

ASSEMBLYMAN McKEON: Sure, Senator.

SENATOR BECK: Dan, of course you're in my legislative district.

MR. BECKER: Yes.

SENATOR BECK: So your objection is not so much to the 30 percent, but the time in which you would have to meet the 30 percent. Did I understand that?

MR. BECKER: To me, the first stage is a-- If I don't have time to adapt to any change, I'm going to go out of business.

SENATOR BECK: Sure.

MR. BECKER: To me it doesn't matter what's in the fertilizer; if I can't find a supply or product to sell, I can't exist.

SENATOR BECK: That's fine. And so you know-- Certainly in my conversations with the Chairman and others, we are open to amendments. So this is not the end. That's the reason we took so much testimony today. So there's certainly an opportunity to look at revising certain aspects of the bill. But I guess, just so I understand: You feel that as long as you had time to phase in over -- whatever it was; I think you said three to five years -- that you're not so much opposed to the 30 percent slow-release, but you just want time to do it. And that's not what I heard Chris say.

MR. BECKER: Well I--

SENATOR BECK: Chris said there is no such-- In the definition that we have in this bill, there is no technology that meets that standard. So I don't know. I wanted to make sure I understood Dan Becker clearly: that he's-- You've got a different position.

MR. BECKER: Well, it's not a different position. It's that-- I don't think the requirements are going to help the consumer. I think it's going to hurt -- it could potentially hurt the environment overall if the lawns are not healthy and they can't absorb excess nutrients from the soil. But if I can't adapt and change my business no matter what the law is, no matter what the regulations are, we're not going to be able to continue.

SENATOR BECK: Okay.

MR. BECKER: All I want is enough time to adapt.

SENATOR BECK: Sure; point well taken. And I think that's reasonable.

Chris-- Through the Chair--

MR. WIBLE: Yes, to clarify: The definition of slow-release in the legislation is not accurate, and does not reflect any of the technologies on the market. That just simply needs to be fixed.

SENATOR SMITH: Would you--

MR. WIBLE: But then with--

SENATOR SMITH: I think we've asked for -- the industry for a definition. I would appreciate seeing it.

MR. WIBLE: Yes, and we have--

SENATOR SMITH: Would you send us language, please?

MR. WIBLE: Yes sir, and we have provided that. I provided that to Kevil Duhon. We'll provide that, and that is an APCO definition that is nationally adopted. The second point in that was: Even with the--

SENATOR BECK: Chris, can I stop you? For whatever reason, it's really hard to hear you. You've got to talk directly into the mike, as opposed to Dan who we could hear very loudly. (laughter) I could not hear Chris. I'm sitting here and I can barely hear you.

MR. WIBLE: Once we correct the definition of slow-release, then we have the second issue of the 30 percent, 0.75 concept, and that there is--

SENATOR SMITH: We know that's your issue.

MR. WIBLE: Right, right. So--

SENATOR SMITH: Next speaker.

D A V I D P E A S E: Thank you. My name is David Pease. I'm a golf administrator and Director of Agronomy for the Monmouth County Parks System golf courses. I've been a golf course superintendent for over 30 years. I'm also an adjunct professor at Brookdale Community College, teaching the course curriculum of turf management in the Bioscience Department. I also serve on the Advisory Board for the Monmouth County Career Center, a secondary high school education platform for their turfgrass science and horticultural program.

I am concerned that the bill that is being presented today, with the recent amendments, will forever change the way plant nutrition is applied to our turfgrass areas, in what I consider a negative way. As written, this bill does not show consideration for science-based agronomic programs, and that would be the dynamics of the programs -- dissecting it.

And we don't have time to go into that today, but I mean everything from environmental to traffic issues.

Over the past two years, the New Jersey Green Industry Council Nutrient Taskforce -- which has included representatives from the golf industry -- have been working diligently on developing nutrient management legislation that is science-based, fair, and workable. I believe we need to go back to this proactive effort and get back to legislation based on sound science. I'm here in opposition to the previous bills -- Senate 1411 as well as Assembly 2290 -- for the same reasons, or for the same bullet items of the (indiscernible) slow-release, which (indiscernible) about for a quarter-pound (*sic*) total nitrogen per thousand square feet annual cap. When you're dealing with golf course operations that are looking for high-performance values on the playability performance -- putting through 250 rounds a day, 50,000 rounds a year per golf course -- the health and care of those turfgrass areas may need to require to go in excess of that. So that's a problem. The all blackout dates of November 15, as previously stated, as well as the excessive fines that do not coincide with existing penalties being administered--

The golf course superintendents of this state are highly educated in the field of turf managing -- many possessing bachelor's and associate's degrees in science. They are graduates of institutions possessing programs specifically focused on turf management. (Indiscernible) Penn State, Cornell, Rutgers University, University of Massachusetts, just to name a few.

I'm here to ask full exemption from this bill for the golf sector. The economic impact that will be felt through deficient agronomic practices

as they relate to the turfgrass fertility will result in poor turf quality, playability, and performance issues, as I mentioned, undermining playing conditions which will deter patrons from playing our golf courses.

Golf courses are part of a multi-million dollar industry in New Jersey and are an intricate component of the New Jersey tourism trade, which Monmouth County depends heavily on with respect to its growing economy.

And now I'd like to thank the Committee for your time and consideration.

BILL LAFIELD: Mr. Chairman, members of the Committee. My name is Bill Lafield, and I represent the Consumer Specialty Products Association -- CSPA. CSPA is a national trade association that represents some 240 companies that represent a variety of products. Our membership includes large companies like Proctor & Gamble, 3M, and (indiscernible); and includes New Jersey-based companies like Reckitt Benckiser; and it includes companies that are in the lawn and garden industry, including Scotts Miracle-Gro.

CSPA shares many of the concerns -- or all of the concerns -- that have been voiced here today, but I will limit my comments to three areas related to those that have been touched on a little bit this morning.

The first is increased cost. When you produce any specialty product -- and that's what fertilizer becomes if this bill is passed, because it has specific geographical restrictions on ingredients and a limited marketing environment -- whenever you do that, you increase the cost to manufacture, to distribute, and maintain the inventory of your product. These costs, whenever possible, are passed on to the consumer. The marketplace

dictates price, and we have not done any studies as to what the impact would be; but usually, almost in every instance, increased cost at the manufacturing level results in increased cost at the product level.

The second area is distribution control and enforcement problems. Most manufacturers have national manufacturing, and very few, I think, have in-state production. Which means most of your big fertilizer manufacturers will manufacture out of the state. Distribution is usually made on a regional basis, which means you may have a large retailer that has a distribution center in another state selling into New Jersey. The manufacturer might have a distribution center -- it probably will be on a regional basis, and not in New Jersey.

And thirdly, you have an independent distributor, and sometimes several levels of independent distributors.

All this makes it very difficult, despite the best efforts of the distribution channel, to ensure that the right product, compliant product, is within the state -- particularly for the small operations, mom-and-pop stores that are more likely to use an independent distributor that may be two or three levels down. The opportunity for getting non-compliant product increases. And unfortunately the enforcement level is at the retail level, and while large retailers can probably -- certainly absorb the level of fines that are included in this bill, and they in all probability will be reimbursed by the supplier, the mom-and-pop operation that may use an independent supplier may be stuck with the cost of that.

The third area is consumer reaction to what might be an inferior product. CSPA has a great deal of experience in negotiating content requirements. We represent the consumer products industry in

California, and the VOC -- or volatile organic compound -- regulation, development, and compliance. I think the best example of what could happen here in New Jersey really is related to something that took place in the Northwest in sort of a very related incident. And that has to do with phosphorous in automatic dishwashing detergent. Years ago, the industry negotiated a standard for detergents and also a very low level for automatic dishwashers. Some areas wanted to reduce that even further. And despite the best efforts of the industry, we could not reach a standard that we could live with. So some -- in this case it was local communities -- passed regulations impacting the phosphorous content of automatic dishwashing detergents. What happened was, consumers quickly detected an inferior product and they immediately began going elsewhere to get their product. Sales within the regulated area fell and in surrounding areas they increased.

I think the same thing could happen here. There was some conversation about trying different brands. I think that may happen, but I think it's probably more likely that consumers will go elsewhere. I lived in Bergen County for eight years, and I know how easy it is to shop outside the state.

So I think that's an unintended consequence that could result from this. I think the industry has worked very hard to reach a consensus, and I think the industry would like nothing better than to pass something in New Jersey that would become industry standard, that we could take to other states and actually pass there. But I think, as some of the amendments are proposed, that simply is not acceptable to the industry. And I'm still hoping that perhaps a compromise can be made that will set some sort of a national standard. Thank you.

SENATOR SMITH: Appreciate it.

SENATOR BECK: Chairman.

SENATOR SMITH: Guys, we have to be a little more--

SENATOR BECK: Yes, speedy?

SENATOR SMITH: It's 3:30. We have to be very succinct and to the point.

Senator.

SENATOR BECK: Could I just ask-- From the Barnegat Bay folks, they provided us with all these different universities that recommend the 30 percent or 50 percent as the optimal, best practice-- You're not opposed to that? You're opposed to how it's structured in the bill? I'm really confused on this point. All these universities -- Cornell, everybody else -- is saying -- and I have it right in front of me, and I'm happy to share it with you -- that this is the best practice. So you're saying, this *isn't* the best practice?

MR. LAFIELD: I can only rely on what the R&D professionals and the professionals in that are saying about what makes the product work. And I think there is agreement within the industry that the 30 percent rate that's proposed in the amendment will not work. You heard Chris earlier say that.

SENATOR BECK: Right.

MR. WIBLE: Bill--

SENATOR BECK: I'm going to have OLS give this to you, and maybe you guys can take a look at it and then maybe give me a better answer.

MR. WIBLE: Well, I am very familiar with that, and what is missing there is the application rate.

UNIDENTIFIED MEMBER OF AUDIENCE: Rates.

MR. WIBLE: And that's what we're saying. The easiest example I can give is, if you had a product that they said, "Fifty percent slow-release," if you delivered a half-a-pound -- so you'd have three-quarters of a pound of soluble nitrogen, three-quarters of a pound of slow-release. And everybody would say, "Great -- that's a 50 percent product." I say, "Okay, what if I just have a product that puts down three-quarters of a pound? Can that be all soluble?" And the answer would be yes, because three-quarters of a pound was okay when I combined it with another three-quarters of a pound of slow-release. So that's what's arbitrary about it. You say you can have three-quarters of a pound when you combine it and put down the whole pound-and-a-half, but you can't have three-quarters of a pound by itself.

SENATOR BECK: So how do you recommend changing the language that's in the amendment?

MR. WIBLE: The way that it has been proposed, and has been circulated widely and -- I don't want to speak to the amount of support that it's gotten so far -- but the proposal is, all the products would have some slow-release in them, and then as the application rate goes up, the amount of slow-release goes up. So, at minimum, you have 15 percent in all the products. If you're looking at a low rate, you have 15 percent. If you go all the way up to a pound, you have 30 percent.

SENATOR BECK: Okay. And you provided that in writing to us? Because I have not seen that.

MR. WIBLE: Yes, I have. Yes.

SENATOR BECK: I haven't seen it, so--

UNIDENTIFIED MEMBER OF AUDIENCE: We'll get you a copy.

E W A L D A L T S T A D T: My thanks to all the Joint Committee members for such a long, long day; and I promise I will, in fact, be brief.

My name is Ewald Altstadt. I am an Ocean County, Toms River resident, and have been for over 20 years. And I'm also currently the Vice President of Operations and Support Services for Lawn Doctor, Incorporated. Lawn Doctor is a New Jersey-founded and based company. We maintain our corporate and national headquarters in Holmdel, and we also maintain a manufacturing facility as well. We currently have 63 franchise units that are operating within the states, with 21 business owners taking care of the day-to-day business operations.

This bill, which is -- my concern is, the shortening of the servicing season is going to have a dramatic, economic impact on our small business owners. When you strip away the ability to produce income for your small business in a four to six week window, between 10 and 15 percent of your income, I guarantee you not only will some Lawn Doctor business people go by the wayside, there will also be a bunch of other lawn care operators within the state that will go by the wayside.

SENATOR SMITH: We've heard this before, but a question for you.

MR. ALTSTADT: Yes.

SENATOR SMITH: What date works for your industry?

MR. ALTSTADT: The date that works for us is December 15.

SENATOR SMITH: Thank you. Anything else?

MR. ALTSTADT: Yes. There is a little problem as far as an earlier date, because the dates-- If you'll understand, we do try to get out there when the soil temperatures are at the optimal for fertilization rates. Sometimes it's earlier, sometimes it's later. As a business owner, we have to try to put down the right material at the right time, because anything else is going to cause fallbacks and it's going to cause not the product that the consumer wants.

SENATOR SMITH: Got it.

MR. ALTSTADT: But in addition to that, the labor force impact that this is going to have, because our operators are confined to certain business services that they have to offer, we're going to be forced to lay off people earlier -- that is certainly going to impact not only our businesses of the lawn care operators, but the State of New Jersey as it has been already testified to. So we are very deeply concerned about this shortened season -- extremely (indiscernible).

SENATOR SMITH: Got it.

Is that the-- Anyone else on the panel?

MICHAEL STACHOWSKI: Michael Stachowski, Golf Course Superintendents Association of New Jersey.

With some of these exemptions that we are now provided in the bill, and some of the other definitions in the bill on the professional for hire, pertaining to a golf course superintendent-- Because usually that pertains to the landscaper. We're actually hired by somebody. That would make us a professional for hire.

My question is, if that is the case, and then if there's some exemptions in there for the professional for hire, if we were not that, we would be exempt from that and, if that's the case, we would respectfully request total exemption from this bill.

SENATOR SMITH: Thank you for your comment.

MR. STACHOWSKI: Thank you.

SENATOR SMITH: Anyone else on the panel? Yes, sir.

DAVID CROW: Yes, sir. I'm David Crow and I represent RISE, the national trade association representing manufacturers and distributors of specialty fertilizers and other products. And many of them are in the room.

I'm going to do you all a favor and be mercifully brief. All of my colleagues have made extremely good points. But I would just like to add two or three, and they will be very brief.

One is that a well-regulated turf creates all kinds of air conditioning and beauty, holds nutrients, and holds water. When I was running this morning, I ran six miles and I ran all through the neighborhoods and I noticed that several of the houses that were for sale had terrible lawns. And I remember looking at them and thinking, "They're not going to sell. There's dirt on the sidewalk, there's some trash everywhere." A well-regulated lawn is a very, very, very valuable environmental thing.

Second is, run-off from lawns is a miniscule -- almost non-existent -- part of what's going on in the Bay. And I'll repeat that: we have science to show the run-off is miniscule. And, if it's done right, it would even be less. Well-regulated lawns don't run off.

The third point is, if you look at the decades of agronomic study, water quality research, and Rutgers' Best Management Practices -- which I think all of us are willing to look at -- they won't support this bill. They will support a different standard that I hope we'll look at.

So I just want to say that we're in opposition to the language -- both bills, S-1411 and A-2290 -- but very hopeful that the Assembly and the Senate, and based on what I've heard today, will sit down with us and try to come to something reasonable.

Thank you very, very much for your time.

D O M I N I C K M O N D I: Hi, thank you, Chairman, Senators, Assemblymen. I'll also be brief and refreshing, in that I'm going to quickly bring up something other than 30 percent.

I've got something else for -- one second here -- and that is the-- I (indiscernible) the New Jersey Nursery and Landscape Association. We represent about 450 small businesses from nursery production to lawn applicators, (indiscernible) contractors, and garden centers.

One component of this bill, which Senator Bateman mentioned in the beginning part of this session, is the fines. The fines as they're written are a little bit excessive compared to the work that's being done. To use one example from a contractor in North Brunswick, Middlesex County, that I spoke with this morning: He charges, for an average residence in North Brunswick, \$45 for fertilizer application. These fines, essentially, would be upwards of 100 times what he gets for one application. And because of some of the subjective nature of the potential for a fine -- being that it surrounds weather conditions and things like that -- there's an opportunity for accidents to happen by the contractor. Fines are going to

happen, and it's literally at a rate where it could put some people, some small businesses, out of business.

I'll leave it at that. Thank you.

ASSEMBLYMAN McKEON: That's it?

UNIDENTIFIED MEMBER OF AUDIENCE: Everybody's available for questions.

ASSEMBLYMAN McKEON: Good, that's fine. I don't think that there'll be any. (laughter) All right.

We are running into a practical problem. We have a lot of other-- We have members who have other commitments. No kidding, I have literally 30 groups that are in favor from various environmental advocacy groups, and some individual citizens. I almost feel guilty about calling out names. Jeff, you have to count two Mississippis-- But whoever the first five are who get up here, if you really feel you'd like to say a few words (laughter)--

UNIDENTIFIED MEMBER OF AUDIENCE: (indiscernible)
(laughter)

UNIDENTIFIED MEMBER OF AUDIENCE: There's blood in the water.

ASSEMBLYMAN McKEON: There you go -- no pun intended.

JACK CASEY: Can I say something? It's totally different.

ASSEMBLYMAN McKEON: Let me just mention something to my friends in the environmental community. If the panel is about to act favorably, we're going to end up putting this off, because we're going to lose enough people for a quorum.

MR. CASEY: Well, everybody knows the environmental implications. I had a conversation with Councilman George Wittmann of Toms River. And so far all the discussion has been about everything that's going to go into the Bay -- you know, quick release, short release, warm release -- it doesn't make any difference what kind of release, it still goes into the Bay. But what no one else has addressed is maybe there should be an option on how to get it out of the Bay.

Now historically--

ASSEMBLYMAN McKEON: Can I just have your name for the record, sir?

MR. CASEY: My name is Jack Casey.

ASSEMBLYMAN McKEON: Thanks, Jack.

MR. CASEY: Bay Head Shores Association. I don't want to talk about all the jellyfish and stuff like that -- we already know all about that.

ASSEMBLYMAN McKEON: We know it's there, Jack.

MR. CASEY: Okay. So if you go way back, there used to be an inlet just east of here, which was the third inlet. George Wittmann, who is a Councilman here in Toms River, he and I were kicking around an idea that part of the big problem in the Bay is that it doesn't flush. You've got inlets separated by a huge distance. We talked about something that you could put in -- culverts -- possibly through Island Beach State Park where the inlet used to be, and you would get a tremendous flush of water which would alleviate all the build up of this toxic material.

We got stimulus -- the great stimulus-and-bail-out country we live in now. Certainly if our voices were loud enough, I think that it would

be a great job creator and would definitely add to the environmental part of the Bay, just by flushing it out with some added culverts. I'm talking about getting the stuff out. Instead of worrying about what's going to go in, because eventually I don't really think that the effect is such a long-term thing of what's going in -- the effect is going to be minimal. And I think that if you focused a little bit more on getting rid of what's in there it would be a big advantage. Thank you.

ASSEMBLYMAN McKEON: Thank you very much, sir.

MR. TITTEL: I'll be real brief.

Thank you very much for all the work that's been done.

ASSEMBLYMAN McKEON: Everybody's on the one-minute rule. I'm literally losing my--

MR. TITTEL: Jeff Tittel, New Jersey Sierra Club.

This bill has a lot of public benefits not just for this Bay, but for the drinking water supply for the people of New Jersey, because nitrates are the major source of pollution in our drinking water wells. A third of our wells test for high levels of nitrates -- they're a major cause of eutrophication in our streams and rivers and reservoirs. When you kill bacteria in our water supply -- that really grow because of the nutrients in that water -- you get die-offs like trihalomethane and chloroform and other things. So this bill saves the Bay, but, more importantly, it helps protect drinking water in everybody's district throughout the state. Thank you.

ASSEMBLYMAN McKEON: Jeff, thank you.

Tom.

MR. FOTE: I'll talk for the fishing industry, because that hasn't been talked about at all at this whole hearing.

I represent commercial recreational fishing, and I'm also the Commissioner of the Atlantic States Marine Fisheries Commission. We're seeing this disaster up and down the coast. If Scotts wanted to do this, they should just make it 30 percent -- they wouldn't have any problem. I'm a business major. You could change products immediately. If you can't shift products by barcodes that go to the right stores -- ShopRite, things like that -- you were ridiculous. I sit here and listen to all this stuff. I just had to get vented.

I sat up here five times in the last year, basically telling commercial fisherman -- as a hearing officer, because I'm here representing the Commission -- putting them out of business, because of what's happening in the bays and estuaries. (applause) Nobody's looking at that business that's going out of business. (Indiscernible) millions of dollars in the State of New Jersey. (Indiscernible) which is \$760 million, is what the Commission is saying. The (indiscernible) fishery, the recreational fishery are worth \$1.3 billion.

And that's my minute.

ASSEMBLYMAN McKEON: Tom, thank you.

J E F F C O L E Y: Yes, hi, my name is Jeff Coley. I live in (indiscernible)

I've been on Barnegat Bay for the past 60 years -- I'm 61 years old now. I represent John Q. Public on Barnegat Bay.

You guys know that the Bay is sick. I've been hearing this for the last six hours. All this testimony discussed about this and that. The studies have been out for 20 years. You guys are our leaders-- do something. Do what they say -- Save Barnegat Bay. They've been studying

it for awhile. You need to pass this bill -- that's the bottom line. Look at all-- You even said it, Assemblyman McKeon: all the billions of dollars that come down here. People aren't going to come down here anymore. The barrier islands -- they're going to be shot -- everything. Pass the (indiscernible)

ASSEMBLYMAN McKEON: Sir, thank you for your passion.

UNIDENTIFIED MEMBER OF COMMITTEE: There are a couple of Freeholders you need to talk to.

MR. PRINGLE: David Pringle, New Jersey Environmental Federation.

I have in front of me a Rutgers Cooperative Extension document written by Dr. Heckman and Dr. Murphy. It says 0.25 to 0.5 pounds of nitrogen per thousand square feet. It also recommends a total of 1,000 square feet. So that's anywhere from 25 to 75 percent slow-release.

If you ask folks here, how many people mow their lawns much after November 15? Very few. Enforcement in this bill's already been compromised up the wazoo. I won't list all of them, other than to say the enforcement-- This bill won't be enforced because it isn't civil administrative penalties. So if anything, the bill should be strengthened.

We talked about the enemy being perfectly good. Let's make sure the less good and the worst isn't the enemy of the better. Thank you.

ASSEMBLYMAN McKEON: Thank you very much.

Cindy.

MS. ZIPF: Thank you. Thank you, Chairman.

I have a very short introduction to say, and then I'm going to turn it over to the experts. Many of the people in the room -- the

environmental organizations -- have depended on our legal team and our science team for the bill. So I'd like them to be able to speak to some of the things that have been said.

One of the things that has been said over and over is that this would be the most stringent bill in the country. Well, I think we ought to be damn proud of that, because we need the best, strongest bill (indiscernible) (applause) because we're the most densely populated state in the country -- number one. And number two, because of a national study that was done, we know that the back bays of New Jersey -- the marine waters -- are some of the worst in the country, which is why we need this bill.

And I'll now turn it over to--

ASSEMBLYMAN McKEON: The Prince of Darkness, the lawyer. (laughter)

It's okay. We're almost done. Thank you.

Paul -- you've been amazing. Thank you.

S E A N T. D I X O N, ESQ: My name is Sean Dixon. I'm the coastal policy attorney for Clean Ocean Action, and thank you for letting us speak here.

Two important things to know, real quick -- just two: is that one, economic ripples as have been stated here -- which would happen, occurring after this bill passes -- are actually economic signals. We all know in any good market, as soon as you get something and you say that this is not good enough for our state, then the people who make the product try and compete for the new business. So while Dr. Murphy did point out that there would be some initial consternation among consumers, people would

put more down on the ground, this would end up in a long-term benefit to the entire system.

And second, on the 30 percent number, it's literally been recommended for the last four hours. It's something that is vital, and it's something that is not, as Scott's has stated, reliant on the rate that you're applying. These are two separate issues, according to almost all of the recommendations from universities all around New Jersey, and Rutgers. We need 40 percent -- 30, 40, 50 or 70 percent slow-release -- no asterisks -- and a total nitrogen.

ASSEMBLYMAN McKEON: Thank you.

HEATHER SAFFERT, Ph.D: I'm Heather Saffert; I'm a staff scientist with Clean Ocean Action. And I would just to respond to the 15 percent study that was cited.

For that one study, for the one product, it did result in a substantial reduction compared to the fast-release product. I'd like to point out that the 95 percent slow-release was even lower; however, there are other studies. Another study of 11 percent total-release product indicated that it behaved similarly to the fast-release product, with high leeching rates in some conditions. And so I'm concerned that if we don't have sufficient slow-release in the product, we're not going to have a substantial change from what we have right now.

SENATOR SMITH: Thank you.

MS. ZIPF: Thank you, Heather.

SENATOR SMITH: Go ahead.

MR. O'MALLEY: Doug O'Malley, Environment New Jersey. Environment New Jersey represents 20,000 citizen members across the

state. And I want to, obviously, thank Dr. Kennish and Dr. Souza for their testimonies regarding the 30 percent requirement.

I want to talk about three numbers: 19 percent, 33 percent, and 3.5. Nineteen percent was the impervious cover in the Barnegat Bay Watershed in the early 1970s; 33 percent is where we are right now. That's why we're in a crisis. Three-point-five -- that's 3.5 billion -- that is the amount of money that's generated through the tourism economy here in the Barnegat Bay.

ASSEMBLYMAN McKEON: Doug, thank you.

Assemblyman Gusciora has to absent himself -- 15 minutes ago.

ASSEMBLYMAN GUSCIORA: I have to leave in 10 minutes.

ASSEMBLYMAN McKEON: Fifteen seconds.

DR. DeVITO: Yes -- Emile DeVito, New Jersey Conservation Foundation.

Assemblywoman Coyle asked Dr. Murphy earlier if 30 percent would work on most lawns. He said it would. He said it might be that it might not work on lawns that were not healthy, with compacted soil. So if people found that the 30 percent wasn't working, that would be indicative of poor soil. All day long you've been trying to fix soil with all the other bills, so for people that the 30 percent doesn't work, they could actually have their landscapers and the fellow at the hardware store and everybody else tell him how to fix their soil, and that's what we're trying to do anyway.

ASSEMBLYMAN McKEON: Okay, thank you all very much.

Anybody else who has signed up -- your names will be on the record, both for or against -- and the fact that you were here. If you have any written testimony, as this isn't the final vote today, please submit it to

the Committee and it will be provided to all members of this panel and all members of the Legislature.

With no further testimony, I'll entertain a motion to move the bill, as amended.

UNIDENTIFIED MEMBER OF COMMITTEE: Move it, as amended.

UNIDENTIFIED MEMBER OF COMMITTEE:
(Indiscernible)

ASSEMBLYMAN McKEON: Moved as amended.

We'll take a roll call on the part of the Assembly.

And any member who would like to speak about their reasons for or against -- again, please use the chance to do it.

MS. HOROWITZ: On Assembly Bill 2290, with the Assembly Committee amendments, Assemblyman Rudder.

ASSEMBLYMAN RUDDER: Mr. Chairman, members of the Committee.

At this moment-- I've heard testimony on both sides, both very compelling. I have some concerns with some portions of the legislation. I've heard that both Chairmen mention that this is not the last step -- that there's going to be many more steps involved. I want to be a part of that discussion. I've offered draft amendments -- I'm not going to move them today, but we'll want that to be part of the discussion as well.

So at this moment, I'm going to abstain.

MS. HOROWITZ: Assemblywoman Coyle.

ASSEMBLYWOMAN COYLE: My family has had a house in a town very near here for well over 40 years. I cannot tell you how many

times I sailed or kayaked on the Barnegat Bay. I have watched the visible decline, and I never swim in the Bay. To the woman who swims -- God bless you. I never swim in the Bay. The visible decline in the Bay -- it's obvious; it's -- frankly, it's more than obvious. And we need to do something about the Bay.

Though what's going on today, there are-- The amendments that we have before you -- I don't even think I can support them, quite frankly. I really applaud Senator Smith and Assemblyman McKeon on their efforts here. It's very difficult to draft legislation with such opposing sides and such surrounding controversy. I'm very concerned about the impact on the economy, and I just think we need to reach a little bit more balance there, and I really do believe we can do that.

I am going to abstain until I see what final -- what we do here, how we finally amend this bill. Thank you.

MS. HOROWITZ: Assemblyman Mainor.

ASSEMBLYMAN MAINOR: Let me just first-- I come from a town where there is no Bay next to me. I come from a town where there's a lake in the park, so I've learned a lot today.

So with what I've heard today, I must vote my conscience, and I have to look at the health issues. So I vote yes. (applause)

MS. HOROWITZ: Assemblywoman Lampitt.

ASSEMBLYWOMAN LAMPITT: I want to thank Senator Smith and Assemblyman McKeon, again, for the efforts that they've taken to get us to this point. We are talking about a few, last, remaining issues -- there were a vast number of other issues that have been worked out in a collaborative basis.

I do have a couple, still, concerns about it, and I brought those concerns up to both of the leading prime sponsors on this particular bill.

I'm going to vote it through today; I'm going to say yes today, but I think -- through my topics of my questions that I've asked, I've brought out my concerns that I still have. And as we're all on the Environment Committee, we all care very much about what happens in New Jersey, and know the fact that New Jersey is our number one pride, and we all work very hard to continue to make it so. Thank you.
(applause)

MS. HOROWITZ: Assemblyman Barnes

ASSEMBLYMAN BARNES: Yes. (applause)

MS. HOROWITZ: Assemblyman Gusciora.

ASSEMBLYMAN GUSCIORA: I also wanted to congratulate the two Chairs for bringing us all together, and the probing questions that we've had. This is a difficult issue, but I've been a Benny down here -- down the Shore (applause) since the Chatterbox was around. (laughter)

ASSEMBLYMAN McKEON: You don't look that old.
(laughter)

ASSEMBLYMAN GUSCIORA: And I've also seen the decline in the Barnegat Bay, and we need to do all we can to preserve it. We also need to make sure that there's a healthy economic environment, but I think this is a step in the right direction. I think we'll probably make improvements to the bill, but for the time being, I vote yes. (applause)

MS. HOROWITZ: Assemblyman McKeon.

ASSEMBLYMAN McKEON: Yes -- first and foremost, thank you so much to the esteemed members of the Assembly Committee on the

Environment -- you worked incredibly hard. Peter -- you're on vacation. You told your wife you'd be home in an hour, right? (laughter)

ASSEMBLYMAN BARNES: I told her--

ASSEMBLYMAN McKEON: You told her you went for ice, right? I'll be back in an hour. (laughter)

Reed is off to try a case. And between Jersey City, Passaic, Somerset, and Camden -- or Cherry Hill -- thank you for being here. You guys are amazing, and I care about you all.

I said thank you very much to partisan and nonpartisan staff: Paul, who is with Senator Bateman's group -- you were--

SENATOR SMITH: You were outstanding.

ASSEMBLYMAN McKEON: You were great (applause) and if you could ever hang out with a Democrat in Essex County, I'll take you. (laughter)

Let me just mention the Democrat thing, because this really-- One or two people made partisan comments; it shouldn't be that. We're all here -- mixed parties -- from every corner of the state. We are all so in this together. And I include in that the industry. You were wonderful, and what the industry did, I'll repeat it: On phosphorous -- I think that you've worked very hard with us, getting to the point where you have. The applicator industry -- we're at November 15. I don't think any of us are smart enough about adding a week or 10 days, one way or the other, if it's going to mean that much to your business and people's jobs and income. And we'll work with that before we deliver something to the Governor's desk, in a bipartisan way that will get his signature with a smile.

And in a similar way, with the percentage of slow-release, you have some great scientific minds that have varying views on things. I think 30 sounds pretty right to me, especially with what I'm hearing from Rutgers, who come as even-handed as you could be in these circumstances. Might there be anybody who is smart enough to say, "What's the difference -- 25 percent." If there's something that could continue the industry's progress pretty close to that 30 number, that will bring you on board, I know as a prime sponsor, with all of my colleagues, we'll keep an open mind to that.

To the environmental advocates: You're all my heroes. The people who are up here will come and go, you continue to do it, year in and year out. I'm proud of you for the effort that you put together -- 10,000 different cards that have come from people from around the state -- the effort that you put forth today, the dignity that you conducted yourselves with, and the passion that you feel. We need you.

So I'm really happy that a year later, that we can come back here, release a strong bill -- number one in the nation -- keep an open mind to getting it to the point that we can all do it collectively, together. And with that, I proudly vote yes. (applause)

SENATOR SMITH: Brevity is the soul of wit.

I echo the comments of Chairman McKeon.

Motion is released by Senator Gordon.

SENATOR GORDON: Yes.

SENATOR SMITH: Seconded by Senator Smith.

Senator Beach left his vote in the affirmative to release, but he did indicate that he had concerns which he hoped would be addressed

between the time that the bill is moved on the floor of the Senate. And I think we all know what those concerns may be, but he did want to help the process along. But he has not committed himself to vote for the bill on the floor if it's not in absolutely better shape.

Would you take a roll call vote, Judy.

MS. HOROWITZ: On Senate Bill 141, with Senate Committee amendments, Senator Beck.

SENATOR BECK: If I could just take a moment.

I have some very-- I have some serious concerns in light of our testimony. This is-- Indeed, I am the co-prime on this legislation, and would not have signed on unless I felt very strongly that this Legislature has to take action to fix the very serious, critical issue of our waterways.

That said, I frankly am more concerned with the amendment than I am with the core bill. And I actually was kind of hoping that we were going to vote on them separately.

There are some serious things that are outstanding: the limited data we have about why we chose our date in November. I think we need to take a look at that and revisit that. I think we need to have one standard, both for consumers and professionals. I thought the comments about tying our effort to water quality improvement over time, and the fact that we may need to even look at stricter standards if we do this and we don't see improvement in water quality, we may need to revisit and actually do something stricter.

The issue of golf courses is enormous; it's not a small issue. We certainly have to tackle that. The penalties are something we have to address. The fact that our erosion control standards conflict with what

we're asking for in this bill, and the fact that new technologies aren't being considered.

And, of course, the slow-release, I have to say-- I don't even know if I'm opposed or in favor of it; I really feel like I need more information. I really need a lot more from everybody involved. As many questions as I asked, I still feel that I don't have clarity on that issue.

So I really do-- I know that the Senator and Assemblyman have invested not just a couple of meetings, but really two years worth of work in getting to this point. But I'm going to abstain today, because I feel that, really, if we're going to move amendments to this bill, I would prefer to move comprehensive amendments and not do some now, and do some on the floor -- but one set of amendments that address what I think are critical issues for our environmental folks who talked about the fact that it's great you're doing this, but if it doesn't improve the water, then I don't know what the point is. To our folks who said maybe having two standards is a little -- doesn't make a whole lot of sense, logically. So I'm going to abstain and look forward to supporting it on the floor with amendments that truly address what I think are outstanding issues.

I just want to congratulate Senator Bob Smith, because I know that he personally, along with Assemblyman McKeon -- they personally have invested hours and hours of their time to try to resolve some of these things, and I guess we just have a little bit more time to spend here. So I'm going to abstain.

MS. HOROWITZ: Senator Bateman.

SENATOR BATEMAN: I'd like to take an opportunity to first of all to thank the Chairmen. I know that, over the course of the past year

or two, both Assemblyman McKeon and Senator Smith have brought the stakeholders together and spent hours and hours of time to try to resolve these issues. And there's no question, I think everybody up here takes our responsibilities as Legislators very seriously and we care about every group; we care about all New Jersey residents.

And this is one of those difficult bills where you have to balance all the interests. And our concern -- I think there are many questions that need to be answered. I think that this is by -- and in all due respect to the sponsors -- this bill is not a perfect bill. I have many questions, and I'm not one-- I'm always trying to help the small businessman. I'm concerned about that.

But I also think that time is of the essence, and that if we don't act, and if we don't move a bill forward, we're going to lose valuable time. Because I think we all want to try to save Barnegat Bay, it's a very valuable resource. And I'm not happy with the final result, but I also have trust in both sponsors, and both Chairmen, that we're going to continue the dialogue. Because there are a number of amendments that I would like to see, there are a number of questions I would like to see answered. But I also think that it's very important, so I am going to vote yes to release.
(applause)

MS. HOROWITZ: Senator Beach has left a yes vote.

Senator Gordon.

SENATOR GORDON: Thank you. Let me add my thanks to the Chairs of this Joint Committee for their work on this bill. And let me also thank everyone who appeared before us today. It was extraordinarily helpful for us to get this kind of input.

All of us up here are in the business of striking a balance between competing interests, and that's what we do in democratic societies. And when it comes to environmental policy, it's usually a very tough balancing act between economic interests and the environment. And that is exactly what we have here today.

I'm reminded of the debates I heard when I first became interested in environment policy, which were about eliminating DDT and other pesticides from the marketplace. We were-- Our national symbol was on the endangered list because the eggs were too thin because of the DDT. That was deemed an emergency. We responded to that, and now all the eagles are back.

I do believe we're facing an emergency here. We're keenly sensitive to the economic concerns, but I do think we have to act, as we have in the past on comparable issues, so I'm going to vote yes. (applause)

MS. HOROWITZ: Senator Smith.

SENATOR SMITH: It's my great pleasure to vote yes, and have the bill released from Committee. (applause)

I want to thank all the Senators and the Assemblymen who participated today, and all of you people who came today and let us know what your views were. Hopefully, at the end of the day, we're going to have an even better bill than we have now. It may be a pretty good bill, but there are some changes that are necessary.

Thanks for coming.

John, we need adjournment.

ASSEMBLYMAN McKEON: Bob, meeting adjourned.

Thank you -- you're the best.

SENATOR SMITH: Back at you.

(MEETING CONCLUDED)

APPENDIX

Healthy Functional Soils-Sustain Healthy Communities

David B. Friedman, District Director
Ocean County Soil Conservation District
New Jersey Joint Legislative Hearing
August 12, 2010

Good morning. I am David Friedman, District Director, Ocean County Soil Conservation District (OCSCD). We are one of fifteen Soil Conservation Districts throughout New Jersey established through the NJ Soil Conservation Act of 1937 charged by the Legislature to conserve the soil and water resources of the State. I would like to begin by saying in my professional career of thirty-five years I have not seen such strong support for soil health. This is truly inspiring and we are grateful for your efforts.

Functional soils are the foundation of every healthy community. It is the structure of our soils which sustains clean water, abundant wildlife, lush forests and wetlands. Soils in the Barnegat Bay Watershed are characterized as sandy textures. Within a forests' natural setting pine needles and leaves fall to help construct an organic soil mattress, allowing rain to filter through and encourage roots to grow deep, in turn creating air channels from the surface to several feet below. Roots become a part of a subsurface circulatory system, circulating air and water all the way to the bay. There is no process which can be conceived by man that can in any way improve on the functions of this naturally formed soil mattress.

Field measurements by the Ocean County Soil Conservation District (OCSCD) and USDA-Natural Resources Conservation Service USDA-NRCS demonstrated in the natural undisturbed forests the infiltration rates are from 6 to 15 inches per hour. Following land disturbance activities measurements confirmed that construction techniques create long-term damage to vital functions in soils, reducing infiltration rates to .01 inches per hour. Heavy equipment used for clearing grading areas permanently destroys the physical, chemical and biological functions in the soils resulting in impenetrable soils that prevents root development, substantially increasing runoff and nutrient transport.

Ocean County Parks Department has experienced restricted use of parks and athletic fields due to soggy conditions because the soil is no longer able to drain properly. We see standing water in stormwater basins that create breeding grounds for disease carrying insects. Homeowners routinely call the County Cooperative Extension and the Soil Conservation District offices complaining about difficulty to maintain lawns and landscapes because the soil is compacted and can no longer function as in its natural state. Roots grow shallow warranting endless irrigation and depleting water resources. The

wide-spread use and over use of chemical fertilizers accumulates in the soil, leaches out into the streams and bay fertilizing everything in its path, including a variety of algae. When these organisms die off they set in motion a chain reaction know as eutrophication. These greenhouse gases deplete the ozone layer and increasing temperatures accelerate the loss of organic matter in the soil, reducing the ability to store water and nutrients.

A new trend is to treat stormwater runoff through green practices so that the natural hydrology is maintained following development. This concept of using green infrastructure is commonly referred to as low-impact development. Within the Barnegat Bay Watershed this green infrastructure are the pores in our undisturbed soils where all the vital functions take place including the exchange of gases, storage of water and plant nutrients. It is these soil pores that serve as natural stormwater utilities, and if we improve the management of our soil resources, our lawns, parks, and other open spaces could provide free stormwater management services. Unfortunately, some Best Management Practices are ineffectual due to construction techniques which severely alter the soils ability to function. Dr. Jim Murphy, Turf Specialist, Rutgers University recently concluded at the DEP Best Management Committee "the number one problem on turf and athletic fields across the state is poor soil management and soil compaction".

Three years ago Assemblyman Dancer and former Assemblyman Fisher, (currently Secretary of NJ Department of Agriculture) introduced legislation to recognize Downer Soil as New Jersey's official state soil. I would like to ask your support in reintroducing this legislation. Our plan is to utilize existing environmental education programs in our schools to educate the public about the importance of sustaining our green infrastructure. At a glance this may not seem significant, however, when we educate our children, we educate a new generation of students so their parents can become informed as well.

Clean water, abundant wildlife, healthy forests and lush wetlands, are obtainable within every community if we make wise use of the one resource that sustains them all--- that resource is healthy soil.

Thank you for your continued support.

David B. Friedman
District Director
Ocean County Soil Conservation District
714 Lacey Road
Forked River, NJ 08731

The conclusions from healthy soil related research are that:

- Native (healthy) soils contain deep plant root growth, high evapotranspiration and surface water infiltration and detention.
- Disturbed soil impacted by human activity, compaction and development has limited organic life, promotes shallow root growth, has low rates of infiltration, and high surface runoff and erosion.
- Data demonstrate the positive effects of soil enhancement on remediating the cumulative effects of surface runoff created by urbanization.
- Data support the pollutant-binding properties of compost use, including suspended solids, turbidity, some metals and chemicals.
- Data demonstrate the effectiveness and the duration of the effectiveness of compost berms in controlling turbidity and total solids in runoff during construction activities.
- The use of compost for erosion and sediment control is beneficial and effective.
- Mulch and seeding results in 80% to 90% sediment reduction on construction sites.
- Compost berms can be more effective than sediment fences in controlling total solids in the stormwater runoff from a site. Additional research is needed to provide data on the ability of compost berms to control turbidity
- Compost soil amendment can decrease the runoff from a site, in addition to providing benefits to vegetation. Compost soil amendment may also significantly reduce the size of any required water detention facilities.
- Data are limited relating to the effects of compost on compaction and engineered fills; more research is needed. Additional studies are needed to better document the benefits of compost amendment of soils on slopes.
- A significant amount of expense can be reduced on construction projects when incorporating low impact and healthy soil practices.

(From: Restoring Soil Health To Urbanized Lands
The Crucial Link between Waste Prevention, Land Use, Construction, Stormwater
Management and Salmon Habitat Restoration
David Kunz, MRP, and Dennis Jurries, PE, of the Oregon Department of Environmental
Quality, 2001)

When to Amend?

Construction Sequencing for Soil Protection and Restoration



The goal: healthy soil under every landscape

Washington State DOE's stormwater BMP T5.13 "Post Construction Soil Quality and Depth" requires that every construction site be left with at least 12 inches of un-compacted soil, and that the upper 8 inches have sufficient organic content to support a healthy landscape and soak up most rainfall. The State BMP (available with a how-to manual at www.BuildingSoil.org) lays out four options for soil management on different areas of sites. Soil best practices fit into construction projects from start to finish.

Design phase: plan to preserve or restore soil

Disturbed soils must be restored (see options at right), so it's better to preserve and protect existing soil and vegetation where possible.

- Identify trees and other vegetation to be preserved.
- Flag and fence off soil areas that will be protected from compaction and not graded. Pay attention to tree root zones (typically twice the width of the tree's canopy or "drip line").
- Once grading plans are complete, make a "Soil Management Plan" that identifies soil areas to be preserved, and compost or amended topsoil and mulch that will be needed to restore the soil areas that are disturbed during grading or compacted by equipment. (See the *Building Soil* manual for a blank Soil Management Plan form, and easy calculator for soil materials.)
- Dig a few holes around site to examine soil quality. Soil tests can determine how much amendment is needed. Or just plan to use "pre-approved" rates.

Land clearing and grading: reuse soil and organic materials

- Land clearing debris can often be chipped on-site and used immediately as erosion-control cover, or stockpiled for re-use as landscape mulch at the end of the project. (Don't mix un-composted debris into the soil – it's better used as mulch.)
- Root zones of trees should be fenced, and protected from compaction by equipment traffic wherever possible. Where traffic is unavoidable, a 6 inch layer of coarse wood chips (hog fuel) or quarry rock will reduce root damage.
- Topsoil removed during grading can be stockpiled and covered with wood chips, plastic, or breathable fabric.
- If amended topsoils will be placed at the end of the project, grade 8-12 inches below finish grade to allow for placing them.

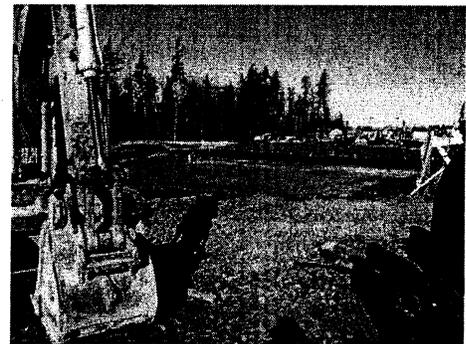
Site prep and construction traffic:

the cheapest messes are the ones we don't make

- Lay out the roads and driveways, and get the rock bases down for them as soon as possible. Then keep as much construction traffic as possible on the road base, and off open soils. Besides reducing soil compaction this helps with erosion compliance, and with site safety by keeping rolling equipment on a firm base.
- Maintain barriers to keep construction traffic off soil, vegetation, and tree root zones that are being preserved.

Four Options for Soil Management

- 1) **Leave native vegetation and soil undisturbed**, and protect from compaction during construction. This is the least expensive option, because undisturbed soils don't have to be restored.
- 2) **Amend existing site topsoil or subsoil with compost** to meet the "soil organic matter" requirements. (Pre-approved rates are 3 inches of compost tilled in to an 8-inch depth for planting beds, or 1.75 inches of compost tilled in 8 inches for turf areas. Alternatively, custom rates may be calculated from soil tests.) Scarify the subsoil, to provide 12 inches of un-compacted soil depth.
- 3) **Stockpile existing topsoil during grading**, and replace 8 inches of topsoil before planting. Amend if needed to meet the organic matter requirement, and scarify subsoil to break up compaction to a 12-inch depth.
- 4) **Import a topsoil mix that meets the organic content and depth requirements.** Topsoil mixes around 40% compost by volume meet the 10% organic matter requirement for planting beds. Mixes around 25% by volume compost meet the 5% organic matter required for turf areas. Scarifying to a 12 inch depth, or tilling in some of the topsoil, will help water and roots to penetrate the subsoil.

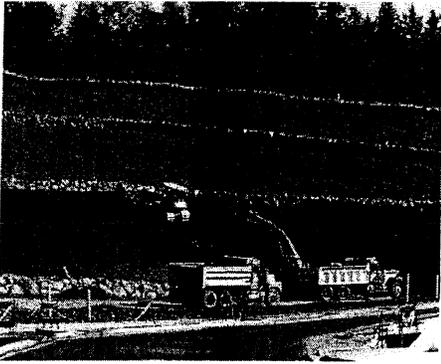


At Redmond Ridge, Quadrant Homes fences and protects areas of existing forest, as an amenity and stormwater filter. They chip land clearing debris. Then they grade to 12 inches below finish grade, stockpiling topsoil for reuse. Next step is to place rock pads for roads and driveways.

Building Soil

Foundation for Success

Learn more at www.BuildingSoil.org

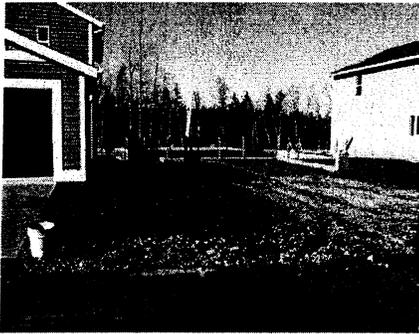


Erosion control and soil quality – a two-for-one with compost

- Required temporary erosion and sediment control (TESC) can be accomplished by spreading a “blanket” of 1-3 inches of coarse compost to protect open soils during construction. At the end of the project, the compost can just be tilled in to create a healthy planting soil, or planted through on slopes too steep to till, saving the expense of removing erosion covers.
- Compost berms or socks often work better as perimeter sediment controls than silt fence, straw bales, etc. Again, the compost can just be knocked down or tilled in and left on site. See *Erosion Control with Compost* at www.BuildingSoil.org.

Reducing compaction: just rip it

- At the end of the project an inspector should be able to push a 3/8” metal bar 12 inches into the soil just with body weight. Compaction could be from an existing hardpan layer in the subsoil (found during the design phase), or caused by unavoidable construction traffic over an area.
- De-compaction can be done with a cat-mounted ripper, tractor-mounted disc, or tiller, before or after placing topsoil or compost. Scarifying through the first lift of applied soil or compost will mix it into subsoil, so that roots and water will penetrate deeper.



Placing and protecting amended topsoils

- Topsoils (from stockpiles or off-site) should be amended with compost as needed to meet the minimum organic matter requirements in the WA State “Post Construction Soil Quality and Depth” BMP T5.13 (see the *Building Soil* manual). The default pre-approved rates are 3 inches of compost blended into the upper 8 inches of soil for planting beds, and 1.75 inches of compost blended into 8-inch depth for turf areas. Custom rates based on soil tests may be lower, and save money on larger sites (see *Building Soil* manual).
- Amended topsoils can be placed as soon as building exterior work is complete, if contractors understand that vehicles must stay on road and driveway pads to prevent soil compaction. Compost/soil blends provide good erosion protection.

Amending soils with compost on-site

- Rather than purchasing “topsoil” of unknown quality (weed seeds or too much clay are common problems), it's often more cost effective to amend existing site top or sub-soils with compost to restore final soil quality. Because Washington composting facilities must follow strict State quality regulations, compost quality is more dependable than purchased soil.
- If compost blankets, berms, and socks have been used for site erosion and sediment control during construction, just till the compost at least 8 inches into the soil before planting. Avoid tilling through tree roots.
- When planting turf (by seed or sod), a pass with a rock rake may be needed to create a smooth seedbed. Roll to firm soil before seeding.



“When to amend?” – it depends

Soil protection starts with initial site planning and continues through to final sale. Compost or wood chip blankets can be great for erosion control during construction. But final soil quality and depth restoration, whether by placing imported or reused topsoil or by amending site soils with compost, should wait at least until building exteriors are finished and trade crews have moved indoors. Before sodding or seeding turf, tilled soils need to be rolled or allowed to settle with rainfall – but trees and shrubs can go in right away. Beds should be mulched right after planting with wood chips or coarse bark, to prevent weeds and erosion, conserve water, and improve plant survival and growth.

Talk to your landscape architect, site prep, grading, and landscape contractors about when and how soil BMPs fit best into your team's construction schedule.



Foundation for Success

Learn more at www.BuildingSoil.org

Soil Quality Information Sheet

Indicators for Soil Quality Evaluation

USDA Natural Resources Conservation Service

April 1996

What are indicators?

Soil quality indicators are physical, chemical, and biological properties, processes, and characteristics that can be measured to monitor changes in the soil.

The types of indicators that are the most useful depend on the function of soil for which soil quality is being evaluated. These functions include:

- providing a physical, chemical, and biological setting for living organisms;
- regulating and partitioning water flow, storing and cycling nutrients and other elements;
- supporting biological activity and diversity for plant and animal productivity;
- filtering, buffering, degrading, immobilizing, and detoxifying organic and inorganic materials; and
- providing mechanical support for living organisms and their structures.



Why are indicators important?

Soil quality indicators are important to:

- focus conservation efforts on maintaining and improving the condition of the soil;
- evaluate soil management practices and techniques;
- relate soil quality to that of other resources;
- collect the necessary information to determine trends;
- determine trends in the health of the Nation's soils;
- guide land manager decisions.

What are some indicators?

Indicators of soil quality can be categorized into four general groups: visual, physical, chemical, and biological.

Visual indicators may be obtained from observation or photographic interpretation. Exposure of subsoil, change in soil color, ephemeral gullies, ponding, runoff, plant response, weed species, blowing soil, and deposition are only a few examples of potential locally determined indicators. Visual evidence can be a clear indication that soil quality is threatened or changing.

Physical indicators are related to the arrangement of solid particles and pores. Examples include topsoil depth, bulk density, porosity, aggregate stability, texture, crusting, and compaction. Physical indicators primarily reflect limitations to root growth, seedling emergence, infiltration, or movement of water within the soil profile.

Chemical indicators include measurements of pH, salinity, organic matter, phosphorus concentrations, cation-exchange capacity, nutrient cycling, and concentrations of elements that may be potential contaminants (heavy metals, radioactive compounds, etc.) or those that are needed for plant growth and development. The soil's chemical condition affects soil-plant relations, water quality, buffering capacities, availability of nutrients and water to plants and other organisms, mobility of contaminants, and some physical conditions, such as the tendency for crust to form.

Biological indicators include measurements of micro- and macro-organisms, their activity, or byproducts. Earthworm, nematode, or termite populations have been suggested for use in some parts of the country. Respiration rate can be used to detect microbial activity, specifically microbial decomposition of organic matter in the soil. Ergosterol, a fungal byproduct, has been used to measure the activity of organisms that play an important role in the formation and stability of soil aggregates. Measurement of decomposition rates of plant residue in bags or measurements of weed seed numbers, or pathogen populations can also serve as biological indicators of soil quality.

How are indicators selected?

Soil quality is estimated by observing or measuring several different properties or processes. No single property can be used as an index of soil quality.

The selection of indicators should be based on:

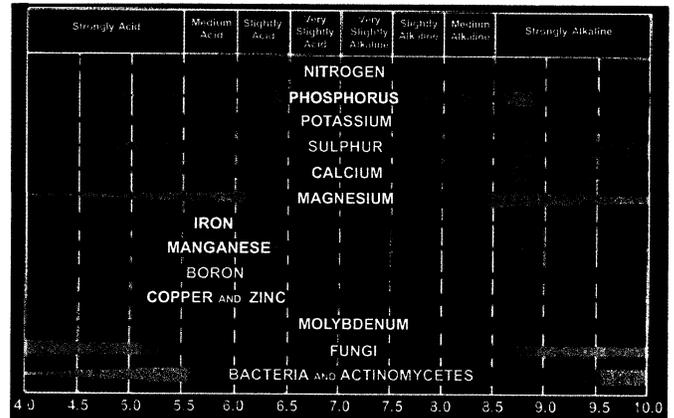
- the land use;
- the relationship between an indicator and the soil function being assessed;
- the ease and reliability of the measurement;
- variation between sampling times and variation across the sampling area;
- the sensitivity of the measurement to changes in soil management;
- compatibility with routine sampling and monitoring;
- the skills required for use and interpretation.

When and where to measure?

The optimum time and location for observing or sampling soil quality indicators depends on the function for which the assessment is being made. The frequency of measurement also varies according to climate and land use.

Soil variation across a field, pasture, forest, or rangeland can greatly affect the choice of indicators. Depending on the function, such factors as the landscape unit, soil map unit, or crop growth stage may be critical. Wheel tracks can dramatically affect many properties measured for plant productivity. Management history and current inputs should also be recorded to ensure a valid interpretation of the information.

Monitoring soil quality should be directed primarily toward the detection of trend changes that are measurable over a 1- to 10-year period. The detected changes must be real, but at the same time they must change rapidly enough so that land managers can correct problems before undesired and perhaps irreversible loss of soil quality occurs.



Soil reaction influence on availability of plant nutrients.

What does the value mean?

Interpreting indicator measurements to separate soil quality trends from periodic or random changes is currently providing a major challenge for researchers and soil managers. Soils and their indicator values vary because of differences in parent material, climatic condition, topographic or landscape position, soil organisms, and type of vegetation. For example, cationexchange capacity may relate to organic matter, but it may also relate to the kind and amount of clay.

Establishing acceptable ranges, examining trends and rates of change over time, and including estimates of the variance associated with the measurements are important in interpreting indicators. Changes need to be evaluated as a group, with a change in any one indicator being evaluated only in relation to changes in others. Evaluations before and after, or with and without intervention, are also needed to develop appropriate and meaningful relationships for various kinds of soils and the functions that are expected of them.

The overall goal should be to maintain or improve soil quality without adversely affecting other resources.

(Prepared by the National Soil Survey Center in cooperation with the Soil Quality Institute, NRCS, USDA, and the National Soil Tilth Laboratory, Agricultural Research Service, USDA)

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Soil Quality Information Sheet

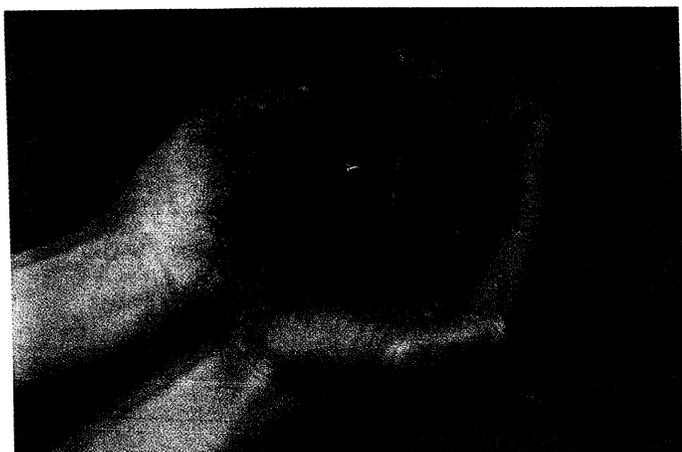
Soil Quality - Introduction

USDA Natural Resources Conservation Service

Revised June 2001

What is soil?

Soil is a dynamic resource that supports plant life. It is made up of different sized mineral particles (sand, silt, and clay), organic matter, and numerous species of living organisms. Thus, soil has biological, chemical, and physical properties, some of which are dynamic and can change in response to how the soil is managed.



What does soil do for us?

Soil provides several essential services or functions:

Soil supports the growth and diversity of plants and animals by providing a physical, chemical, and biological environment for the exchange of water, nutrients, energy and air.

Soil regulates the distribution of rain or irrigation water between infiltration and runoff, and regulates the flow and storage of water and solutes, including nitrogen, phosphorus, pesticides, and other nutrients and compounds dissolved in the water.

Soil stores, moderates the release of, and cycles plant nutrients and other elements.

Soil acts as a filter to protect the quality of water, air, and other resources.

Soil supports structures and protects archeological treasures.

What is soil quality?

Soil quality is the capacity of a specific kind of soil to function, within natural or managed ecosystem boundaries, to sustain plant and animal productivity, maintain or enhance water and air quality, and support human health and habitation. Changes in the capacity of soil to function are reflected in soil properties that change in response to management or climate.

Why is soil quality important?

Management that enhances soil quality will benefit cropland, rangeland, and woodland productivity. Enhanced soil quality can help to reduce the onsite and offsite costs of soil erosion, improve water and nutrient use efficiencies, and ensure that the resource is sustained for future use. It also benefits water quality, air quality, and wildlife habitat.



How is soil quality evaluated?

Soil quality is evaluated separately for each individual soil using soil quality indicators that reflect changes in the capacity of the soil to function. Useful indicators are those that are sensitive to change, and change in response to management. The type and number of indicators used depends on the scale of the evaluation (i.e., field, farm, watershed, or region) and the soil functions of interest. For example, infiltration rate and aggregate stability help indicate the capacity of the soil to intake water and resist runoff and erosion. Changes in soil organic matter, including active organic carbon or particulate soil organic matter, may indicate changes in productivity. Increased bulk density may reflect limits to root growth, seedling emergence, and water infiltration. Measurements of indicators can be made with simple to somewhat complex field tests, or sophisticated laboratory analyses.

To evaluate soil quality, indicators can be assessed at one point in time or monitored over time to establish trends.

An **assessment** provides information about the current functional status or quality of the soil. The assessment must start with an understanding of the standard, baseline value, or reference value to be used for comparison. Assessments can be made to help identify areas where problems occur, to identify areas of special interest, or to compare fields under different management systems. Land managers can use this information, along with data from soil surveys, fertility tests, and other resource inventory and monitoring data, to make management decisions.

Monitoring of soil quality indicators over time **files** changes or trends in the functional status **of** the soil. Monitoring can be used to determine the **success** of management practices or the need for **tional** management changes or adjustments.

What concerns relate to soil quality?

Evaluating soil quality can improve the response to **many** resource concerns, including those listed in **For** further information, refer to other Soil Quality **Information** Sheets.

- Loss of soil by erosion
- Deposition of sediment by wind or floodwater
- Compaction of layers near the surface
- Degradation of soil aggregates or soil structure
- Reduced infiltration and increased runoff
- Crusting of the soil surface
- Nutrient loss or imbalance
- Pesticide carryover
- Buildup of salts
- An unfavorable change in pH
- Loss of organic matter
- Reduced biological activity
- Poor residue breakdown
- Infestation by weeds or pathogens
- Excessive wetness
- Increased water-repellency of soils due to fire
- Reduced water quality
- Greenhouse gas emissions

The full series of Soil Quality Information Sheets is **available** at www.statlab.iastate.edu/survey/SQI.

This Sheet was prepared by the Soil Quality Institute in cooperation with the National Soil Survey Center, NRCS, USDA; and the National Soil Tilth Laboratory, Agricultural Research Service, USDA

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Soil Quality Information Sheet

Soil Quality Indicators: **Aggregate Stability**

USDA Natural Resources Conservation Service

April 1996



What are soil aggregates?

Soil aggregates are groups of soil particles that bind to each other more strongly than to adjacent particles. The space between the aggregates provide pore space for retention and exchange of air and water.

What is aggregate stability?

Aggregate stability refers to the ability of soil aggregates to resist disruption when outside forces (usually associated with water) are applied.

Aggregate stability is not the same as *dry aggregate stability*, which is used for wind erosion prediction. The latter term is a size evaluation.

Why is aggregate stability important?

Aggregation affects erosion, movement of water, and plant root growth. Desirable aggregates are stable against rainfall and water movement. Aggregates that break down in water or fall apart when struck by raindrops release individual soil particles that can seal the soil surface and clog pores. This breakdown creates crusts that close pores and other pathways for water and air entry into a soil and also restrict emergence of seedlings from a soil.

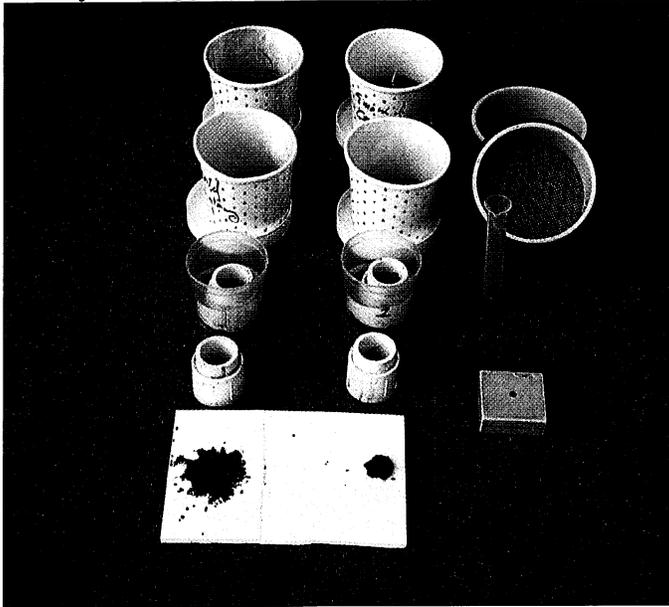
Optimum conditions have a large range in pore size distribution. This includes large pores between the aggregates and smaller pores within the aggregates. The pore space between aggregates is essential for water and air entry and exchange. This pore space provides zones of weakness through which plant roots can grow. If the soil mass has a low bulk density or large pore spaces, aggregation is less important. For example, sandy soils have low aggregation, but roots and water can move readily.

How is aggregate stability measured?

Numerous methods measure aggregate stability. The standard method of the NRCS Soil Survey Laboratory can be used in a field office or in a simple laboratory. This procedure involves repeated agitation of the aggregates in distilled water.

An alternative procedure described here does not require weighing. The measurements are made on air-dry soil that has passed through a sieve with 2-millimeter mesh and retained by a sieve with a 1-millimeter mesh. A quantity of these 2-1 millimeter aggregates is placed in a small open container with a fine screen at the bottom. This container is placed in distilled water. After a period of time, the container is removed from the water and its contents are allowed to dry. The content is then removed and visually examined for the breakdown from the original aggregate size. Those materials that have the least change from the original aggregates have the greatest aggregate stability.

Soils that have a high percentage of silt often show lower aggregate stability if measured air-dry than the field behavior would suggest, because water entry destroys the aggregate structure.



What influences aggregate stability?

The stability of aggregates is affected by soil texture, the predominant type of clay, extractable iron, and extractable cations, the amount and type of organic matter present, and the type and size of the microbial population.

Some clays expand like an accordion as they absorb water. Expansion and contraction of clay particles can shift and crack the soil mass and create or break apart aggregates.

Calcium ions associated with clay generally promote aggregation, whereas sodium ions promote dispersion.

Soils with over about five percent iron oxides, expressed as elemental iron, tend to have greater aggregate stability.

Soils that have a high content of organic matter have greater aggregate stability. Additions of organic matter increase aggregate stability, primarily after decomposition begins and microorganisms have produced chemical breakdown products or mycelia have formed.

Soil microorganisms produce many different kinds of organic compounds, some of which help to hold the aggregates together. The type and species of microorganisms are important. Fungal mycelial growth binds soil particles together more effectively than smaller organisms, such as bacteria.

Aggregate stability declines rapidly in soil planted to a clean-tilled crop. It increases while the soil is in sod and crops, such as alfalfa.

(Prepared by the National Soil Survey Center in cooperation with the Soil Quality Institute, NRCS, USDA, and the National Soil Tilth Laboratory, Agricultural Research Service, USDA)

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Soil Quality Indicators: Soil Crusts

USDA Natural Resources Conservation Service

April 1996



Soil crusts are relatively thin, somewhat continuous layers of the soil surface that often restrict water movement, air entry, and seedling emergence from the soil. They generally are less than 2 inches thick and are massive.

Crusts are created by the breakdown of structural units by flowing water, or raindrops, or through freeze-thaw action. Soil crusts are generally only a temporary condition. Typically, the soil immediately below the surface layer is loose.

Why are soil crusts a concern?

Crusts reduce infiltration and increase runoff. Rainfall and sprinkler irrigation water impart a large amount of impact energy onto the soil surface. If the soil is not protected by a cover of growing plants, crop residue or other material, and if soil aggregates are weak, the energy can cause a soil crust to form.

If a crust forms, individual soil particles fill the pore space near the surface and prevent the water from entering (infiltrating) the soil. If the infiltration is limited, water accumulates and flows down slope,

causing movement of soil particles. Thus water erosion is initiated.

Crusts restrict seedling emergence. The physical emergence of seedlings through a soil crust depends on the:

- thickness of the crust,
- strength of the crust,
- size of the broken crust pieces,
- water content, and
- type of plant species. Non-grass plant species, such as soybeans or alfalfa, exert less pressure under identical conditions than grasses such as corn.

Crusts reduce oxygen diffusion to seedlings. Seed germination depends on the diffusion of oxygen from the air through the soil. If soil crusts are wet, oxygen diffusion is reduced as much as 50 percent.

Crusts reduce surface water evaporation. The reflectance of a crusted surface is higher than that for an uncrusted surface. Higher reflectance results in less absorption of energy from the sun. This results in a cooler soil surface and decreases the rate of evaporation.

Crusts decrease water loss because less of their surface area is exposed to the air than a tilled soil. When crusts become dry, they become barriers to evaporation by retarding capillary movement of water to the soil surface.

Crusts affect wind erosion. Crusts increase wind erosion in those soils that have an appreciable amount of sand. Rainfall produces clean sand grains that are not attached to the soil surface. These clean sand grains are subject to movement by air along the smooth surface of the crust. The sand breaks down the crust as it moves across the soil surface. Cultivation to break the crust and increase the surface roughness reduces wind erosion on sandy soils.

For soils that have a small amount of sand, crusts protect the soil surface and generally decrease the hazard of wind erosion.

How do crusts form?

Soil crusts and associated cracks form by raindrop impact or freeze-thaw processes.

Raindrop impact breaks soil aggregates, moves clay downward a short distance leaving a concentration of sand and silt particles on the soil surface.

Raindrop-impact crusts break down to a granular condition in many soils that have a high shrink-swell potential and experience frequent wetting and drying cycles.

Freeze-thaw crusts are formed by the puddling effect as ice forms, melts, and reforms. The temperature and water regimes and parent material control freeze-thaw crust formation. These crusts are generally 3/8- to 5/8-inch thick, compared to 1/4-inch commonly for raindrop-impact crusts.

The size and behavior on wetting of cracks associated with raindrop-impact and freeze-thaw crust differ. Both extend to the base of the crust. The cracks in raindrop-impact crust are 1/4 inch wide. They close on wetting and hence are ineffective in increasing infiltration. The cracks in freeze-thaw crust are 1/4- to 3/4-inch wide. They do not close on wetting and hence increase infiltration.

How are soil crusts measured?

Soil crusts are characterized by their thickness and strength (air dry rupture resistance). Crust air dry rupture resistance can be measured by taking a dry piece about 1/2 inch on edge and applying a force on the edge until the crust breaks. In general, more force is required for crusts that are thick and have a high clay content. Other means of measurement, such as a penetrometer, may be used.



How can the problem be corrected?

- Maintain plant cover or crop residues on the soil surface to reduce the impact of raindrops.
- Adopt management practices that increase aggregate stability.
- Use practices that increase soil organic matter content or reduce concentrations of sodium ions.
- Use a rotary hoe or row cultivator to shatter crusts and thus increase seedling emergence and weed control.
- Employ sprinkler water to reduce restriction of seedling emergence.

(Prepared by the National Soil Survey Center in cooperation with the Soil Quality Institute, NRCS, USDA, and the National Soil Tilth Laboratory, Agricultural Research Service, USDA). Soil crust photo courtesy of University of Nebraska-Lincoln, Institute of Agriculture and Natural Resources.

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Soil Quality Information Sheet

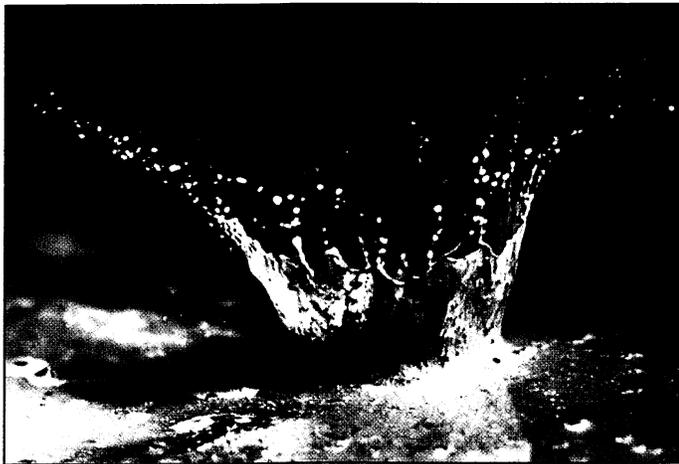
Soil Quality Indicators: Infiltration

USDA Natural Resources Conservation Service

January 1998

What is Infiltration?

Infiltration is the process of water entering the soil. The rate of infiltration is the maximum velocity at which water enters the soil surface. When the soil is in good condition or has good soil health, it has stable structure and continuous pores to the surface. This allows water from rainfall to enter unimpeded throughout a rainfall event. A low rate of infiltration is often produced by surface seals resulting from weakened structure and clogged or discontinuous pores.



Why is infiltration a concern?

Soil can be an excellent temporary storage medium for water, depending on the type and condition of the soil. Proper management of the soil can help maximize infiltration and capture as much water as allowed by a specific soil type.

If water infiltration is restricted or blocked, water does not enter the soil, and it either ponds on the surface or runs off the land. Thus, less water is stored in the soil profile for use by plants. Runoff can carry soil particles and surface applied fertilizers and pesticides off the field. These materials can end up in streams and lakes or in other places where they are not wanted.

Soils that have reduced infiltration have an increase in the overall amount of runoff water. This excess water can contribute to local and regional flooding of streams and rivers or results in accelerated soil erosion of fields or streambanks.

In most cases, maintaining a high infiltration rate is desirable for a healthy environment. However, soils that transmit water freely throughout the entire profile or into tile lines need proper chemical management to ensure the protection of groundwater and surface water resources.

Soils that have reduced infiltration can become saturated at the surface during rainfall. Saturation decreases soil strength, increases detachment of particles, and enhances the erosion potential. In some areas that have a steep slope, surface material lying above a compacted layer may move in a mass, sliding down the slope because of saturated soil conditions.

Decreases in infiltration or increases in saturation above a compacted layer can also cause nutrient deficiencies in crops. Either condition can result in anaerobic conditions which reduce biological activity and fertilizer use efficiencies.

What factors influence infiltration?

A number of factors impact soil infiltration. Some of these are:

- **Texture:** The type of soil (sandy, silty, clayey) can control the rate of infiltration. For example, a sandy surface soil normally has a higher infiltration rate than a clayey surface soil. A soil survey is a recorded map of soil types on the landscape.
- **Crust:** Soils that have many large surface connected pores have higher intake rates than soils that have few such pores. A crust on the soil surface can seal the pores and restrict the entry of water into the soil.

- **Compaction:** A compacted zone (plowpan) or an impervious layer close to the surface restricts the entry of water into the soil and tends to result in ponding on the surface.
- **Aggregation and Structure:** Soils that have stable strong aggregates as granular or blocky soil structure have a higher infiltration rate than soils that have weak, massive, or platelike structure. Soils that have a smaller structural size have higher infiltration rates than soils that have a larger structural size.
- **Water Content:** The content or amount of water in the soil affects the infiltration rate of the soil. The infiltration rate is generally higher when the soil is initially dry and decreases as the soil becomes wet. Pores and cracks are open in a dry soil, and many of them are filled in by water or swelled shut when the soil becomes wet. As they become wet, the infiltration rate slows to the rate of permeability of the most restrictive layer.
- **Frozen Surface:** A frozen soil greatly slows or completely prevents water entry.
- **Organic Matter:** An increased amount of plant material, dead or alive, generally assists the process of infiltration. Organic matter increases the entry of water by protecting the soil aggregates from breaking down during the impact of raindrops. Particles broken from aggregates can clog pores and seal the surface and decrease infiltration during a rainfall event.
- **Pores:** Continuous pores that are connected to the surface are excellent conduits for the entry of water into the soil. Discontinuous pores may retard the flow of water because of the entrapment of air bubbles. Organisms such as earthworms increase the amount of pores and also assists the process of aggregation that enhances water infiltration.



How can infiltration be increased?

A number of management options can help increase soil infiltration:

- Decrease compaction by reducing tillage and by avoiding the use of machinery when the soils are wet. Keep the number of trips across a field to a minimum and follow the same wheel tracks for all operations, if possible.
- Decrease the formation of crusts by maintaining plant cover or by practicing residue management to reduce the impact of raindrops. Use a rotary hoe or row cultivator to shatter crust.
- Increase the amount of organic materials added to the soil to increase the stability of soil aggregates.
- Decrease or eliminate tillage operations to help maintain surface connected pores and encourage biological activity.

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Soil Quality Information Sheet

Soil Quality Resource Concerns: **Soil Biodiversity**

USDA Natural Resources Conservation Service

January 1998

What is soil biodiversity?

Soil biodiversity reflects the mix of living organisms in the soil. These organisms interact with one another and with plants and small animals forming a web of biological activity.

Soil is by far the most biologically diverse part of Earth. The soil food web includes beetles, springtails, mites, worms, spiders, ants, nematodes, fungi, bacteria, and other organisms. These organisms improve the entry and storage of water, resistance to erosion, plant nutrition, and break down of organic matter. A wide variety of organisms provides checks and balances to the soil food web through population control, mobility, and survival from season to season.



What are the benefits of soil organisms?

Residue decomposition

Soil organisms decompose plant residue. Each organism in the soil plays an important role. The larger organisms in the soil shred dead leaves and stems. This stimulates cycling of nutrients. The larger soil fauna include earthworms, termites, pseudoscorpions, microspiders, centipedes, ants, beetles, mites, and springtails.

When mixing the soil, the large organisms bring material to smaller organisms. The large organisms also carry smaller organisms within their systems or as "hitchhikers" on their bodies.

Small organisms feed on the by-products of the larger organisms. Still smaller organisms feed on the products of these organisms. The cycle repeats itself several times with some of the larger organisms feeding on smaller organisms.

Some larger organisms have a life span of two or more years. Smaller organisms generally die more quickly, but they also multiply rapidly when conditions are favorable. The food web is therefore quick to respond when food sources are available and moisture and temperature conditions are good.

Infiltration and storage of water

Channels and aggregates formed by soil organisms improve the entry and storage of water. Organisms mix the porous and fluffy organic material with mineral matter as they move through the soil. This mixing action provides organic matter to non-burrowing fauna and creates pockets and pores for the movement and storage of water. Fungal hyphae bind soil particles together and slime from bacteria help hold clay particles together. The water-stable aggregates formed by these processes are more resistant to erosion than individual soil particles. The aggregates increase the amount of large pore space which increases the rate of water infiltration. This reduces runoff and water erosion and increases soil moisture for plant growth.

Nutrient cycling

Soil organisms play a key role in nutrient cycling. Fungi, often the most extensive living organisms in the soil, produce fungal hyphae. Hyphae frequently appear like fine white entangled thread in the soil. Some fungal hyphae (mycorrhizal fungi) help plants extract nutrients from the soil. They supply nutrients to the plant while obtaining carbon in exchange and thus extend the root system. Root exudates also provide food for fungi, bacteria, and nematodes.

When fungi and bacteria are eaten by various mites, nematodes, amoebas, flagellates, or ciliates, nitrogen is released to the soil as ammonium. Decomposition by soil organisms converts nitrogen from organic forms in decaying plant residues and organisms to inorganic forms which plants can use.

Management considerations

Cultivation

The effects of cultivation depend on the depth and frequency of the cultivation. Tilling to greater depths and more frequent cultivations have an increased negative impact on all soil organisms. No-till, ridge tillage, and strip tillage are the most compatible tillage systems that physically maintain soil organism habitat and biological diversity in crop production.

Compaction

Soil compaction reduces the larger pores and pathways, thus reducing the amount of suitable habitat for soil organisms. It also can move the soil toward anaerobic conditions, which change the types and distribution of soil organisms in the food web. Gaps in the food web induce nutrient deficiencies to plants and reduce root growth.

Pest control

Pesticides that kill insects also kill the organisms carried by them. If important organisms die, consider replacing them. Plant-damaging organisms usually increase when beneficial soil organisms decrease. Beneficial predator organisms serve to check and balance various pest species.

Herbicides and foliar insecticides applied at recommended rates have a small impact on soil organisms. Fungicides and fumigants have a much greater impact on soil organisms.

Fertility

Fertility and nutrient balances in the soil promote biological diversity. Typically, carbon is the limiting resource to biological activity. Plant residue, compost, and manure provide carbon. Compost also provides a mix of organisms, so the compost should be matched to the cropping system.

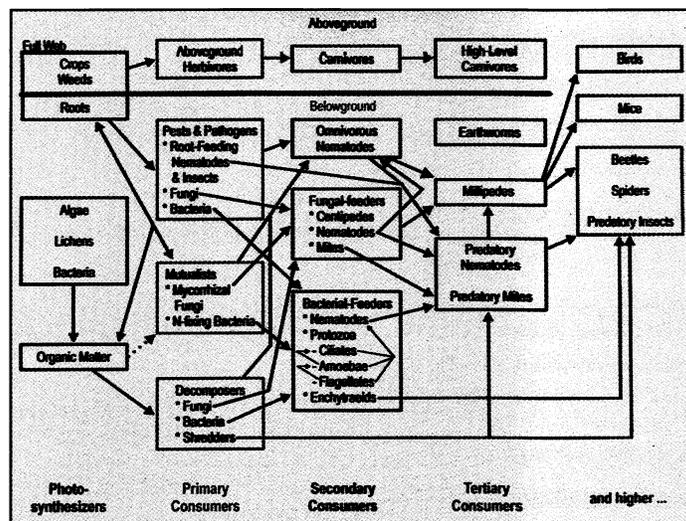
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Cover crops and crop rotations

The type of crops that are used as cover or in crop rotations can affect the mix of organisms that are in the soil. They can assist in the control of plant pests or serve as hosts to increase the number of pests. Different species and cultivars of crops may have different effects on pests. However, the organisms and their relation to the crop are presently not clearly understood.



Crop residue management

Mixing crop residue into the soil generally destroys fungal hyphae and favors the growth of bacteria. Since bacteria hold less carbon than fungi, mixing often releases a large amount of carbon as carbon dioxide (CO₂). The net result is loss of organic matter from the soil.

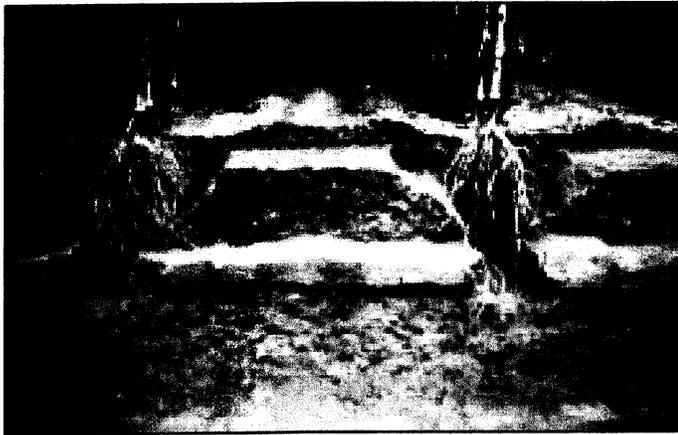
When crop residue is left on the soil surface, primary decomposition is by arthropod shredding and fungal decomposition. The hyphae of fungi can extend from below the soil surface to the surface litter and connect the nitrogen in the soil to the carbon at the surface. Fungi maintain a high C:N ratio and hold carbon in the soil. The net result is toward building the carbon and organic matter level of the soil. In cropping systems that return residue, macro-organisms are extremely important. Manage the soil to increase their diversity and numbers.

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Soil Quality Resource Concerns: **Compaction**

USDA Natural Resources Conservation Service

April 1996



How can compacted soils be identified?

- platy or weak structure, or a massive condition,
- greater penetration resistance,
- higher bulk density,
- restricted plant rooting,
- flattened, turned, or stubby plant roots.

What is compaction?

Soil compaction occurs when soil particles are pressed together, reducing the pore space between them. This increases the weight of solids per unit volume of soil (bulk density). Soil compaction occurs in response to pressure (weight per unit area) exerted by field machinery or animals. The risk for compaction is greatest when soils are wet.

The significance of bulk density depends on the soil texture. Rough guidelines for the minimum bulk density at which a root restricting condition will occur for various soil textures are (g/cc stands for grams per cubic centimeter):

<u>Texture</u>	<u>Bulk Density (g/cc)</u>
Coarse, medium, and fine sand and loamy sands other than loamy very fine sand	1.80
Very fine sand, loamy very fine sand	1.77
Sandy loams	1.75
Loam, sandy clay loam	1.70
Clay loam	1.65
Sandy clay	1.60
Silt, silt loam	1.55
Silty clay loam	1.50
Silty clay	1.45
Clay	1.40

Why is compaction a problem?

Compaction restricts rooting depth, which reduces the uptake of water and nutrients by plants. It decreases pore size, increases the proportion of water-filled pore space at field moisture, and decreases soil temperature. This affects the activity of soil organisms by decreasing the rate of decomposition of soil organic matter and subsequent release of nutrients.

Compaction decreases infiltration and thus increases runoff and the hazard of water erosion.

What causes soil compaction?

Soil compaction is caused by tilling, harvesting, or grazing when the soils are wet.

Soil water content influences compaction. A dry soil is much more resistant to compaction than a moist or wet soil.

Other factors affecting compaction include the texture, pressure exerted, composition (texture, organic matter, plus clay content and type), and the number of passes by vehicle traffic and machinery. Sandy loam, loam, and sandy clay loam soils compact more easily than silt, silt loam, silty clay loam, silty clay, or clay soils.

Compaction may extend to 20 inches. Deep compaction affects smaller areas than shallow compaction, but it persists because shrinking and swelling and freezing and thawing affect it less. Machinery that has axle loads of more than 10 tons may cause compaction below 12 inches. Grazing by large animals can cause compaction because their hooves have a relatively small area and therefore exert a high pressure.

How long will compaction last?

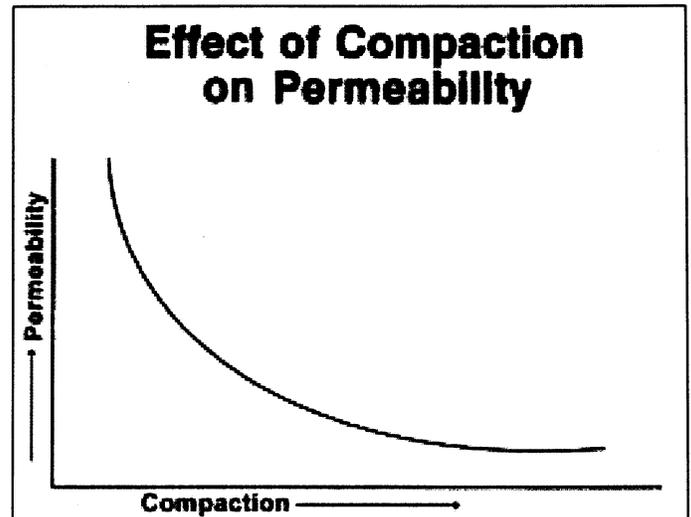
The persistence of soil compaction is determined by the depth at which it occurs, the shrink-swell potential of the soil, and the climate. As the depth increases, the more persistent the condition. The type and percentage of clay determine the shrink-swell potential. The greater the shrink-swell potential and number of wet/dry cycles, the lower is the duration of compaction at a particular depth. Freeze/thaw cycles also help decrease near-surface compaction.

How do organic matter and compaction interact?

Soil organic matter promotes aggregation of soil particles. This increases porosity and reduces bulk density (i.e., compaction). It also increases permeability and may increase plant available water.

Addition of manure, compost, or other organic materials including newspaper, woodchips, and municipal sludge can improve soil structure, helping to resist compaction.

Thick layers of forest litter reduce the impact of machinery, thus reducing compaction.



How can compaction be reduced?

- Reduce the number of trips across the area.
- Till or harvest when the soils are not wet.
- Reduce the pressure of equipment.
- Maintain or increase organic matter in the soil.
- Harvest timber on frozen soil or snow.

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Soil Quality Resource Concerns: **Compaction**

USDA Natural Resources Conservation Service

April 1996



How can compacted soils be identified?

- platy or weak structure, or a massive condition,
- greater penetration resistance,
- higher bulk density,
- restricted plant rooting,
- flattened, turned, or stubby plant roots.

What is compaction?

Soil compaction occurs when soil particles are pressed together, reducing the pore space between them. This increases the weight of solids per unit volume of soil (bulk density). Soil compaction occurs in response to pressure (weight per unit area) exerted by field machinery or animals. The risk for compaction is greatest when soils are wet.

The significance of bulk density depends on the soil texture. Rough guidelines for the minimum bulk density at which a root restricting condition will occur for various soil textures are (g/cc stands for grams per cubic centimeter):

<u>Texture</u>	<u>Bulk Density (g/cc)</u>
Coarse, medium, and fine sand and loamy sands other than loamy very fine sand	1.80
Very fine sand, loamy very fine sand	1.77
Sandy loams	1.75
Loam, sandy clay loam	1.70
Clay loam	1.65
Sandy clay	1.60
Silt, silt loam	1.55
Silty clay loam	1.50
Silty clay	1.45
Clay	1.40

Why is compaction a problem?

Compaction restricts rooting depth, which reduces the uptake of water and nutrients by plants. It decreases pore size, increases the proportion of water-filled pore space at field moisture, and decreases soil temperature. This affects the activity of soil organisms by decreasing the rate of decomposition of soil organic matter and subsequent release of nutrients.

Compaction decreases infiltration and thus increases runoff and the hazard of water erosion.

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What causes soil compaction?

Soil compaction is caused by tilling, harvesting, or grazing when the soils are wet.

Soil water content influences compaction. A dry soil is much more resistant to compaction than a moist or wet soil.

Other factors affecting compaction include the texture, pressure exerted, composition (texture, organic matter, plus clay content and type), and the number of passes by vehicle traffic and machinery. Sandy loam, loam, and sandy clay loam soils compact more easily than silt, silt loam, silty clay loam, silty clay, or clay soils.

Compaction may extend to 20 inches. Deep compaction affects smaller areas than shallow compaction, but it persists because shrinking and swelling and freezing and thawing affect it less. Machinery that has axle loads of more than 10 tons may cause compaction below 12 inches. Grazing by large animals can cause compaction because their hooves have a relatively small area and therefore exert a high pressure.

How long will compaction last?

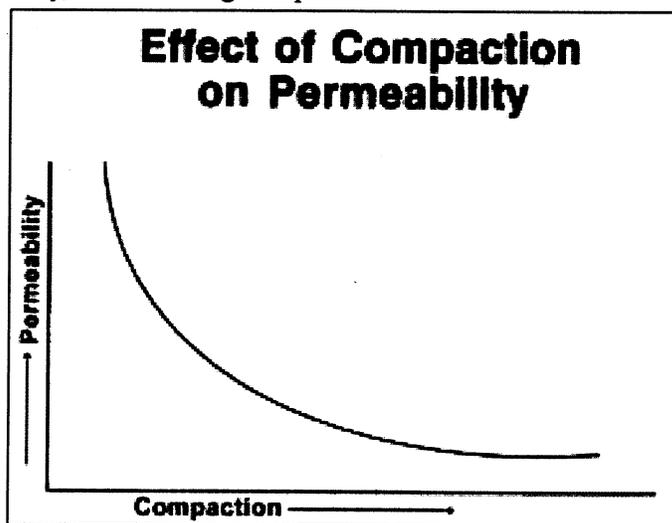
The persistence of soil compaction is determined by the depth at which it occurs, the shrink-swell potential of the soil, and the climate. As the depth increases, the more persistent the condition. The type and percentage of clay determine the shrink-swell potential. The greater the shrink-swell potential and number of wet/dry cycles, the lower is the duration of compaction at a particular depth. Freeze/thaw cycles also help decrease near-surface compaction.

How do organic matter and compaction interact?

Soil organic matter promotes aggregation of soil particles. This increases porosity and reduces bulk density (i.e., compaction). It also increases permeability and may increase plant available water.

Addition of manure, compost, or other organic materials including newspaper, woodchips, and municipal sludge can improve soil structure, helping to resist compaction.

Thick layers of forest litter reduce the impact of machinery, thus reducing compaction.



How can compaction be reduced?

- Reduce the number of trips across the area.
- Till or harvest when the soils are not wet.
- Reduce the pressure of equipment.
- Maintain or increase organic matter in the soil.
- Harvest timber on frozen soil or snow.

Literature Cited

Vorhees, W.B. 1992. Wheel-induced soil physical limitations to root growth. In i and B.O.. Stewart eds. Adv. Soil Sci 19:73-92.

(Prepared by the National Soil Survey Center in cooperation with the Soil Quality Institute, NRCS, USDA, and the National Soil Tilth Laboratory, Agricultural Research Service, USDA)

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Soil Quality Information Sheet

Soil Quality Resource Concerns:

Available Water Capacity

USDA Natural Resources Conservation Service

January 1998

What is available water capacity?

Available water capacity is the amount of water that a soil can store that is available for use by plants.

It is the water held between field capacity and the wilting point adjusted downward for rock fragments and for salts in solution. Field capacity is the water retained in a freely drained soil about 2 days after thorough wetting. The wilting point is the water content at which sunflower seedlings wilt irreversibly.

Why be concerned?

In areas where drizzle falls daily and supplies the soils with as much or more water than is removed by plants, available water capacity is of little importance. In areas where plants remove more water than the amount supplied by precipitation, the amount of available water that the soil can supply may be critical. This water is necessary to sustain the plants between rainfall events or periods of irrigation. The soil effectively buffers the plant root environment against periods of water deficit.

How is available water expressed?

Available water is expressed as a volume fraction (0.20), as a percentage (20%), or as an amount (in inches). An example of a volume fraction is water in inches per inch of soil. If a soil has an available water fraction of 0.20, a 10 inch zone then contains 2 inches of available water.

Available water capacity is often stated for a common depth of rooting (where 80 percent of the roots occur). This depth is at 60 inches or more in areas of the western United States that are irrigated and at 40 inches in the higher rainfall areas of the eastern United States. Some publications use classes of available water capacity. These classes are specific to the area in which they are used. Classes use such terms as very high, high, medium, and low.

Soil properties affect available water

Rock fragments reduce the available water capacity in direct proportion to their volume unless the rocks are porous.

Organic matter increases the available water capacity. Each 1 percent of organic matter adds about 1.5 percent to available water capacity.

Bulk density plays a role through its control of the pore space that retains available water. High bulk densities for a given soil tend to lower the available water capacity.

Osmotic pressure exerted by the soil solution is 0.3 - 0.4 times the electrical conductivity in mmhos/cm. A significant reduction in available water capacity requires an electrical conductivity of more than 8 mmhos/cm.

Texture has a significant effect. Some guidelines follow, assuming intermediate bulk density and no rock fragments.

Textures	Fraction Available Water
Sands, and loamy sands and sandy loams in which the sand is not dominated by very fine sand	Less than 0.10
Loamy sands and sandy loams in which very fine sand is the dominant sand fraction, and loams, clay loam, sandy clay loam, and sandy clay	0.10 - 0.15
Silty clay, and clay	0.10 - 0.20
Silt, silt loam, and silty clay loam	0.15 - 0.25

The **rooting depth** affects the total available water capacity in the soil. A soil that has a root barrier at 20 inches and an available water fraction of 0.20 has 4 inches of available water capacity. Another soil, that has a lower available water fraction of 0.10, would, if the roots

extended to a depth of 60 inches, have 6 inches of available water capacity. For shallow rooting crops, like onions, the available water below 1-2 feet has little significance. For deeper rooting crops, like corn, the available water at the greater depth is very important.



Figure 1: Pore size varies greatly between sponges.

Soil quality and available water

First, consider the difference between precipitation and evapotranspiration during the growing season. Second, decide what plants are involved. As indicated, some plants root less deeply than others.

Compare two soils that have different internal properties and climates selecting a crop that will extract water to a depth of 60 inches, unless there is a shallower root barrier.

Quantity	Soil Locations	
	OK	ME
Rooting depth (in.)	30	60
Available water fraction	x 0.10	0.15
Available water amount (in.)	= 3.0	9.0
Evapotranspiration deficit (in./day)	÷ 0.17	0.04
Time available water satisfies deficit (days)	= 18	222

* Evapotranspiration deficit is the monthly precipitation subtracted from monthly evapotranspiration. Calculate the average daily deficit for the month with the largest deficit.

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Soil quality with respect to available water is better for the soil from Maine (ME), because of both the internal properties and the lower evapotranspiration deficit.



Figure 2: Available water capacity is greater with small pore size.

Improving the available water

Apply organic matter to the surface or mix into the upper few inches to increase the available water fraction near the surface. Available water near the surface is especially important at the seedling stage while roots are very shallow.

Maintain salts below the root zone. Keep infiltration high, reduce evaporation with a residue cover, minimize tillage, avoid mixing the lower soil layers with the surface, and plant seeds and seedlings on the furrow edges.

Minimize compaction by reducing the weight of vehicles and the amount of traffic, especially when the soil is moist or wet. Break up compacted layers when needed by ripping, and effectively expand the depth of the soil and increase the available water capacity.

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Soil Quality Information Sheet

Soil Quality Indicators: Organic Matter

USDA Natural Resources Conservation Service

April 1996

What is soil organic matter?

Soil organic matter is that fraction of the soil composed of anything that once lived. It includes plant and animal remains in various stages of decomposition, cells and tissues of soil organisms, and substances from plant roots and soil microbes. Well-decomposed organic matter forms *humus*, a dark brown, porous, spongy material that has a pleasant, earthy smell. In most soils, the organic matter accounts for less than about 5% of the volume.



What does organic matter do?

Organic matter is an essential component of soils because it:

- provides a carbon and energy source for soil microbes;
- stabilizes and holds soil particles together, thus reducing the hazard of erosion;
- aids the growth of crops by improving the soil's ability to store and transmit air and water;
- stores and supplies such nutrients as nitrogen, phosphorus, and sulfur, which are needed for the growth of plants and soil organisms;
- retains nutrients by providing cation-exchange and anion-exchange capacities;
- maintains soil in an uncompacted condition with lower bulk density;

- makes soil more friable, less sticky, and easier to work;
- retains carbon from the atmosphere and other sources;
- reduces the negative environmental effects of pesticides, heavy metals, and many other pollutants.

Soil organic matter also improves tilth in the surface horizons, reduces crusting, increases the rate of water infiltration, reduces runoff, and facilitates penetration of plant roots.

Where does it come from?

Plants produce organic compounds by using the energy of sunlight to combine carbon dioxide from the atmosphere with water from the soil. Soil organic matter is created by the cycling of these organic compounds in plants, animals, and microorganisms into the soil.

What happens to soil organic matter?

Soil organic matter can be lost through erosion. This process selectively detaches and transports particles on the soil surface that have the highest content of organic matter.

Soil organic matter is also utilized by soil microorganisms as energy and nutrients to support their own life processes. Some of the material is incorporated into the microbes, but most is released as carbon dioxide and water. Some nitrogen is released in gaseous form, but some is retained, along with most of the phosphorus and sulfur.

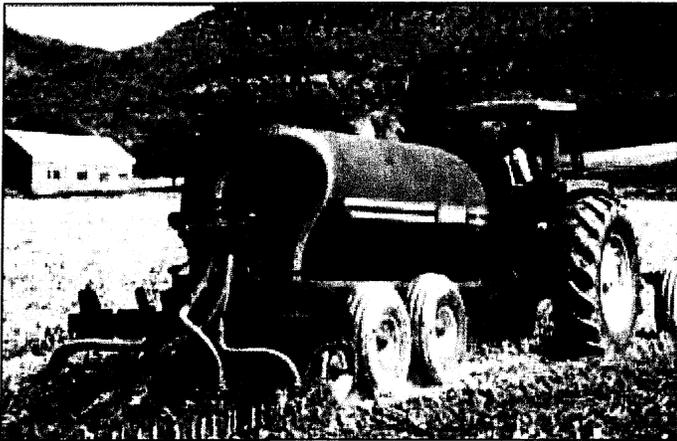
When soils are tilled, organic matter is decomposed faster because of changes in water, aeration, and temperature conditions. The amount of organic matter lost after clearing a wooded area or tilling native grassland varies according to the kind of soil, but most organic matter is lost within the first 10 years.

Rates of decomposition are very low at temperatures below 38 °F (4 °C) but rise steadily with increasing

temperature to at least 102°F (40°C) and with water content until air becomes limiting. Losses are higher with aerobic decomposition (with oxygen) than with anaerobic decomposition (in excessively wet soils). Available nitrogen also promotes organic matter decomposition.

What controls the amount?

The amount of soil organic matter is controlled by a balance between additions of plant and animal materials and losses by decomposition. Both additions and losses are very strongly controlled by management activities.



The amount of water available for plant growth is the primary factor controlling the production of plant materials. Other major controls are air temperature and soil fertility. Salinity and chemical toxicities can also limit the production of plant biomass. Other controls are the intensity of sunlight, the content of carbon dioxide in the atmosphere, and relative humidity.

The proportion of the total plant biomass that reaches the soil as a source of organic matter depends largely on the amounts consumed by mammals and insects, destroyed by fire, or produced and harvested for human use.

Practices decreasing soil organic matter include those that:

- 1. Decrease the production of plant materials by**
 - replacing perennial vegetation with short-season vegetation,
 - replacing mixed vegetation with monoculture crops,
 - introducing more aggressive but less productive species,
 - using cultivars with high harvest indices,
 - increasing the use of bare fallow.
- 2. Decrease the supply of organic materials by**
 - burning forest, range, or crop residue,
 - grazing,
 - removing plant products.
- 3. Increase decomposition by**
 - tillage,
 - drainage,
 - fertilization (especially with excess nitrogen).

Practices increasing soil organic matter include those that:

- 1. Increase the production of plant materials by**
 - irrigation,
 - fertilization to increase plant biomass production,
 - use of cover crops
 - improved vegetative stands,
 - introduction of plants that produce more biomass,
 - reforestation,
 - restoration of grasslands.
- 2. Increase supply of organic materials by**
 - protecting from fire,
 - using forage by grazing rather than by harvesting,
 - controlling insects and rodents,
 - applying animal manure or other carbon-rich wastes,
 - applying plant materials from other areas.
- 3. Decrease decomposition by**
 - reducing or eliminating tillage,
 - keeping the soil saturated with water (although this may cause other problems),
 - keeping the soil cool with vegetative cover.

(Prepared by the National Soil Survey Center in cooperation with the Soil Quality Institute, NRCS, USDA, and the National Soil Tilth Laboratory, Agricultural Research Service, USDA). Animal waste photo courtesy University of Nebraska-Lincoln, Institute of Agriculture and Natural Resources

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Soil Quality Information Sheet

Soil Quality Concerns: Pesticides

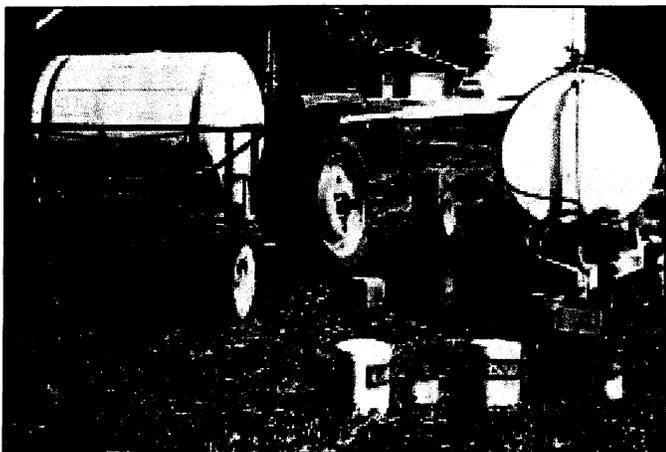
USDA Natural Resources Conservation Service

January 1998

What are pesticides?

Pesticides are synthetic organic chemicals used to control weeds in fields and lawns, and unwanted or harmful pests, such as insects and mites that feed on crops. Pesticides are divided into categories according to the target organisms they are designed to control (e.g., insecticides control insects).

Herbicides are by far the most commonly used pesticides in the United States. They range from non selective to highly selective for control of specific weeds in specific crops, with different products having postemergence, preplant, and preemergence uses. Insecticides are second in usage, and fungicides are third.



Effects of Pesticides on Soil Quality

The capacity of the soil to filter, buffer, degrade, immobilize, and detoxify pesticides is a function of the quality of the soil. Soil quality also encompasses the impacts that soil use and management can have on water and air quality, and on human and animal health. The presence and bio-availability of pesticides in soil can adversely impact

human and animal health, and beneficial plants and soil organisms. Pesticides can move off-site contaminating surface and groundwater and possibly causing adverse impacts on aquatic ecosystems.

What are pesticide formulations?

The formulation is the chemical and physical form in which the pesticide is sold for use. The active ingredient (a.i.) is the chemical in the formulation that has the specific effect on the target organism. The formulation improves the properties of the pesticides for storage, handling, application, effectiveness, or safety. Examples of formulated products are wettable powders and water-dispersible granules. A single pesticide is often sold in several different formulations, depending on use requirements and application needs.

Pesticide mode of action

Mode of action refers to the mechanism by which the pesticide kills or interacts with the target organism.

- Contact pesticides kill the target organism by weakening or disrupting the cellular membranes; death can be very rapid.
- Systemic pesticides must be absorbed or ingested by the target organism to disrupt its physiological or metabolic processes; generally they are slow acting.

How effective the pesticides are at killing the target organisms (efficacy) depends on the properties of the pesticide and the soil, formulation, application technique, agricultural management, characteristics of the crop, environmental or weather conditions, and the nature and behavior of the target organism.

Fate of pesticides in the environment

Ideally, a pesticide stays in the treated area long enough to produce the desired effect and then degrades into harmless materials. Three primary modes of degradation occur in soils:

- biological - breakdown by micro-organisms
- chemical - breakdown by chemical reactions, such as hydrolysis and redox reactions
- photochemical - breakdown by ultraviolet or visible light

The rate at which a chemical degrades is expressed as the half-life. The half-life is the amount of time it takes for half of the pesticide to be converted into something else, or its concentration is half of its initial level. The half-life of a pesticide depends on soil type, its formulation, and environmental conditions (e.g., temperature, moisture). Other processes that influence the fate of the chemical include plant uptake, soil sorption, leaching, and volatilization. If pesticides move off-site (e.g., wind drift, runoff, leaching), they are considered to be pollutants. The potential for pesticides to move off-site depends on the chemical properties and formulation of the pesticide, soil properties, rate and method of application, pesticide persistence, frequency and timing of rainfall or irrigation, and depth to ground water.

Retention of pesticides in the soil

Retention refers to the ability of the soil to hold a pesticide in place and not allow it to be transported. Adsorption is the primary process of how the soil retains a pesticide and is defined as the accumulation of a pesticide on the soil particle surfaces. Pesticide adsorption to soil depends on both the chemical properties of the pesticide (i.e., water solubility, polarity) and properties of the soil (i.e., organic matter and clay contents, pH, surface charge characteristics, permeability). For most pesticides, organic matter is the most important soil property controlling the degree of adsorption.

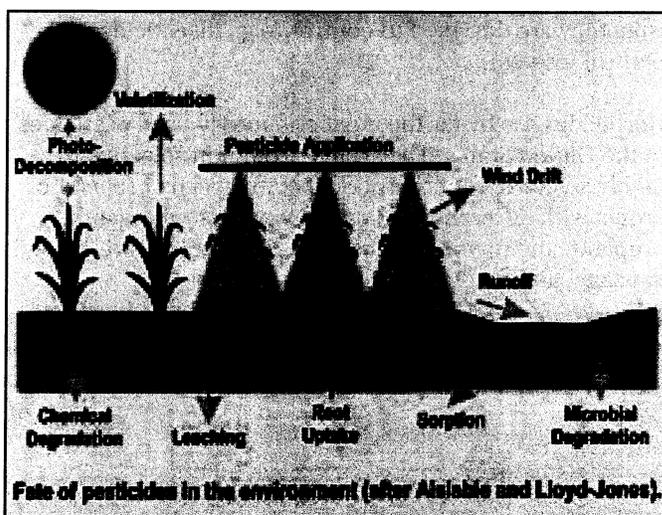
For most pesticides, the degree of adsorption is described by an adsorption distribution coefficient (K_d), which is mathematically defined as the amount of pesticide in soil solution divided by the amount adsorbed to the soil.

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Pesticide toxicity

The toxicity level of a pesticide depends on the deadliness of the chemical, the dose, the length of exposure, and the route of entry or absorption by the body. Pesticide degradation in soil generally results in a reduction in toxicity; however, some pesticides have breakdown products (metabolites) that are more toxic than the parent compound.

Pesticides are classified according to their potential toxicity to humans and other animals and organisms, as restricted-use (can only be purchased and applied by certified persons who have had training in pesticide application), and general use (may be purchased and applied by any person).



Use and application considerations

- Apply pesticides at the lowest effective level.
- Avoid unnecessary pesticide treatments.
- Use Integrated Pest Management.
- Follow all label instructions.
- Apply proper rates and times as label indicates.
- Calibrate application equipment.
- Apply formulations that minimize drift.
- Use safety equipment when handling.
- Store and dispose of pesticide containers properly.
- Use biological controls when appropriate.
- Alter farming or cropping systems to control pests.
- Use disease and insect resistant crop varieties.

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Soil Quality Information Sheet

Soil Quality Indicators: pH

USDA Natural Resources Conservation Service

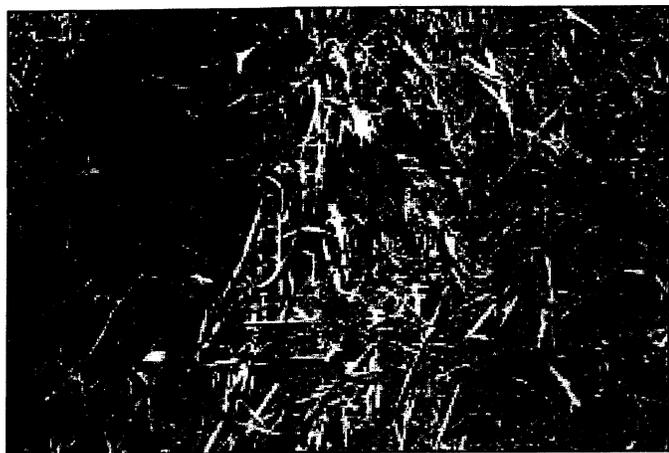
January 1998

What is pH?

Soil pH is a measure of the acidity or alkalinity in the soil. It is also called soil reaction.

The most common classes of soil pH are:

Extremely acid	3.5 – 4.4
Very strongly acid	4.5 – 5.0
Strongly acid	5.1 – 5.5
Moderately acid	5.6 – 6.0
Slightly acid	6.1 – 6.5
Neutral	6.6 – 7.3
Slightly alkaline	7.4 – 7.8
Moderately alkaline	7.9 – 8.4
Strongly alkaline	8.5 – 9.0



What is the significance of pH?

Availability of Nutrients

Soil pH influences the solubility of nutrients. It also affects the activity of micro-organisms responsible for breaking down organic matter and most chemical transformations in the soil. Soil pH thus affects the availability of several plant nutrients.

A pH range of 6 to 7 is generally most favorable for plant growth because most plant nutrients are readily available

in this range. However, some plants have soil pH requirements above or below this range.

Soils that have a pH below 5.5 generally have a low availability of calcium, magnesium, and phosphorus. At these low pH's, the solubility of aluminum, iron, and boron is high; and low for molybdenum.

At pH 7.8 or more, calcium and magnesium are abundant. Molybdenum is also available if it is present in the soil minerals. High pH soils may have an inadequate availability of iron, manganese, copper, zinc, and especially of phosphorus and boron.

Micro-organisms

Soil pH affects many micro-organisms. The type and population densities change with pH. A pH of 6.6 to 7.3 is favorable for microbial activities that contribute to the availability of nitrogen, sulfur, and phosphorus in soils.

Pesticide Interaction

Most pesticides are labeled for specific soil conditions. If soils have a pH outside the allowed range, the pesticides may become ineffective, changed to an undesirable form, or may not degrade as expected, which results in problems for the next crop period.

Mobility of heavy metals

Many heavy metals become more water soluble under acid conditions and can move downward with water through the soil, and in some cases move to aquifers, surface streams, or lakes.

Corrosivity

Soil pH is one of several properties used as a general indicator of soil corrosivity. Generally, soils that are either highly alkaline or highly acid are likely to be corrosive to steel. Soils that have pH of 5.5 or lower are likely to be highly corrosive to concrete.

What controls soil pH?

The acidity or alkalinity in soils have several different sources. In natural systems, the pH is affected by the mineralogy, climate, and weathering. Management of soils

often alters the natural pH because of acid-forming nitrogen fertilizers, or removal of bases (potassium, calcium, and magnesium). Soils that have sulfur-forming minerals can produce very acid soil conditions when they are exposed to air. These conditions often occur in tidal flats or near recent mining activity where the soil is drained.

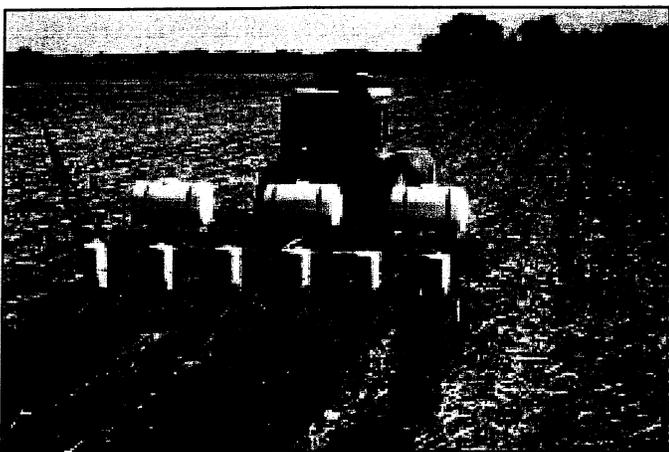
The pH of a soil should always be tested before making management decisions that depend on the soil pH.

How is pH measured?

A variety of kits and devices are available to determine the pH in the field. The methods include:

- dyes
- paper strips
- glass electrodes.

Soil pH can change during the year. It depends on temperature and moisture conditions, and can vary to as much as a whole pH unit during the growing season. Since pH is a measure of the hydrogen ion activity [H⁺], many different chemical reactions can affect it. Temperature changes the chemical activity, so most measurements of pH include a temperature correction to a standard temperature of 25 degrees C (77°F). The soil pH generally is recorded as a range in values for the soil depth selected.



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How is soil pH modified?

A soil pH below about 5.6 is considered low for most crops. Generally, the ideal pH range is between 6.0 and 7.0. Liming is a common method to increase the pH. It involves adding finely ground limestone to the soil. The reaction rate for limestone increases when soil temperatures are warm and soil moisture is high. If the limestone is more finely ground, the reaction is faster.

The amount of limestone to apply depends on the amount of organic matter and clay as well as the pH. Fertility testing laboratories that have local experience make this determination.

A soil pH that is more than about 8.0 is considered high for most crops. Soils that have a pH in this range are often also calcareous.

Calcareous soils have a high content of calcium carbonate. The pH of these soils does not change until most of the calcium carbonate is removed. Acids that are added to the soil dissolve the carbonates and lower the soil pH. Treatments with acid generally are uneconomical for soils that have a content of calcium carbonate of more than about 5%. Because phosphorus, iron, copper, and zinc are less available to plants in calcareous soils, nutrient deficiencies are often apparent. Applications of these nutrients are commonly more efficient than trying to lower the pH.

When the soil pH is above 8.6, sodium often is present. These soils generally do not have gypsum or calcium carbonates, at least not in the affected soil horizons. Addition of gypsum followed by leaching using irrigation is a common reclamation practice. However, salts flushed into drainage water may contaminate downstream waters and soils.

The application of anhydrous ammonia as a nitrogen fertilizer contributes to lowering the soil pH. In some parts of the country, applications of ammonia lower the surface soil pH from ranges of 6.6 to 7.3 to below 5.6. This reduction can be easily overlooked in areas of no-till cropping unless the pH is measured in the upper 2 inches.

Chemical amendments that contain sulfur generally form an acid, which lowers the soil pH.

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Soil Quality Information Sheet

Soil Quality Resource Concerns: Soil Erosion

USDA Natural Resources Conservation Service

April 1996



Deposition of eroded materials can obstruct roadways and fill drainage channels. Sediment can damage fish habitat and degrade water quality in streams, rivers, and lakes.

Blowing dust can affect human health and create public safety hazards.

What are some signs of erosion?

Wind erosion:

- dust clouds,
- soil accumulation along fence lines or snowbanks,
- a drifted appearance of the soil surface.

Water erosion:

- small rills and channels on the soil surface,
- soil deposited at the base of slopes,
- sediment in streams, lakes, and reservoirs,
- pedestals of soil supporting pebbles and plant material.

Water erosion is most obvious on steep, convex landscape positions. However, erosion is not always readily visible on cropland because farming operations may cover up its signs. Loss of only 1/32 of an inch can represent a 5 ton per acre soil loss.

Long-term soil erosion results in:

- persistent and large gullies,
- exposure of lighter colored subsoil at the surface,
- poorer plant growth.

How can soil erosion be measured?

Visual, physical, chemical, and biological indicators can be used to estimate soil surface stability or loss.

What is erosion?

Wind or water erosion is the physical wearing of the earth's surface. Surface soil material is removed in the process.

Why should we be concerned?

Erosion removes topsoil, reduces levels of soil organic matter, and contributes to the breakdown of soil structure. This creates a less favorable environment for plant growth.

In soils that have restrictions to root growth, erosion decreases rooting depth, which decreases the amount of water, air, and nutrients available to plants.

Erosion removes surface soil, which often has the highest biological activity and greatest amount of soil organic matter. This causes a loss in nutrients and often creates a less favorable environment for plant growth.

Nutrients removed by erosion are no longer available to support plant growth onsite, but can accumulate in water where such problems as algal blooms and lake eutrophication may occur.

Visual indicators

- comparisons of aerial photographs taken over time,
- presence of moss and algae (cryptogams) crusts in desert or arid soils,
- changes in soil horizon thickness,
- deposition of soil at field boundaries.

Physical indicators

- measurements of aggregate stability,
- increasing depth of channels and gullies.

Chemical indicators

- decreases in soil organic matter content,
- increases in calcium carbonate content at the surface, provided greater content exists in subsurface layers,
- changes in cation-exchange capacity (CEC).

Biological indicators

- decreased microbial biomass,
- lower rate of respiration,
- slower decomposition of plant residues.

What causes the problem?

Water erosion

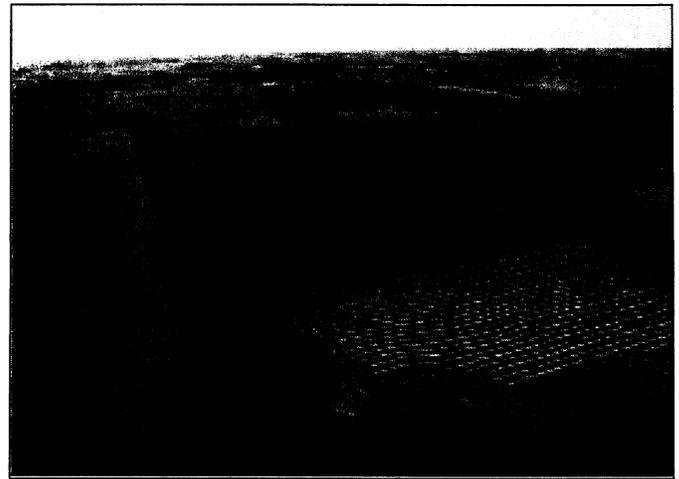
- lack of protection against raindrop impact,
- decreased aggregate stability,
- long and steep slopes,
- intense rainfall or irrigation events when plant or residue cover is at a minimum,
- decreased infiltration by compaction or other means.

Mechanical erosion

- removal by harvest of root crops,
- tillage and cultivation practices that move soil downslope.

Wind erosion

- exposed surface soil during critical periods of the year,
- occurrence of wind velocities that are sufficient to lift individual soil particles,
- long, unsheltered, smooth soil surfaces.



How can soil erosion be avoided?

Soil erosion can be avoided by:

- maintaining a protective cover on the soil,
- creating a barrier to the erosive agent,
- modifying the landscape to control runoff amounts and rates.

Specific practices to avoid water erosion:

- growing forage crops in rotation or as permanent cover,
- growing winter cover crops
- interseeding,
- protecting the surface with crop residue,
- shortening the length and steepness of slopes,
- increasing water infiltration rates,
- improving aggregate stability.

Specific practices to avoid wind erosion:

- maintaining a cover of plants or residue,
- planting shelterbelts,
- stripcropping,
- increase surface roughness,
- cultivating on the contour,
- maintaining soil aggregates at a size less likely to be carried by wind.

(Prepared by the National Soil Survey Center in cooperation with the Soil Quality Institute, NRCS, USDA, and the National Soil Tilth Laboratory, Agricultural Research Service, USDA)

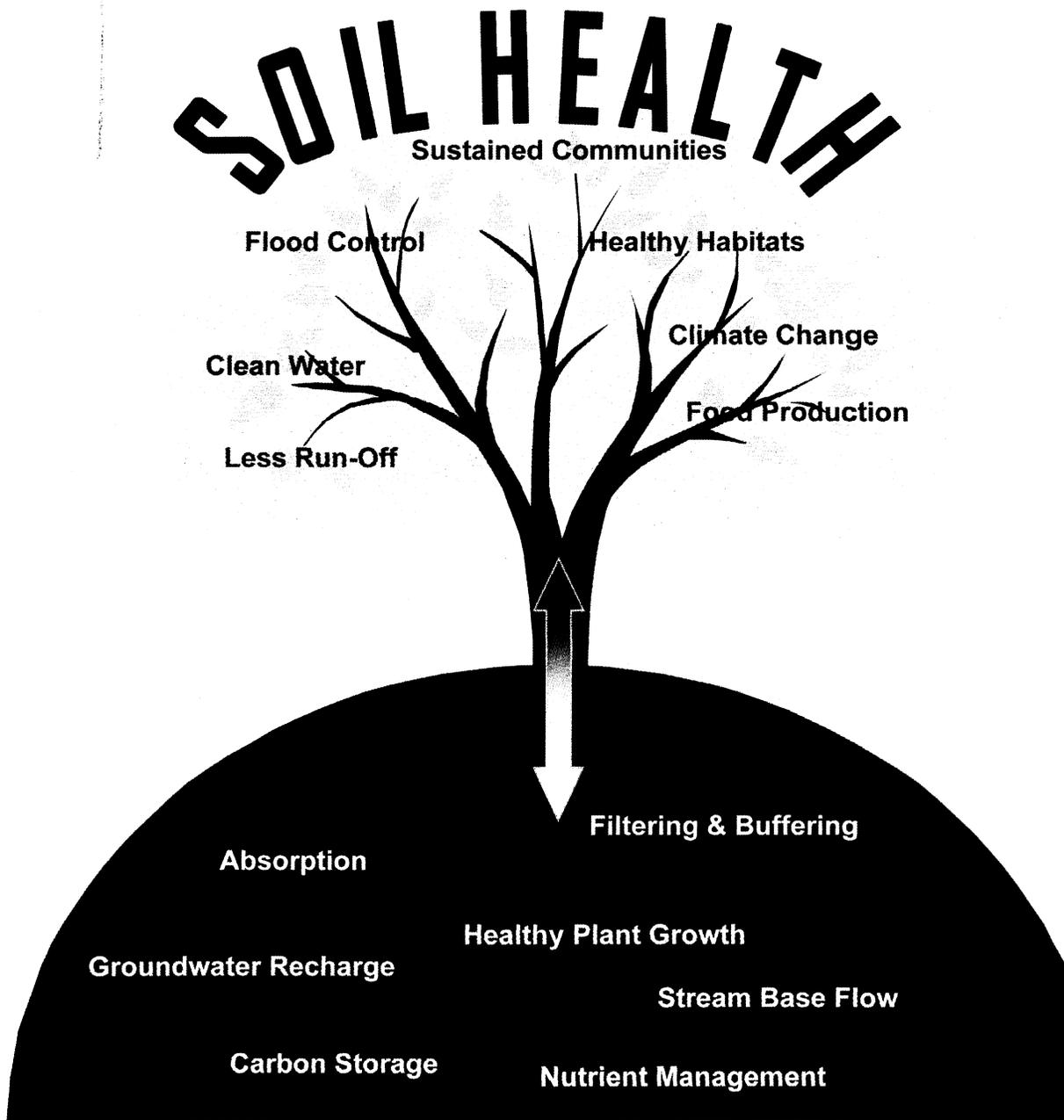
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**New Jersey Association of Conservation Districts
presents the**

1st Annual Soil Health Conference

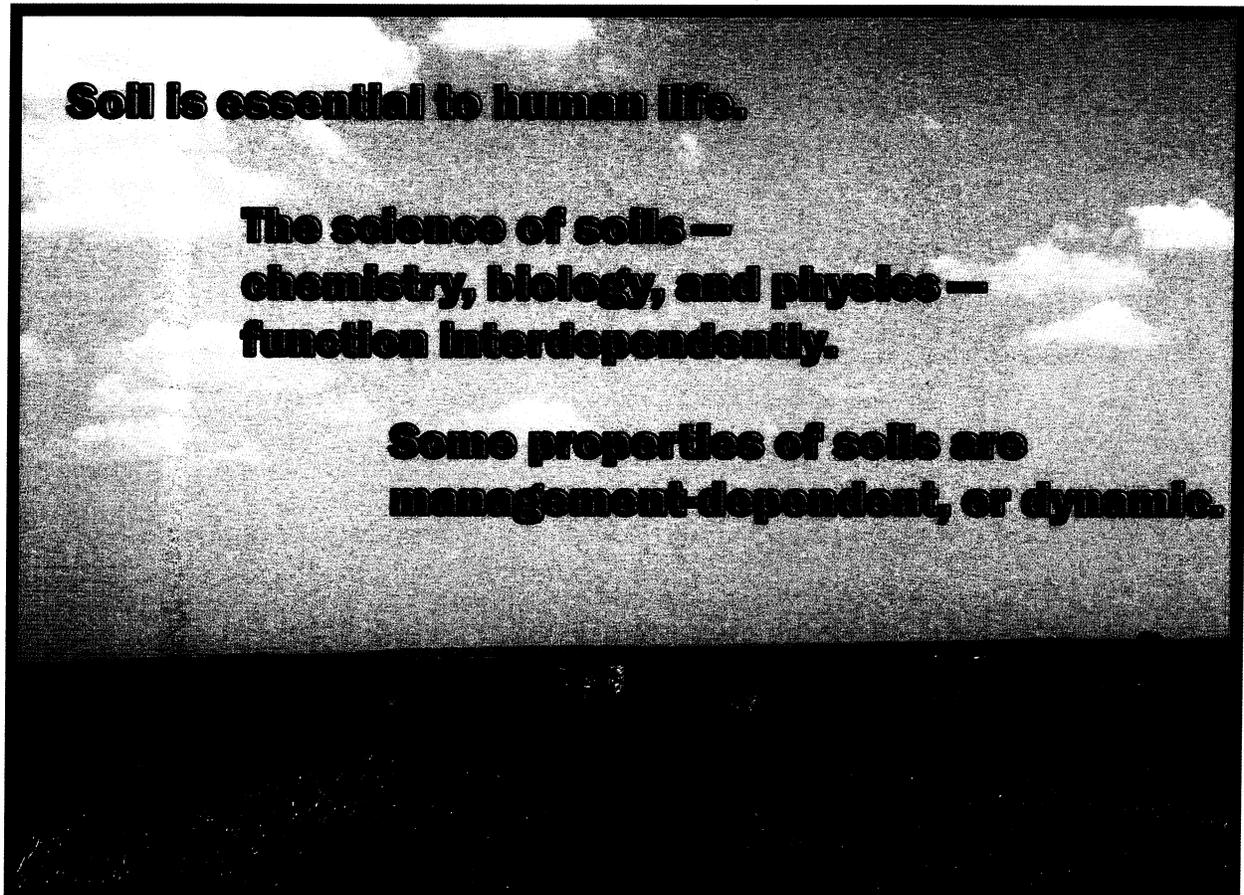
Burlington County College, The Enterprise Center, Mount Laurel, New Jersey - March 9, 2010



is at the ROOT of Everything!

Soil Health - The capacity of a specific kind of soil to function, within natural or managed ecosystem boundaries, to sustain plant and animal productivity, maintain or enhance water and air quality, and support human health and habitation.

Soil Science Society of America, 1995



3 Easy Steps to Healthy Soil

Note: Soil Health Scorecard is at <http://www.sjrkd.org/soilhealth/scorecard/>



Step 1: To Examine Soil Health, you must first dig a hole.

Step 2: To Assess Soil Health, you must evaluate properties.

Step 3: To apply Soil Health concepts, you must discuss site-specific land use.

Welcome

March 9, 2010

Dear Participants:

On behalf of the New Jersey Association of Conservation Districts, we welcome you to the 1st of what we anticipate to be many Soil Health Conferences. Our slogan says it best- ***Healthy Soil is At the Root of Everything.***

We have all witnessed how soil health is closely connected to the quality of our air, water and other natural resources. But to what degree do we understand how to recognize, create and sustain healthy soils? Through your participation at this conference we know you will leave with a better appreciation of how healthy soils are truly connected to everything we do.

We have an outstanding line-up of key note speakers here today. Through their presentations and subsequent break-out sessions we are providing an excellent opportunity to exchange ideas, technology and best management practices to better manage our soils. We are pleased to have you here today and know that you will take advantage of this opportunity to learn, make new connections and to bring soil health into all aspects of your life.

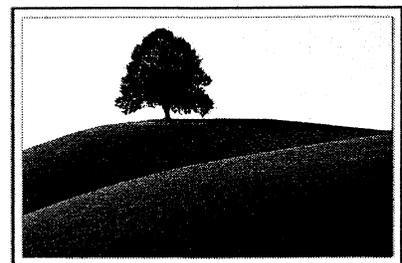
This is a unique opportunity to gather together such a diverse group from around the region for an educational conference that focuses on soil health issues. We thank you for attending and sharing your knowledge and expertise.

Louise Davis, President
New Jersey Association of Conservation Districts

What is Healthy Soil?

"Healthy soil means to me that our ecosystem is fully functioning. It means a soil that can buffer nutrients, absorb water, is rich in living organisms and can produce healthy food and fiber for our world to enjoy. It is the source of our existence." — Eileen B. Miller

"Soil health is directly related to the structure of soil microbial communities which are responsible for critical ecosystem processes such as nutrient cycling, beneficial plant symbioses, food web stability; the vulnerability of habitats to invasive species; and the origin of many chemicals used for human health." — Dr. Rusty Rodriguez



"Soils are living ecosystems that interact with every other ecosystem on the planet. Soils that are not "healthy" cannot carry out their normal functions and will inhibit these interactions, and eventually all the adjoining ecosystems may collapse. For this reason, healthy soils are essential to the overall health of the planet." — Fred Schoenagel

Agenda

7:45 – 8:30 am **Registration, Refreshments & Exhibits**

8:30 – 9:00 am **Welcome, Introductions and Opening Remarks**

*Louise Davis, President, NJ Association of Conservation Districts
Dr. Robert C. Messina, Jr., President, Burlington County College (Invited)
Dr. Robert M. Goodman, Executive Dean, School of Environmental and
Biological Sciences, Rutgers University
State Senator Phil Haines, 8th District
U.S. Congressman John Adler (Invited)*

9:00 – 9:30 am **Opening Plenary**

Jeffrey W. Moyer, Farm Director, Rodale Institute

9:30 – 10:00 am **Demonstration of Soil Health**

*Fred Schoenagel, Soil Scientist
Eileen Miller, Resource Conservationist
USDA- NJ Natural Resources Conservation Service*

10:00 – 10:15 am **BREAK**

10:15 - 11:30 am **A Panel Discussion with the Experts**

*Don Knezick, Moderator & Conference Committee Chair
Member, State Soil Conservation Committee
Supervisor, Burlington County SCD*

Why Soil Health Matters to . . .

- ❖ **Runoff Impacts & Stormwater**
Joseph Skupien, P.E., President, Stormwater Management Solutions
- ❖ **Recharge Quantity and Quality**
Timothy Reilly, Research Hydrologist, US Geological Survey
- ❖ **Climate Change & Ecosystems**
Jenifer Wightman, Dept. of Crop and Soil Sciences, Cornell University
- ❖ **Habitat Connections & Fisheries**
Dr. Russell "Rusty" Rodriguez, USGS Biological Resources Division
- ❖ **Sustainable Agriculture**
Dr. Mary Barbercheck, Professor of Entomology, Penn State University

SOIL HEALTH IS AT THE ROOT OF EVERYTHING!

11:30 – 12:00 am **Q&A**

12:00 – 1:00 pm **LUNCH**

*Douglas H. Fisher, Secretary, NJ Department of Agriculture
Clips from "Dirt the Movie" <http://www.dirtthemovie.org/>
Tour of NASA Hydrology Lab Available*

1:00 – 1:30 pm **Making Meaningful Measurements of Soil Health**

Overview of Problems in Barnegat Bay – A Case Study
*Robert Nicholson, Hydrologist
U.S. Geological Survey, New Jersey Water Science Center*

Barnegat Bay Soil Health Card – An Assessment Tool
Eileen Miller, Resource Conservationist, NRCS

1:30 – 2:30 pm **Solution Sessions – Small Group Break-Out**

*Participants in **Solution Sessions** identify gaps in our knowledge, implementation issues, & practical management strategies.*

❖ **Air & Climate Change:**

*Facilitator: Ken Marsh, 2nd Vice President, NJACD
Recorder: Ken Taaffe, Coordinator, South Jersey RC&D*

❖ **Water Resources:**

*Facilitator: Timothy Reilly, Research Hydrologist, USGS
Recorder: Martha Maxwell-Doyle, Supervisor, Ocean County SCD*

❖ **Land Use Issues:**

*Facilitator: Marilyn Mroz, P.E., Cushetunk Technical Services, Inc.
Recorder: Bill Brash, District Manager, Mercer County SCD*

2:30 pm **BREAK**

2:45 – 3:30 pm **Reconvene Entire Group - Solution Session Report Out**

3:30 – 4:00 pm **Resources - Helping People Sustain Healthy Soil**

- ◆ **"Web Soil Survey"** - Fred Schoenagel, Soil Scientist, NRCS
- ◆ **"Soil Biology Primer"** – Loren Muldowney, Soil Scientist, Rutgers/NJAES Soil Testing Lab
- ◆ **"Urban Soil Primer"** – Eileen Miller, Resource Conservationist, NRCS

4:00 – 4:30 pm **Bringing it Back Together – Next Steps – Evaluations**

Don Knezick, Moderator

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Supervisor, Burlington County Soil Conservation District,
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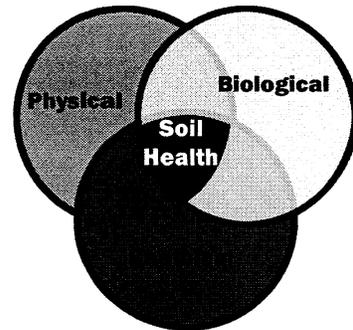
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Special thanks to **Ken Taaffe**, Coordinator of South Jersey RC&D Council and **KP Kilpatrick** for all the computer assistance, website development, and all around technological expertise.



More information on Soil Health may be found at

<http://www.sjrkd.org/soilhealth/>

Speaker bios, info, & presentations will be posted.

DIRT! The Movie

tells the amazing and little known story of the relationship between humans and living dirt.

Dirt feeds us and gives us shelter. Dirt holds and cleans our water. Dirt heals us and makes us beautiful. Dirt regulates the earth's climate. Dirt is the ultimate natural resource for all life on earth.

Yet most humans ignore, abuse, and destroy our most precious living natural resource. It doesn't have to be that way. The film offers a vision of a sustainable relationship between Humans and Dirt through profiles of the global visionaries who are determined to repair the damage we've done before it's too late. There are many ways we can preserve the living skin of the earth for future generations. If you care about your food, water, the air you breathe, your health and happiness...



Roll up your sleeves and **Get Dirty!**

Shown at noon today!

Introducing our Plenary Speaker — Jeffrey W. Moyer

Jeffrey W. Moyer has worked for the Rodale Institute for over 33 years and has been the Farm Manager/Director for the past 27 years. He directs all the farming operations involving all the planted areas, research trials, production fields, greenhouses, gardens and grounds. The Institute farm is a 333 acres research and education facility in Southeastern Pennsylvania.

Currently as Farm Director he has vast experience and knowledge regarding organic farming, agronomic crops, vegetable production, livestock production (dairy and beef), apples, and composting systems. Jeff has provided the media with a reliable source and perspective for information on current agricultural issues.

Jeff is also the project leader on the highly acclaimed Biological No-Till project where cover crop systems and specialized rolling equipment are being developed to facilitate no-till planting systems without herbicides.

He currently serves as Chairman of the National Organic Standards Board (NOSB), helped write the national compost standards, pasture regulations, and

aquaculture standards for fish production. He holds a position on the Leonardo Academy's (ANSI) committee for sustainable ag and frequently speaks at farming seminars and workshops around the world.

He possesses both production and research expertise in crop production, livestock production (beef), greenhouse management, compost systems and cover crop management.

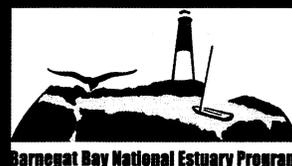
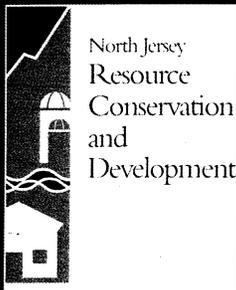




NJACD and the members of the Committee acknowledge and thank the following organizations whose support has helped make the 1st Annual Soil Health Conference possible:



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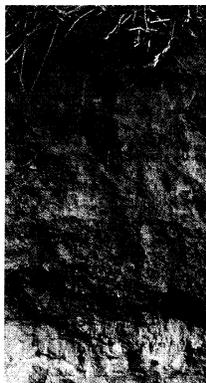
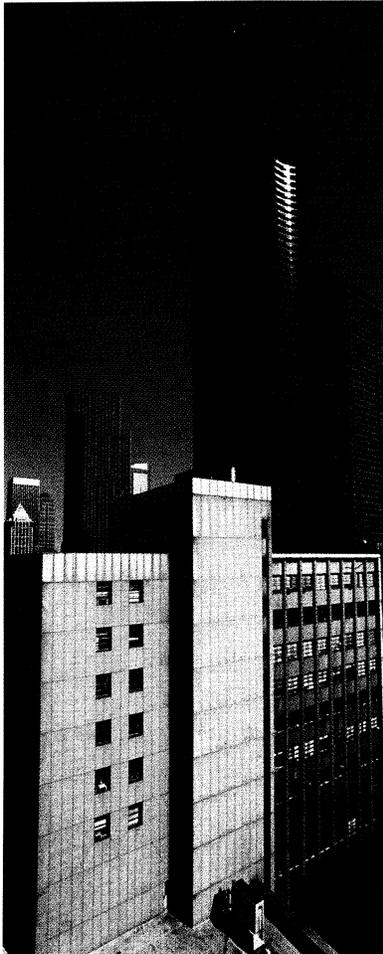


Urban Soil Primer



Natural
Resources
Conservation
Service

**For homeowners and renters, local planning boards,
property managers, students, and educators**



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Suggested citation: Scheyer, J.M., and K.W. Hipple. 2005. Urban Soil Primer. United States Department of Agriculture, Natural Resources Conservation Service, National Soil Survey Center, Lincoln, Nebraska (<http://soils.usda.gov/use>).

Cover: Urban scenes and soil profiles from across the United States.

Preface

The *Urban Soil Primer* is intended to give planning officials and people who live in urban areas an introduction to soils. It provides information important in planning and managing land resources in a manner that helps to prevent or mitigate problems associated with sedimentation, contamination, runoff, and structural failure. In nontechnical language, this publication describes the basic processes and functions common to all soils. Much of the complexity of soil science is simplified, and many sensitive issues are discussed only in passing.

This primer lists many affordable resources available to people seeking information about soils in urban areas. These resources include government agencies, such as the Environmental Protection Agency (www.epa.gov), which provides information about contamination, and the Natural Resources Conservation Service (www.nrcs.usda.gov), which provides assistance with conservation planning and implementation through local field offices. The Natural Resources Conservation Service (NRCS) provides leadership in a partnership effort to help people conserve, maintain, and improve our natural resources and environment. Other resources include universities, private consultants, and nonprofit groups experienced with soils in urban areas.

This primer provides the basic vocabulary and key concepts needed for further explorations in urban soil survey and for the development of interpretive guidelines for specific local uses by soil type. Many of the terms used in this publication are defined in the Glossary. The primer was produced by staff at the NRCS National Soil Survey Center with assistance from a cadre of NRCS field soil scientists. It is available as a printed booklet and as a compact disc (CD), or it may be downloaded from the NRCS Web site (<http://soils.usda.gov/use>).

Contact your State or local office of the Natural Resources Conservation Service for more information. Visit http://offices.usda.gov/scripts/ndCGI.exe/oip_public/USA_map to find the NRCS field office near you.

Welcome to the fascinating field of urban soils.

Photo Credits

Most of the photos included in this primer are courtesy of USDA, NRCS Photo Gallery; USDA Image Gallery; USDA, ARS Photo Gallery; USDA, NRCS employees; and USDA, NRCS Earth Team Volunteers. Exceptions are as follows:

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2.1 and 4.5	Dr. Ann Kennedy, USDA, Agricultural Research Service
3.1, 4.1, 5.1a, 5.1b, and 6.1	Laszlo Falvay, artist, Green Pac Program
4.8	Dr. Samantha Langley-Turnbaugh
6.6	USDI, United States Geologic Survey

Acknowledgements

A cadre of NRCS field soil scientists in urban areas helped to develop and review this primer and provided some of the photos. Community members in various States also provided assistance. Members of National Soil Interpretations Advisory Group helped to review the document, and NRCS soil scientists at National Soil Survey Center provided peer review. NRCS Earth Team Volunteers in Urban Soils at the National Soil Survey Center contributed preliminary design, draft text, and photos.

Chapter 1: Introduction

Soil is an amazing, mostly natural material that covers nearly all of the land surface of the earth. Soil, along with water and air, provides the basis for human existence. It is the interface between the earth's atmosphere and bedrock or ground water. It has either formed in place or has been transported to its present location by wind, water, ice, gravity, or humans. Soils may have been deposited thousands or millions of years ago by volcanoes, glaciers, floods, or other processes or were delivered to the site by truck or other mechanical device an hour ago, a week ago, or several months ago. These facts illustrate why soils are very complex. Soil functions, as part of a natural ecosystem, are also very complex and diverse. Basic knowledge about soil allows us to use it wisely.

The primary goal of this publication is to help people who live in cities understand soil and to help them know where and how to get information about soil. Knowing about soil and its potentials and limitations helps urban planners and those living in urban areas to make good decisions about using their soil as a basic and valuable resource. Soil is the basic raw material and common link to all projects whether one wants to build a park, a street, a golf course, or a large building, landscape a yard, or just plant a backyard garden. Soil lies beneath each activity!



Figure 1.1: Urban garden.



Figure 1.2: Playground.

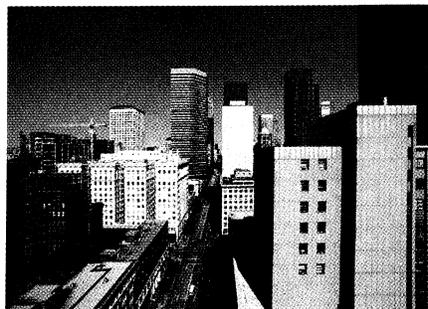


Figure 1.3: City skyline.

Urban project managers and homeowners can predict a soil's behavior under similar situations when they know how soil responds to the same use in other locations. Similar kinds of soil tend to behave in the same ways. There are more than 22,000 different soils identified and mapped in the United States. Some States recognize more than 1,000 different kinds of soil. Knowing soil responses to specific uses allows engineers and others to design projects that will not require high maintenance costs, will last a long time, will not harm individuals, society, or ecosystems, and will not fail and/or require expensive repair and/or removal costs.



Figure 1.4: Urban development.

Growth Trends in Urban Areas

Figure 1.5 demonstrates that urban areas are expanding at a rapid rate within the United States. Urbanization is also a worldwide issue. Soils that are best suited to other uses, such as providing food and fiber for our Nation, are commonly the easiest to use as sites for homes and cities. Urban areas often expand into surrounding forestland, rangeland, or agricultural land areas because these areas are adjacent to existing urban areas. Prime farmland is vanishing at a alarming rate in certain regions of the United States because of urban expansion and development (figure 1.6). We must balance the increasing size of urban areas with our need for food and fiber.

Urban areas occur all across the USA, from coastal areas to areas high in the mountains, and soils occur in such areas as parks, playgrounds, lawns, and gardens. These soils are similar in some ways to soils in rural areas, but in other ways they are very different. A basic understanding of urban soils will help you learn more about this valuable resource. As urban areas grow and change, so must the management of natural resources surrounding and within those areas.

We invite you to continue to explore the complex, fascinating, and fun science of urban soils.

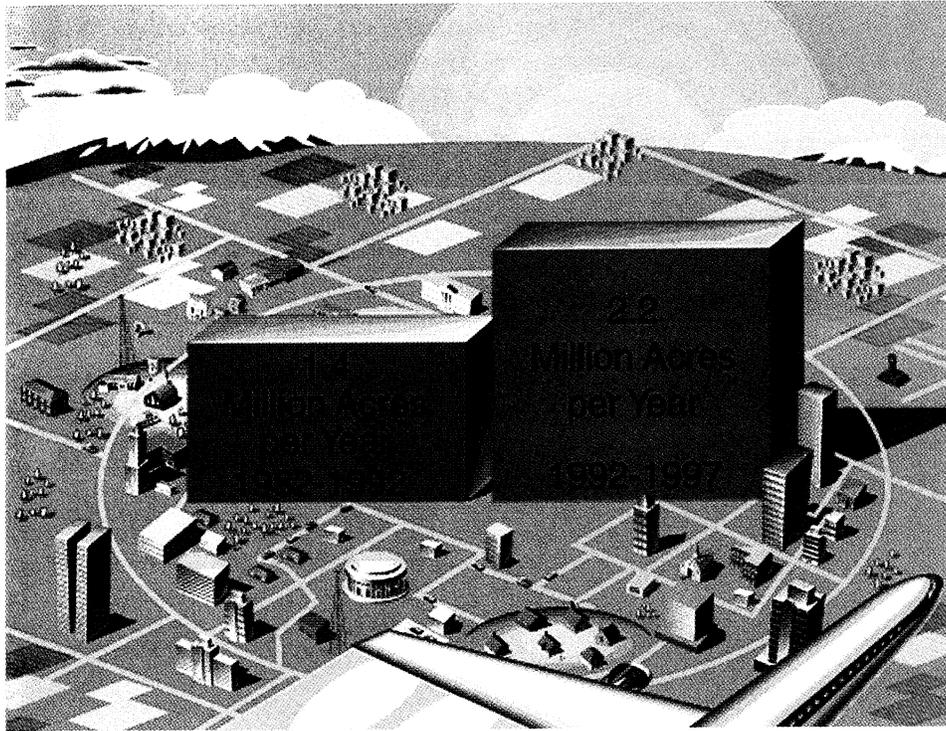


Figure 1.5: Land converted to urban development from 1982 through 1997 (NRCS, NRI).

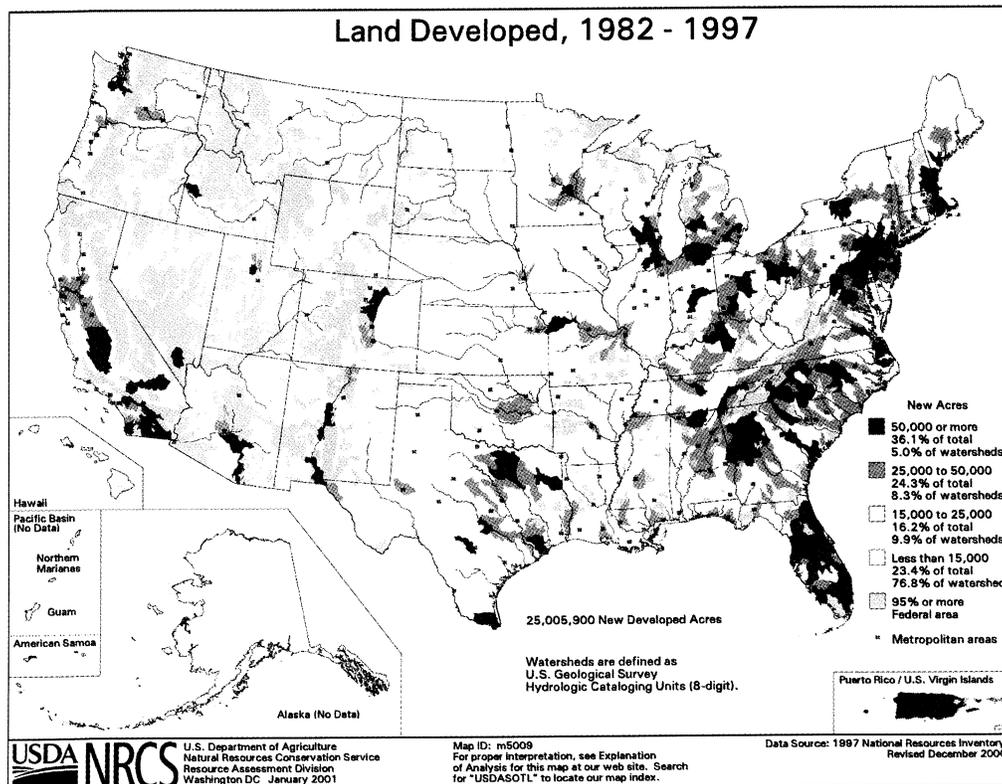


Figure 1.6: Annual rate of urban development from 1982 through 1997 (NRCS, NRI).

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Chapter 2: Basic Soil Properties

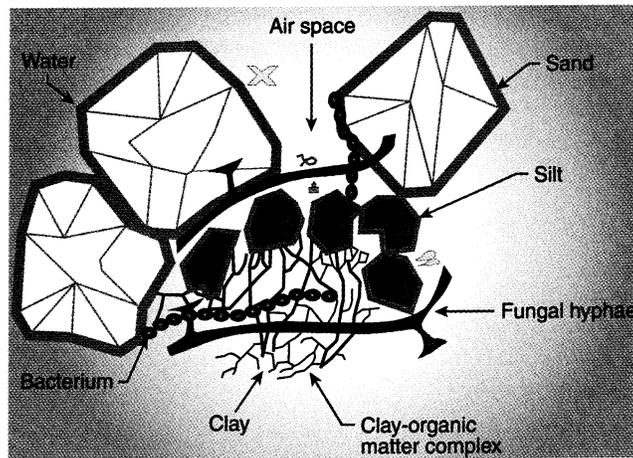


Figure 2.1

Soils in an urban area may share some properties with soils in forests, pastures, cotton fields, or even other urban areas. There are large differences in soils as they naturally occur in forests, farmed fields, and grazing land areas, and these differences are changed when an area is converted to an urban area. Soil scientists have developed conventions and language to communicate among themselves. It is important that we share scientific information with everyone, not just other scientists and professionals. Soil properties, such as soil texture and structure, particle-size distribution, soil reaction, and bulk density, help us to understand and predict how soils react and respond to different uses. Construction activities, compaction, and surface sealing dramatically change soil properties and can sometimes result in a reduced ability to perform the critical functions or activities of natural soil.

Topics in this chapter:

- Soil variation
- Soil components
- Soil-forming processes
- Soil horizons
- Measuring and monitoring soil properties

Soil Variation

What is soil and why is soil important to each of us? Traditionally, soil is defined as a dynamic natural body that is made up solids, liquids, and gases, occurs on the earth's surface, contains living matter, and supports or is capable of supporting plants. Bockheim (1974) defines urban soil as "soil material having a non-agricultural, man-made surface layer more than 50 cm (20 inches) thick that has been produced by

mixing, filling, or by contamination of land surface in urban and suburban areas.” In some important ways, soils of urban areas differ from soils of other areas.

Differences in urban soils have been observed and recorded by scientists, engineers, equipment operators, and construction workers for a long time. Even within urban areas, there is a multiplicity of soil conditions, ranging from “natural” soils that are relatively undisturbed to soils in which the natural materials have been mixed or truncated, to soils that formed in added materials, or fill, of varying thickness. Each of these areas, in turn, can be subject to different types of use and management, which can further affect their soil properties. Soils in urban areas can be divided into two general types: *natural* soils, which formed in material naturally deposited by water, wind, or ice or in material weathered from the underlying bedrock, and *anthropogenic* soils, which formed in human-deposited material, or fill (table 2.1). Anthropogenic soils are almost anywhere in the urban environment. The purpose of adding fill to an area may be to alleviate undesirable soil properties or to modify the urban landscape for specific activities.

Table 2.1: Examples of Fill Material in Urban Soils

- Natural soil materials that have been moved around by humans
- Construction debris
- Materials dredged from waterways
- Coal ash
- Municipal solid waste
- A combination of any or all of the above

Characteristics of soil in any urban area depend on many things. They depend on how deep the site has been excavated during construction and if new materials were brought in and mixed with the original soil materials. They depend on the properties of the original natural soil and the past uses of the site. Many times topsoil is removed from the site prior to construction and may or may not be returned to the site. After excavation, subsoil may be placed as fill over topsoil. Changing the order of the soil layers or mixing the topsoil and subsoil can alter soil properties. These variables make predicting soil behavior difficult in urban areas.

Soil Components

All soil is made up of air, water, numerous kinds of living and/or dead organisms (organic matter), and mineral matter (sand, silt, and clay). In the urban arena, it includes many manmade materials. The amount of each of these soil components varies from one place to another in the world or from one kind of soil to another. Soil components can vary dramatically within distances of only a few feet on the same landscape.

Soil composition can be dramatically changed by pedestrian or vehicular traffic, especially when the soil is wet. The soil components most easily changed are the amounts of soil air and water. Imagine the change in soil composition at construction sites after large trucks and heavy construction equipment drive over a soil and compact it. Imagine people walking and playing on wet soils in city parks and recreation areas or yards. Note the differences in percent of soil air and soil water in figures 2.2 and 2.3. Figure 2.2 illustrates the general composition of a natural soil. Figure 2.3 illustrates the general composition of a soil that has been compacted by heavy traffic. As soil particles are squeezed together, pores for air and water are reduced in size and number (figure 2.4). The reduced pore space changes the way a soil handles water intake and water movement throughout its layers, or horizons.

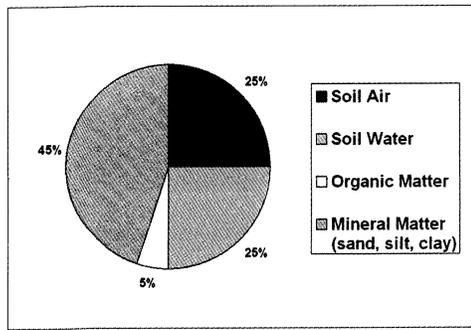


Figure 2.2: Composition of a natural soil, by weight.

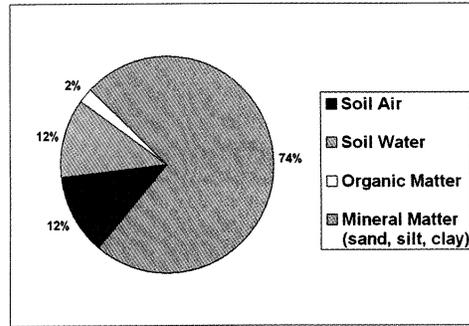


Figure 2.3: Composition of a compacted soil, by weight.

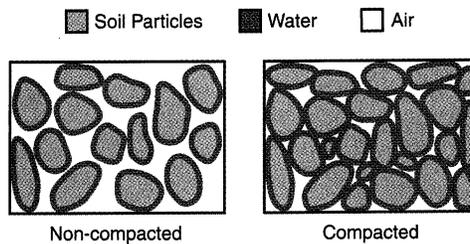


Figure 2.4: Soil pore space.

Soil-Forming Processes

Soils form through a group of processes no matter where they are located or what they are used for. All soils form because of four processes operating along with five basic soil-forming factors. The four processes that operate on soil material are additions, transformations, translocations, and losses (figure 2.5). We are able to map, classify, and interpret soil because a given set of environmental factors produces a predictable kind of soil.

The soil-forming factors are parent material, climate, living and dead organisms, time, and landscape position. When all soil-forming factors are similar, a similar soil is produced. If we change one or more of the soil-forming factors significantly, then a different soil is produced.

Additions to soil generally include organic matter, fertilizer, pollutants, and deposits of soil material. All of the additions change a soil and how it functions. In urban areas new soil material is sometimes added on top of an existing soil. If thick enough, the new layer or layers can change the way the soil develops. When a layer of concrete or asphalt is added to the top of a soil in areas where streets, parking lots, or driveways are built, additions to the soil are suddenly altered, restricted, or even stopped.

Transformations are changes that take place within a soil. In figure 2.5, transformations are illustrated by the letters x and y and the arrows that connect them. During transformation processes, material does not leave the soil but is simply changed from one form to another or from one compound to another. Micro-organisms and earthworms play an important role in soil transformations. Earthworms eat soil and plant materials and transform them into organic material that provides

food for plants and other organisms. Chemical weathering changes parent material, such as rocks and sand grains, and creates new minerals and/or smaller particles. Rocks are transformed into sand grains, and sand grains are transformed into silt and clay particles over time. As iron particles change form, they change soil colors from gray to brown or to red and yellow. Applying too much fertilizer of certain kinds can transform a soil into one that is too acidic for plants to grow.

Translocations are movements of soil components from one place to another in the soil. Translocations can move materials from one soil layer to another and can even move the materials completely out of a soil. Water moves through a soil profile and carries clay particles, soluble salts, organic matter, and chemical compounds downward into the soil. Translocations can also be upward or horizontal. As soil dries and water evaporates from the soil surface, minerals and salts may move back toward the soil surface. In dry areas translocations are restricted because there is less water to carry compounds and materials deep into the soil. Compounds and minerals can move only as deep as water moves into a soil. Concentrations of soluble material generally are closer to the surface in dry areas than in other areas. Windthrow and the activity of animals (i.e., ants, termites, groundhogs, and worms) also can move soil components upward.

Losses occur when water moves material through and out of a soil profile. If enough water is available, soluble materials, such as sodium and calcium, are removed early in the process of soil formation. Lawn and garden fertilizers are relatively soluble and may be removed from a soil when too much water is applied. Ground-water pollution can occur if too much water is added to a soil that contains contaminants. Erosion by wind or water removes the soil particles and compounds needed for plant growth. Topsoil removed through water erosion in a given area can improve the soil in the area where the sediments are deposited.

Soil Horizons

Soils are made up of soil horizons, or layers, that form as the result of five soil-forming factors. The six major kinds of soil horizons are designated as O, A, E, B, C, and R (figure 2.6). All six of these horizons are not always evident in every soil profile.



Figure 2.5: Soil-forming processes.

For example, most agricultural soils do not have an O horizon because organic horizons are usually mixed with A horizons during tillage. Also, a soil has an R horizon only if bedrock is close to the surface.

O horizons are generally the uppermost layers and form on top of mineral horizons where they occur. They are formed by the accumulation of fresh and decaying plant parts, such as leaves, grass, needles, and twigs. O horizons are dark colored (mainly black or brown) because decomposing plant and animal materials produce humus. They are generally in forested or wet areas.

A horizons are below O horizons and are made up mostly of mineral material. They are characterized by the loss of iron, clay, and aluminum and the addition of organic matter by soil organisms. Hence, they are dark colored in most areas, except for extremely dry areas. A horizons are commonly referred to as topsoil.

E horizons are commonly in forested areas. The "E" stands for eluvial, which means that clay, iron, organic matter, and other minerals have been removed from this horizon. E horizons commonly appear white or lighter in color than the horizons above and below them.

B horizons are below A or E horizons and are characterized by the accumulation of iron, clay, aluminum, and other compounds. B horizons are commonly referred to as subsoil.

C horizons are below B horizons and are commonly referred to as the substratum. They are made up mainly of partially weathered or disintegrated parent material, but soft bedrock can also occur. Because C horizons are deeper in the profile, the effects of the soil-forming factors are less pronounced than the effects in the overlying A and B horizons.

R horizons are made up of bedrock. The bedrock can be far below or just a few inches below the surface.

Horizons in urban soils may not be fully related to the natural soil-forming factors but instead may be manmade layers formed by the deposition of dredge, fill, and/or mixed materials. Human artifacts, such as bricks, bottles, pieces of concrete, plastics, glass, pesticides, petroleum products, pollutants, garbage, and disposable diapers, are often components of urban soils. Manmade materials may be added to raise a landscape to a higher level, backfill ditches or foundation walls, or construct berms. In urban areas, human activity is often the predominant activity in making soil instead of the action of the natural agents of wind, water, ice, gravity, and heat.

Urban soils differ from natural soils because they have been altered to some degree. They have been excavated, compacted, disturbed, and mixed and may no longer possess their natural soil properties and features. Many highly disturbed soils in urban areas or on construction sites have not been in place long enough for soil-forming factors to significantly change them and to form soil horizons. In areas where

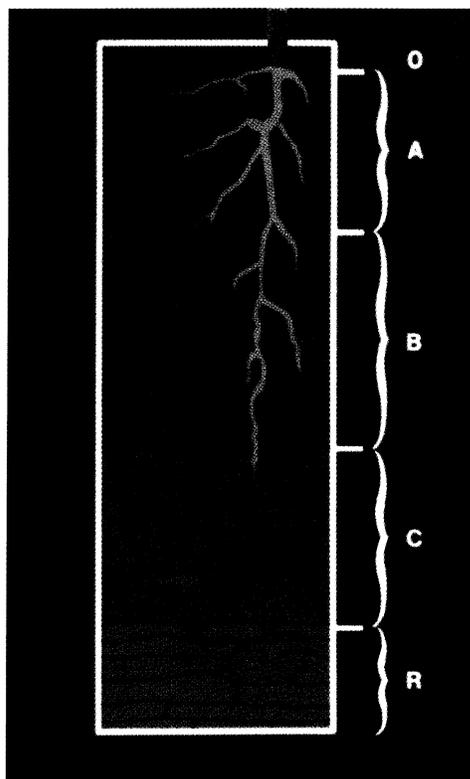


Figure 2.6: Natural soil profile with major horizons.

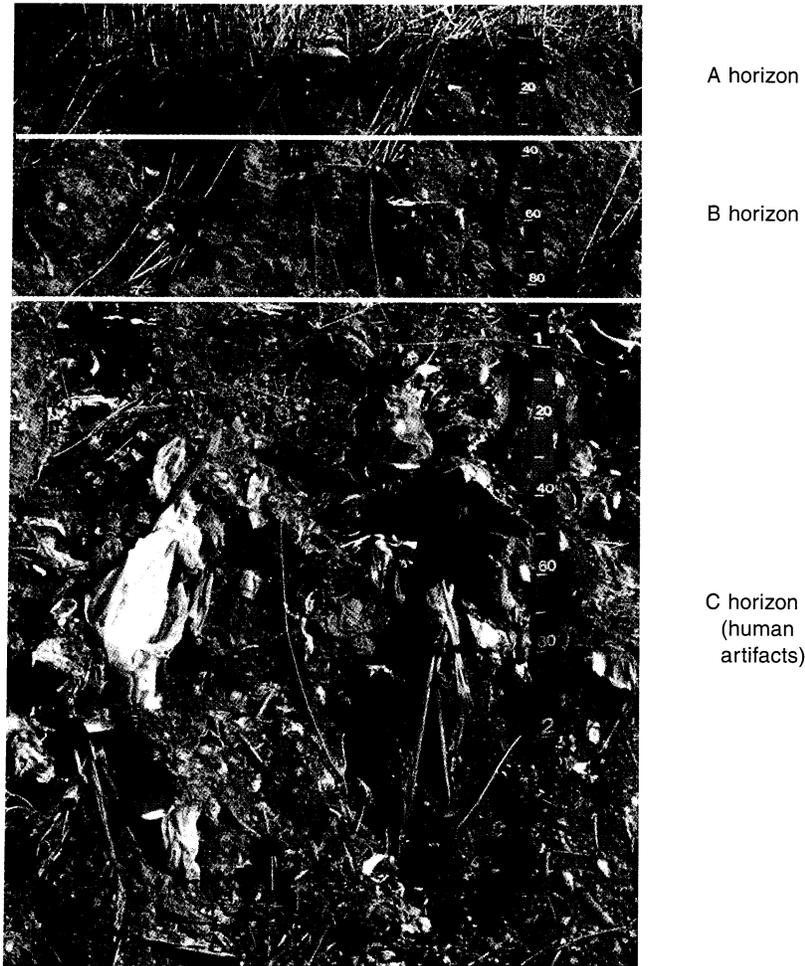


Figure 2.7: Urban soil profile.

fill materials have been in place for a considerable time (e.g., 50 years or so), the formation of A horizons and sometimes weakly expressed B horizons has been documented. Figures 2.7 and 2.8 show soil horizons in urban and natural soil profiles.

Measuring and Monitoring Soil Properties

Soil properties are measured at specific sites or sampled for laboratory analysis. The properties that can be described in the field include horizonation and layering, color, texture, structure, consistence, depth to bedrock, and drainage class. The properties that generally are measured in the laboratory include content of organic matter, particle-size distribution, clay mineralogy, reaction, exchangeable cations, and concentrations of contaminants. The soil characteristics that are estimated or calculated from the measured properties include engineering classification and erodibility.

Physical Soil Properties

Soil is a mixture of mineral matter, organic material, air, and water. The texture of a mineral soil is based on the amounts of sand, silt, and clay in the soil. Sand, silt, and clay are defined on the basis of the size of each individual soil particle. These size

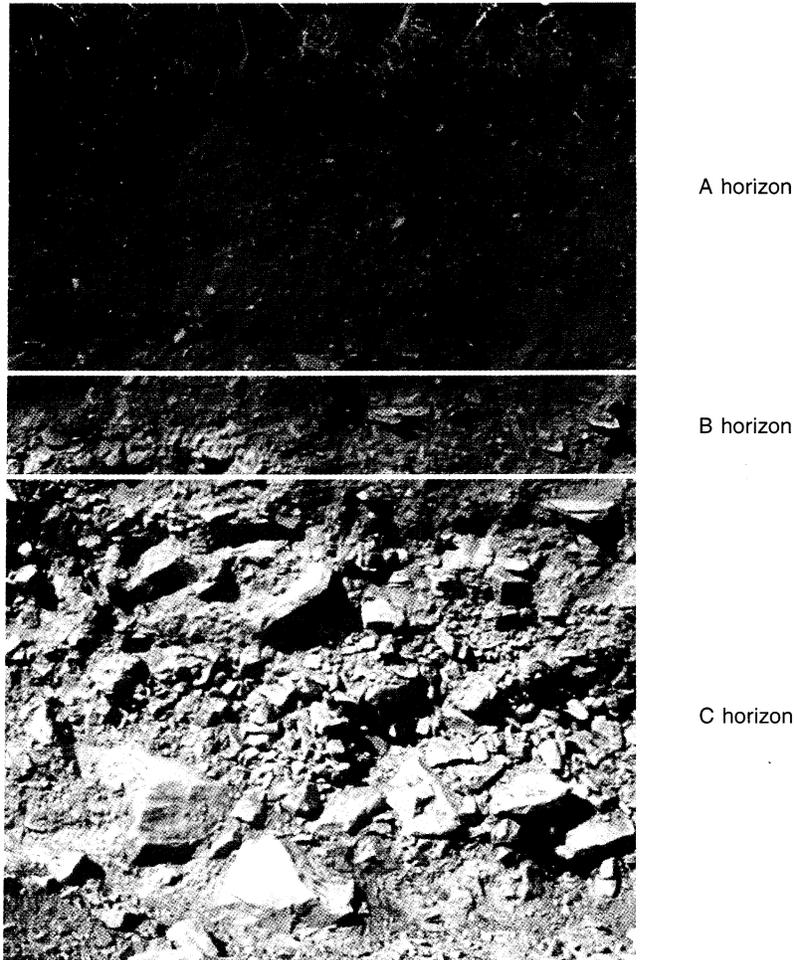


Figure 2.8: Natural soil profile.

relationships can be demonstrated by imagining that a sand particle is the size of a basketball, a silt particle is the size of a baseball, and a clay is the size of an aspirin tablet (figure 2.9).

Soil texture and other soil properties vary significantly within short distances on urban or natural landscapes. This variation is caused by the movement and mixing of soil materials during construction activities or changes in any of the soil-forming

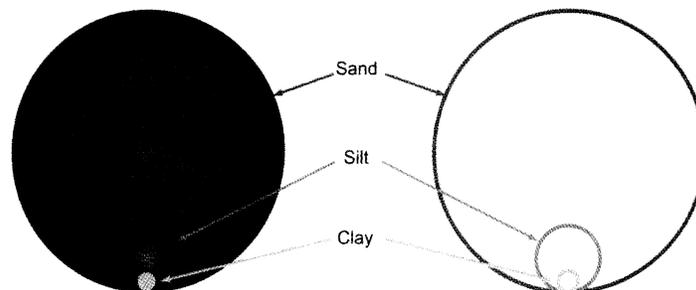


Figure 2.9: Relative sizes of sand, silt, and clay particles.

factors. The combinations of different textures may improve or limit the soil for a specific use.

Soil texture affects water and air movement through the soil as particles of different sizes pack together and thus determine the size and spacing of pores and channels. Sand particles have the largest pore spaces and allow water to drain through the pores most freely. Silt particles have smaller pore spaces, so water moves through them more slowly. Clay particles have very small pores, and so they tend to adsorb and hold more water. The mixture of particle sizes affects water, nutrient, and contaminant absorption. The specific type of mineral influences engineering properties, such as shrink-swell potential and excavation difficulty, especially in expanding clays (smectite), which behave like plastics.

The soil textural triangle (figure 2.10) can be used to determine soil texture from the relative amounts of particles of any two sizes. For example, a clay percentage of 15 with a silt percentage of 70 gives a soil texture of silt loam.

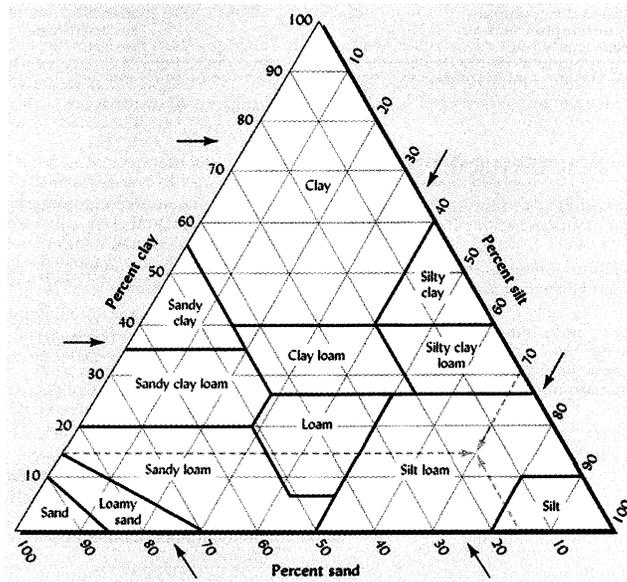


Figure 2.10: Soil textural triangle.

Measures of Water Movement

Water movement in urban soils is described in three ways (figure 2.11):

- infiltration into the soil surface, especially from rainfall
- percolation within the soil drain lines from septic systems, which is especially important in the soil below the drain line and above a restrictive layer
- permeability within the soil from the surface to a restrictive layer

Key terms in understanding water movement in soils are “restrictive layer” and “water table.” Restrictive layers have high density (high weight in a given volume of soil) and low porosity (limited space between particles), so that water cannot flow into or through them. Restrictive layers at the surface can cause surface sealing and limit

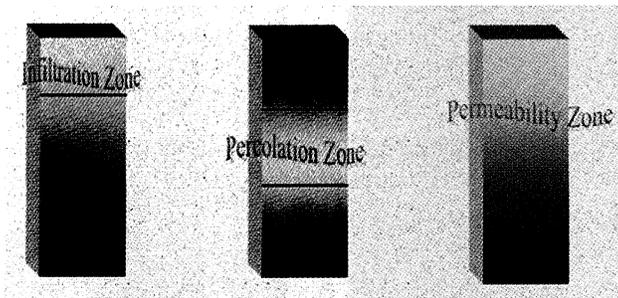


Figure 2.11: Comparison of descriptive terms for water movement in soils.

infiltration of water into the soil. Restrictive layers within the percolation zone reduce the drainage rate of fluids in septic drain lines and can cause septic systems to back up and fail. Compaction of soil materials can occur if heavy weight is on the surface when the soil is wet, resulting in dense restrictive layers below the surface.

A “perched” water table occurs when a restrictive layer anywhere in the soil limits waterflow deeper into the soil. Water drains down from the soil surface and builds up, or “perches,” above the restrictive layer and above the expected water table depth. An “apparent” water table is fed from below by ground water, streamflow, or subsurface lateral flow as water moves across a restrictive layer below the soil surface.

Soil Color

Soil color differences in a profile reflect soil-forming processes and can be an indicator of soil wetness. These differences help to distinguish fill from natural soil. Important coloring agents in soil include parent (geologic) material, soil wetness, extent of leaching, content of organic matter, and the chemical form and content of iron.

Organic matter darkens the soil to a degree, depending on the content and the extent of decomposition. *Iron* gives soil a brown, yellow, or red color. Shades of blue or green may also appear, depending on iron amount, oxidation state, and hydration state. When soil is saturated, iron can become soluble and can be removed, leaving the soil with “mottled” brown and gray colors or completely gray colors, depending on the extent of the wetness.

Soil Structure

Soil structure is the combination or arrangement of primary soil particles into secondary units or aggregates. Organic materials and clay are important binding agents. Wetting and drying cycles are important in creating structure. Soil structure influences pore space and water movement in soils.

The principal forms of soil structure are—*granular* (roughly spherical); *platy* (laminated); *angular or subangular blocky* (roughly cube shaped, with more-or-less flat surfaces); *prismatic* (vertical axis of aggregates longer than horizontal); and *columnar* (prisms with rounded tops). See figures 2.12 to 2.15.

Structureless soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).



Figure 2.12: Granular structure.



Figure 2.13: Blocky structure.



Figure 2.14: Prismatic structure.



Figure 2.15: Columnar structure.

Chapter 3: Soils Regulate, Partition, and Filter Air and Water

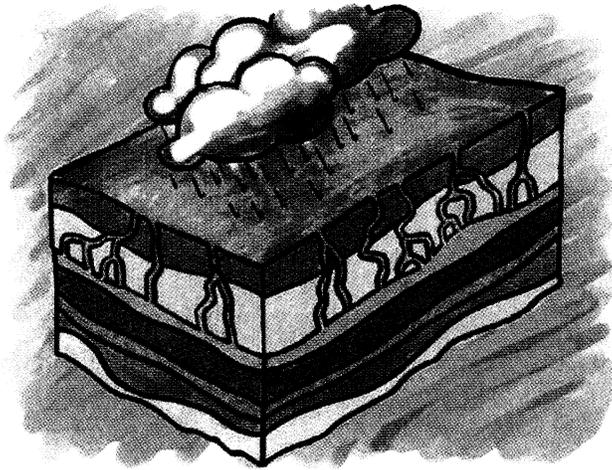


Figure 3.1

Soils play a very important role in storing, regulating, and filtering both air and water resources. As rainwater falls onto the soil surface, it may percolate into the soil or run off the surface, depending on soil properties. Soil particles may hold chemicals and nutrients, making them available for plant roots and keeping them from moving into lakes and streams or entering the ground water. Soil pores that hold and transmit air and water play an important role in the health of the soil environment. All living organisms need both air and water. If all soil pores are filled with water or compacted, then less air is available to plant roots. After site preparation or manipulation, the properties of urban soils differ from those of natural soils and the soil air and water react much differently.

Topics in this chapter:

- Soil functions
- Urban landscapes
- Soil and water interactions
- Soil temperature
- Stream corridors
- Storm water management
- Urban wind erosion

Soil Functions

The kinds of activities that soils perform are called soil functions. Soil functions help us sort the extremely complex soil system into smaller parts that can be studied and understood. We depend on soil for more than just producing food. Other soil functions include a) providing building materials and support for structures; b) preserving natural

and cultural history; c) regulating, partitioning, and filtering air and water; d) sustaining biological diversity and productivity; e) trapping pollutants; and f) providing sites for recreation. Soils perform specific critical functions no matter where they are located, and they perform more than one function at a time (table 3.1).

Table 3.1: Five Concurrent Soil Functions

- Soils act like *sponges*, soaking up rainwater and limiting runoff. Soils also impact ground-water recharge and flood-control potentials in urban areas.
- Soils act like *faucets*, storing and releasing water and air for plants and animals to use.
- Soils act like *supermarkets*, providing valuable nutrients and air and water to plants and animals. Soils also store carbon and prevent its loss into the atmosphere.
- Soils act like *strainers or filters*, filtering and purifying water and air that flow through them.
- Soils buffer, degrade, immobilize, detoxify, and *trap* pollutants, such as oil, pesticides, herbicides, and heavy metals, and keep them from entering ground-water supplies. Soils also store nutrients for future use by plants and animals above ground and by microbes within the soils.

Soil functions occur in spite of the land use. Rainwater must be dispersed or regulated in urban areas, and landscaping plant roots must have air available for growth. When areas are paved over, plans must be in place to handle rainwater. Buildings constructed on fill material must still be supported by the materials on the site. Soils perform the same or similar functions in all areas, including urban ones.

An important task is convincing people living in the urban environment to consider soil information and data before urban projects begin. This information must be part of the planning process for all urban projects. As soil properties change because of construction or other disturbances, major changes occur in the capacity of a soil to function, as predicted by engineering properties. The ability of a soil to support buildings and other structures changes when the soil is disturbed and/or mixed with other materials. Soil materials placed on top of garbage cannot support large buildings and certain other structures. Thus, it is important to know ahead of time what functional changes are expected to result from soil disturbance. Soil maps and soil profile descriptions can help us to understand how the soil at the building site will respond to project management.

Urban Landscapes

Landscapes in urban areas are controlled by underlying geologic landforms; by human activities, such as excavation or other disturbances and removal of water, oil, or minerals; and by microrelief in small areas. Soil movement can result from hazards, such as the formation of sinkholes, soil settling, decomposition of buried trees or landfills, and landslides. Some of these hazards are natural in the environment, and others are caused by human activities, such as excavation and filling for building. These impacts are secondary to the intended soil use. Old geologic formations, such as lava flows and lava tubes, collapse and unexpectedly create large holes. Knowing the underlying geologic formations before building can eliminate the need for costly repairs.

Urban planning for landscape changes requires consideration of fill consistency, soil porosity, internal water movement, surface drainage, and the increased water retention as organic matter is added to the soil. Knowledge of landforms helps us to understand water movement and storage whether the landforms were created by geologic forces or human construction. Some human-constructed soil layers dramatically impact water movement in soils. Geologic landforms lie beneath areas of urban development and may not be visible on the landscape (figure 3.2).

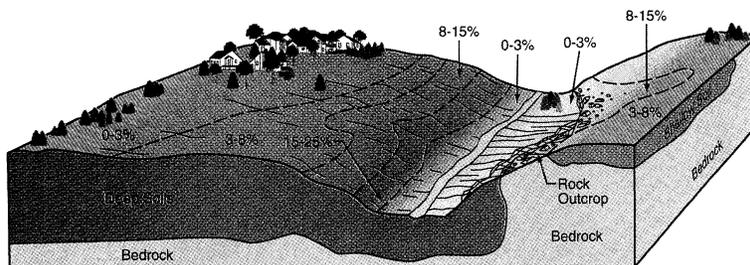


Figure 3.2: Soil slope and underlying geology.

Table 3.2: Summary of Inputs Useful in Identifying Urban Soil-Landscape Units

• Infrastructure	Storm drains, building heights, housing density, and road types
• Soil catenas	Interrelated drainage, soil texture, soil depth, and geologic deposits
• Block diagrams	Geologic material, relief, and spatial patterns of cuts and fills
• Site data	Measured erosion, infiltration, streamflow, and waste filtration
• Soil science	Chemical, physical, and biological interactions and discontinuities
• Vegetation	Seasonal variation, opportunistic species, and adapted physiology

Soil and Water Interactions

Maps with contour lines, called topographic maps, show the direction of waterflow from landforms (figure 3.3). The contour lines are drawn around landforms. Each line represents the same elevation. Contour lines generally show 10- or 20-foot intervals. They run side by side across a slope, and water moves perpendicularly (at a right angle) to the lines to get downhill. The contour lines are closest together where the slope, or downhill gradient, is steepest.

When contour lines form a V shape and elevation increases as you follow the point of the V, the V points upstream. The lines for flat areas or gentle slopes are spaced farther apart than the lines for steeper areas. A closed circle indicates a hilltop or knoll. A closed circle with hatch lines inside indicates a closed depression or sinkhole at the lowest point on a landscape. Map unit symbols on soil survey maps commonly

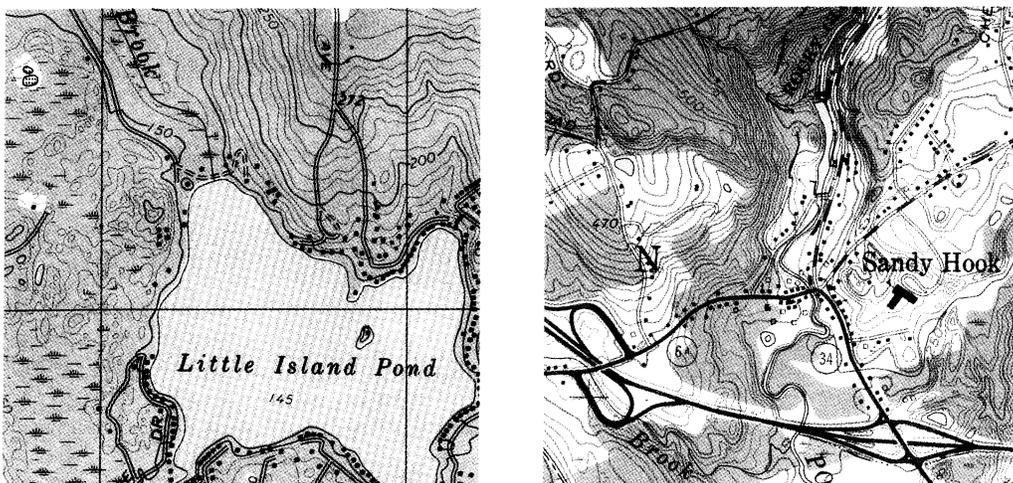


Figure 3.3: Topographic map detail.

indicate the relative steepness of slope. They tie the map unit delineation in soil survey reports to the name of the soil, the texture of its surface layer, and its slope. An example is Ridgebury loam, 3 to 8 percent slopes.

Water tables are underground supplies of water that generally occur closer to the surface during wet periods and are deeper during dry periods. Land use impacts water tables and runoff. An area of wetland may occur where the land surface slopes to an elevation below the water table. Where the underground water does not rise to the surface, it is called an aquifer. Water tables can be identified by observing and recording soil color and soil wetness in urban project excavations or in test holes.

The movement of water into a soil depends heavily on soil texture, soil structure, slope, bulk density, compaction, surface loading, and vegetation. Figures 3.4 and 3.5 demonstrate that more water moves into the soil on natural landscapes than on

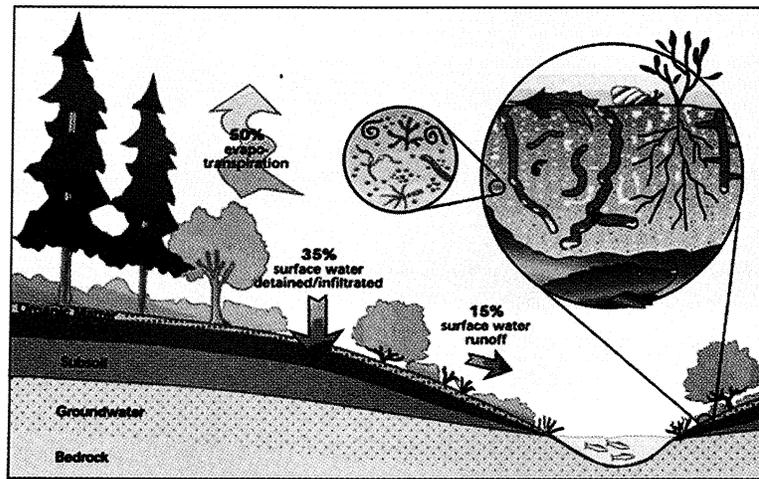


Figure 3.4: Water movement on a natural landscape with a plant cover.
This landscape is in a humid area. In the drier regions, the stream level is higher than the surrounding land.

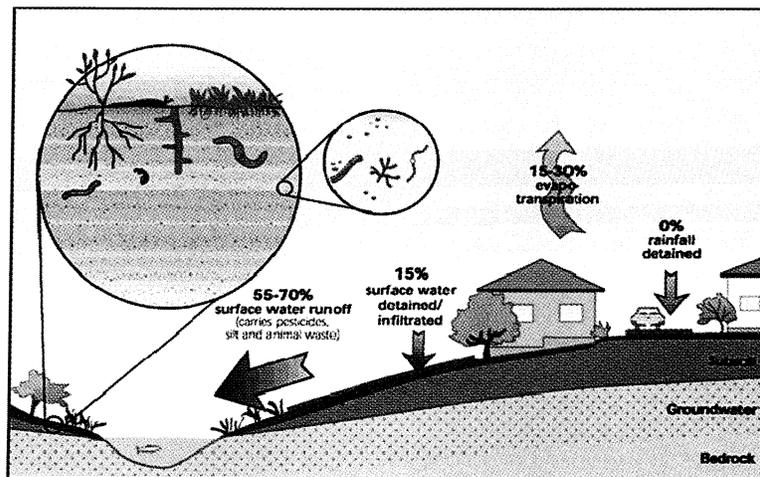


Figure 3.5: Water movement on a disturbed urban landscape with limited vegetation and impervious surfaces. This landscape is in a humid area. In the drier regions, the stream level is higher than the surrounding land.

disturbed landscapes, such as those in urban areas. More water evaporates into the air on natural landscapes than in areas covered by streets, roads, homes, garages, and other buildings. More water runs off urban areas because of the impervious nature of pavement, compacted soil layers, and urban buildings. Water containing sediment clogs lakes and reservoirs. Removing this sediment is costly (figure 3.6).

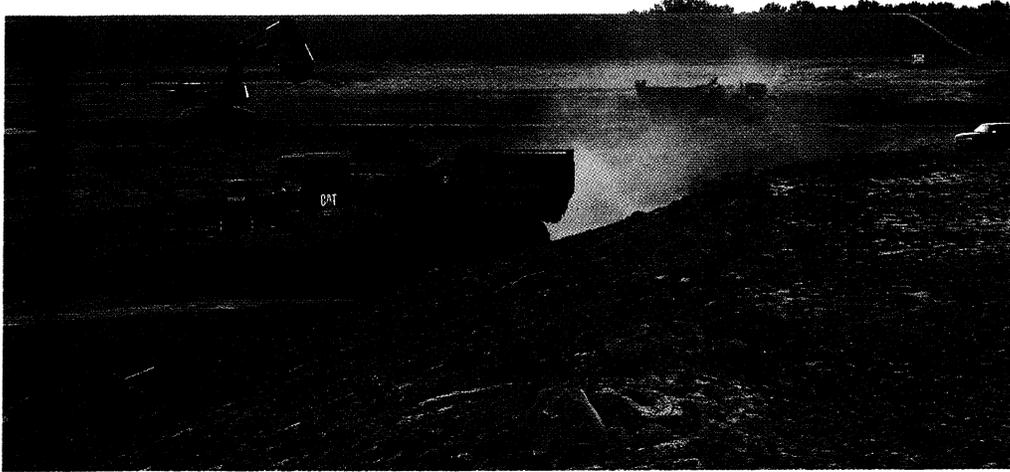


Figure 3.6: Removing sediment from a flood-control lake. A dam is in the background.

Oil, gas, lawn fertilizer, pesticides, and other pollutants often run off from urban areas and into lakes, streams, or reservoirs and reduce water quality. Some of the fertilizer, pesticides, and herbicides can run through the soil and into ground water, also impacting urban water quality.

Geologic formations, the kinds of rocks that occur below soils, affect water movement in soils and their landscapes. An example of an unstable geologic formation is a shale bed, which is prone to slippage and landslides (figures 3.7 and 3.8). The weight of excess water in the soil can reduce slope and soil stability, especially in urban areas where expensive urban projects are built.

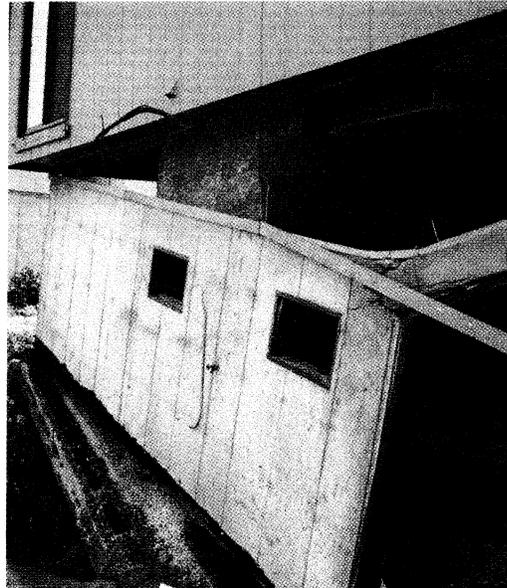


Figure 3.7: A home damaged by slippage of shale beds.

Soil Temperature

Soil temperature may be higher in urban areas than in the surrounding forests and fields. Heat islands form where extensive pavement and large buildings absorb and return heat and restrict airflow within a city. The water supply may be limited in the heat islands as roof runoff and rainwater are piped to storm drains in the streets. Heat stress can occur in plants in excessively dry soils. Soil water and microbial activity within the soil have a significant impact on subsurface soil temperature (figure 3.9).

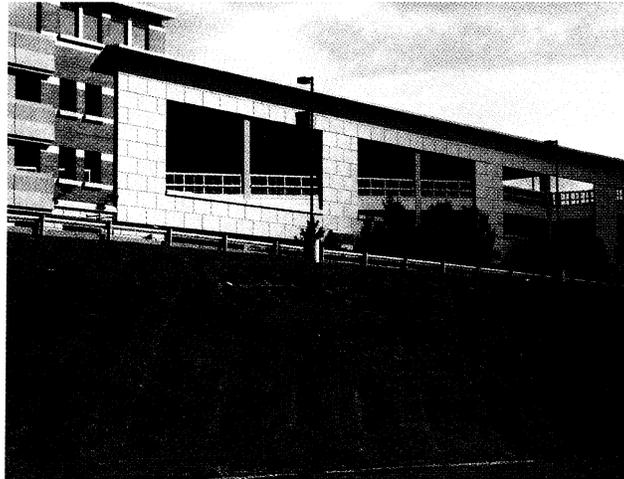


Figure 3.8: Soil slump on a steep slope below a mall.

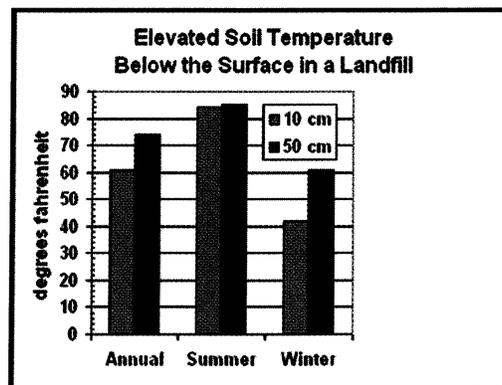


Figure 3.9: Increased microbial activity results in elevated soil temperature in a landfill.

Stream Corridors

Stream corridors provide opportunities for recreational green space, flood control, and wildlife habitat in urban areas. Urban and suburban soil ecosystems are similar to rural ones but have the added dynamics of heat islands, channeled storm water, and transportation systems for urban residents. In some areas, streets interrupt normal surface drainage and ponds or lakes form. Many urban projects restore streams that were piped underground in the past and create riparian stream corridors. These areas may connect with retrofitted parking lots of porous pavement, so that more rainwater eventually returns to the ground water or surface rivers and lakes.

The filtering function of soils is critical in areas within stream corridors and under parking areas. Soils require an active biological community for the chemical reactions that draw toxic materials out of runoff water and hold them in less reactive forms within the soils.

Because of a high population density and the resulting intensive land use, urban soils commonly are disturbed. This disturbance can be small and involve only the soil profile. Examples are mixing of soil horizons, removal of topsoil, and additions of soil material for plant growth. Other disturbances, such as shaping and grading activities, can be more dramatic and can change the shape of the landscape itself. Cutting and

filling activities change the surface characteristics that impact water movement into and through soil, site erosion characteristics, and soil fertility. Shaping and grading activities may improve a project site, but they may also change the direction and flow of water, causing problems on adjacent sites. Planning is required prior to construction to minimize the problems in adjacent areas and the impacts on ground water, erosion, and sedimentation. Silt fences can keep sediment from reaching streams and other water bodies (figure 3.10).



Figure 3.10: Silt fences collect sediment and keep it from reaching water bodies near construction sites. Construction is just starting on this site.

Watersheds in urban areas can be defined by the type of boundary between landscape features that forces water to move in a different direction. We can differentiate between an urban watershed, or “sewer shed” (defined by storm drains), and a “natural” watershed, defined by topographic watershed divides.

Landscape disturbance may also have positive effects. It sometimes introduces additional plant and animal species or helps to minimize the effects of the less favorable traits of natural landscapes. Soil reconstruction can take advantage of different soil textures and boundary conditions between soil layers to manage waterflow, structural stability, and nutrient storage.

Storm Water Management

Construction activities can be major contributors to poor water quality from sedimentation and dust in urban areas. Changes in water quality in adjacent streams and wetlands commonly indicate poor management of urban soils. For example, a lower abundance of organisms, such as crayfish and dragonflies, in streams can be an indicator of poorly managed urban soils nearby.

Runoff is water that cannot infiltrate the soil and flows across the land surface, picking up soil particles and any other objects that can be moved as sediment during rainstorms and periods of flooding (figure 3.11). Sediment can clog streets and storm drains with mud, and floodwater can carry excess phosphorus, nitrogen, and other contaminants to streams or lakes. Excess nutrients, attached to soil particles in sediment, may cause algae blooms and poor underwater visibility. Algae blooms are sometimes health hazards and impact swimming and fishing. Algae blooms and sedimentation also decrease water quality, usually by reducing the oxygen content.

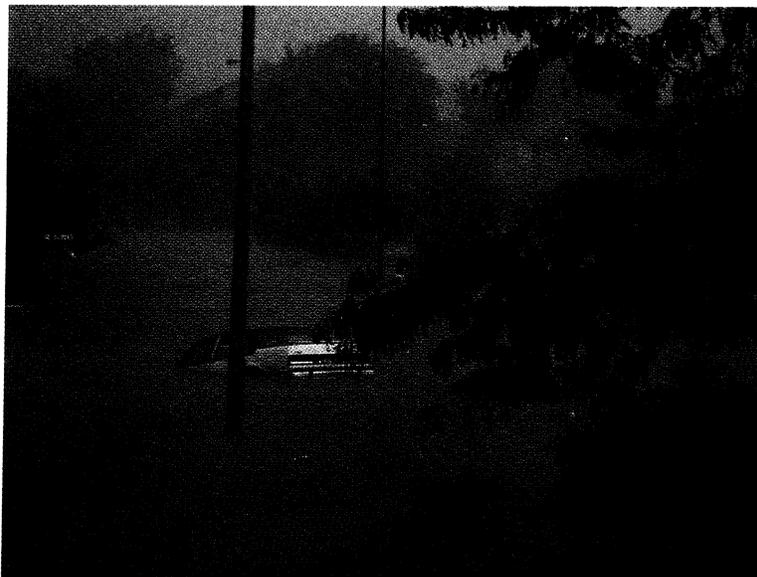


Figure 3.11: Street flooding submerges cars.

Erosion- and sediment-control plans are used where large land areas are to be disturbed or where activity is expected to last through a number of rainfall or windstorm events. Two major components of these plans are control of runoff and windblown dust and maintenance of the flow rate and amount of water (hydrology) at preconstruction levels. Preventative measures that slow the flow of sediment to waterways include silt fences staked on contours across hillsides and hay bales anchored at intervals within runoff ditches.

Some urban areas have rapid soil infiltration rates of approximately 2.5 inches per hour. A negative effect of the high infiltration rate is that if fertilizer is applied immediately before a severe thunderstorm, then a great deal of the fertilizer may be leached through the soil into ground water or washed directly into the storm drains. Soil scientists have called these nutrient-rich storm drains human-made wormholes. Wormholes in the soil fulfill a similar function of carrying nutrients rapidly to distant places in the soil.

More often, storm water management in highly developed areas is needed to prevent flooding and emergency discharge of untreated sewage into rivers (figure 3.12). The amount and flow of storm water depend on how much rainfall can infiltrate into the soil. The amount of rainfall varies greatly in urban areas across the Nation. Construction practices that disturb the soil may differ from one State to another because of local and State ordinances. Increased runoff resulting from decreased water infiltration (from compaction or land shaping) is a high priority in urban planning.

“Urban Hydrology for Small Watersheds” (Technical Release 55, USDA, NRCS, 1986) is still widely used as a tool for planning and monitoring water movement, especially in urban areas where soils have been disturbed. Water infiltration plays a critical role in the calculation of the amount of water that will flow from a site in a certain amount of time. Relative infiltration rates for different housing densities and varying degrees of lawn vigor are expressed as runoff curve numbers (RCN) in TR-55 (table 3.3). The hydrologic soil group (HSG), which is an indicator of infiltration, is predetermined for each soil. The letter A indicates rapid infiltration, and the letter D indicates that rainwater generally runs off the surface. Soil management in urban areas can focus on decreasing runoff (RCN) by increasing the area of “good” open lawn, where more than 75 percent of the surface is covered with grass. Each addition of pavement will increase the amount and speed of water leaving the site.



Figure 3.12: A flooded parking lot and street.

Table 3.3: TR-55 Runoff Curve Numbers by Housing Density and Vigor of Cover

Cover type	Increasing runoff (RCN) by decreasing infiltration (HSG)				Soil condition
	A	B	C	D	
Paved driveway	98	98	98	98	impervious
Commercial district	89	92	94	95	85% impervious
Newly graded area	77	86	91	94	no vegetation
Housing lot <1/8 acre	77	85	90	92	65% impervious
Housing lot 1/4 acre	61	75	83	87	38% impervious
Housing lot 1/2 acre	54	70	80	85	25% impervious
Housing lot 2 acres	46	65	77	82	12% impervious
"Poor" open lawn	68	79	86	89	<50% grassed
"Good" open lawn	39	61	74	80	>75% grassed

Excerpt from table 2.2a in TR-55, "Urban Hydrology for Small Watersheds." RCN is the runoff curve number (30-98). The number 30 indicates the least runoff. HSG is hydrologic soil group (A-D). Group A consists of soils characterized by rapid infiltration.

Urban Wind Erosion

Wind erosion is the movement of soil particles by wind. It occurs when land surfaces lack vegetation and the soil dries out. Windspeeds must reach a certain velocity (in most cases more than 12 miles per hour at 1 foot above the land surface) to move soil particles, depending on the size of the particles. The smaller soil particles (silt and clay) require lower windspeeds, and individual particles of organic matter move most easily and with the lowest windspeeds because of their low weight. "PM-2.5" dust refers to soil particles less than 2.5 microns in size. It can enter human lungs and cause respiratory problems. These small particles form when construction vehicles pulverize soil under dry and windy conditions. There is a high potential for dust blowing on large construction sites and in other disturbed areas (figures 3.13 and 3.14).



Figure 3.13: A cut on a construction site. This site is subject to wind erosion.



Figure 3.14: A dust cloud along a highway. Windblown particles are measured by the meter in the foreground.

There are three kinds of wind erosion based on particle size and weight (figure 3.15). "Soil creep" occurs when very high wind moves coarse sand particles by rolling them along the soil surface. "Saltation" occurs when wind moves soil particles by bouncing them along the soil surface. Medium-sized sand particles usually are moved by this process. A "dust storm" occurs when wind detaches small soil particles from the land surface and suspends them in the air. Wind erosion is most visible during the suspension stage of dust storms.

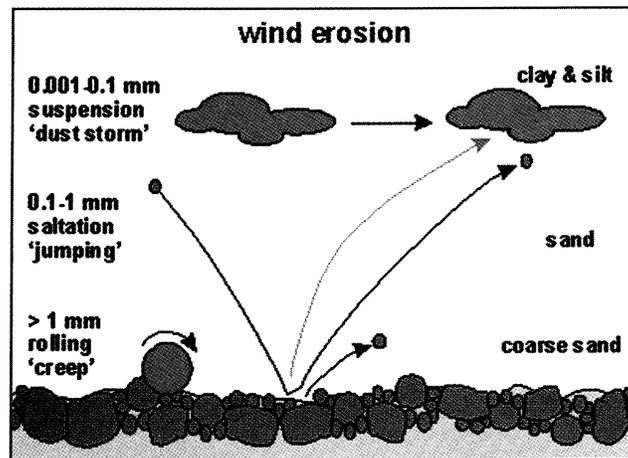


Figure 3.15: Process of wind erosion.

Flat areas in dry climates are likely to have serious wind erosion problems. Certain areas of the United States are more prone to high-velocity winds than others. Construction activities usually disturb the land surface by removing plants and pulverizing soil aggregates, making the site more likely to dry out. Reducing traffic over the land surface, keeping the surface rough by maintaining soil clods or aggregates, watering construction site surfaces, applying mulch to disturbed sites, and maintaining windbreaks or barriers reduce the risk of urban wind erosion. Establishing grasses and other plants as soon as possible after construction is completed also helps to control wind erosion.

Chapter 4: Soils Sustain Plant and Animal Diversity and Productivity

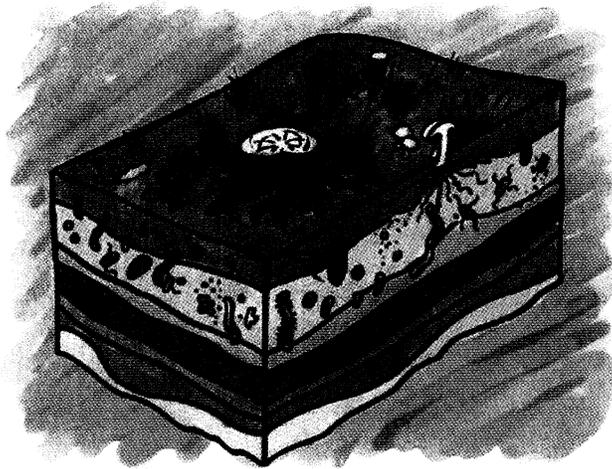


Figure 4.1

Whether they are in urban or natural areas, soils provide living space and supply air, water, and nutrients for micro-organisms, plants, animals, and humans. In most areas, soil properties determine which plants and animals can live in and on the soil. Urban soils that have been disturbed and mixed may no longer possess the natural characteristics needed to support life. Soil amendments may be required to reestablish plants. In many urban areas, the remaining soil materials must be modified before they can support plant and animal life.

Topics in this chapter:

- Soil fertility and plant nutrition
- Soil acidity
- Soil organisms and biochemistry
- Soil as a filter and buffer for waste
- Identifying problem sites from historical records
- Identifying problem sites by visual clues
- Precautions for community gardens, playgrounds, and parks
- Historical tidbits on waste management

Soil Fertility and Plant Nutrition

Management of urban soils for productive gardens requires a basic understanding of physical and chemical soil properties. Local sampling and testing can help gardeners to determine the suitability of urban soils for certain plants and the need for fertilizer, or plant food (table 4.1).

Table 4.1: Examples of the Factors That May Affect the Productivity of Urban Soil

- Little or no addition of organic matter
- Artifacts that disrupt water movement
- Elevated salt content
- Interrupted nutrient cycling and modified activity of micro-organisms
- High soil temperatures that increase the rate of chemical reactions
- Generally higher pH values resulting from additions of cement, plaster, and road salts
- Lateral (sideways) subsurface waterflow resulting from compacted layers

Meeting the nutritional needs of urban plants requires consideration of soil moisture and temperature as well as the chemicals and biological organisms needed to convert fertilizers into useful nutrients. Plant selection may vary according to the grower's nutritional needs, cultural traditions, soil conditions, and the space available. Plants common in different ethnic diets can be successfully grown in urban areas (figures 4.2 and 4.3). Attention must be paid to different plant tolerances for metals and to drainage, the growing season, and weed control.



Figure 4.2: Produce from a Vietnamese home garden.

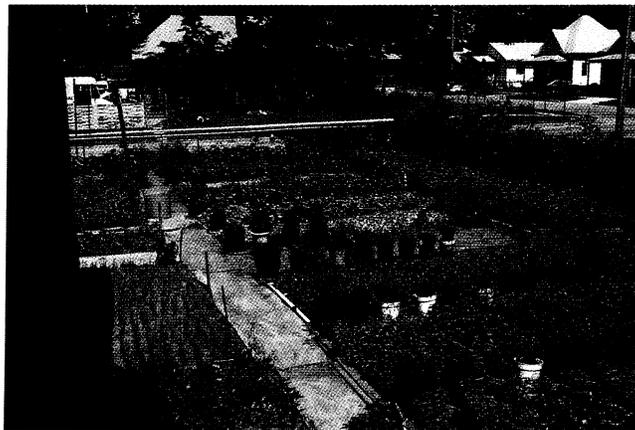


Figure 4.3: Intensive Vietnamese home garden in an urban area.

Plant growth and nutrition are closely linked to soil properties. The ability of soil particles to hold and release nutrients for plants and micro-organisms to use is called the cation-exchange capacity (CEC). This capacity determines which nutrients stay in solution and are available for uptake by plant roots and which nutrients are moved through the soil and thus are not available for plant and microbe use. Cations in the soil are positively charged nutrients, such as nitrogen, sodium, calcium, and potassium. Different plants and microbes require different kinds and amounts of nutrients. Trace metals also are nutrients in the soil. They generally are used in very small amounts. Such trace metals as iron and manganese are necessary for plant growth. Also, they help plants to fight diseases. Metal mobility and potential toxicity in soil occur at the lower pH levels and depend on metal binding through cation exchange.

Various kinds of clay in the soil attract and hold cations onto negatively charged parts of their surfaces. Certain clays internally bind some chemicals very tightly. As a result, it is difficult for plants to obtain the necessary nutrients from the soil solution. In areas of these highly active clays, we often add lime (calcium carbonate) to reduce the acidity of the soils and facilitate release of the nutrients from the clays into soil solution.

Organic matter has many active sites that bind chemicals in a manner similar to the way clay particles bind the chemicals in the soil. Organic matter is often visible in a thick, dark surface layer, in which plants begin to grow and take up nutrients. Clays and other soil materials are mixed with the organic matter in each soil layer to form a chemical system. Intensive vegetable gardening over many years during which unused plant materials and organic waste are returned to the soil can produce a thick, dark surface layer of organic matter. The color of the resulting dark surface layer may contrast with the color of the underlying soil, as is shown in figure 4.4, which pictures a 100-year-old continuous vegetable garden.

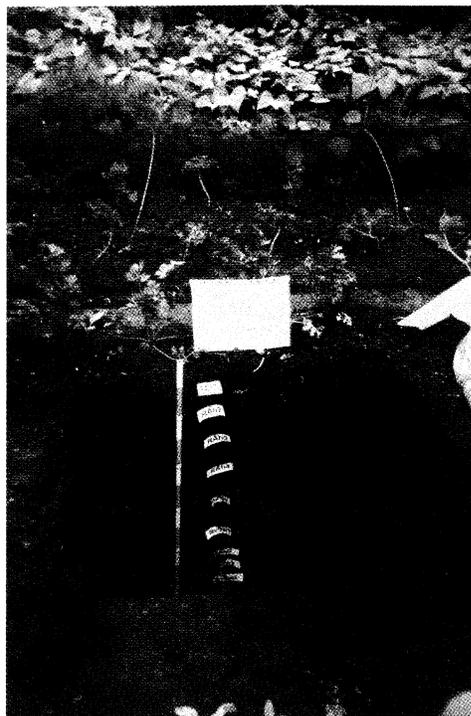


Figure 4.4 Soil profile in a long-term garden.

Soil Acidity

An acid is a substance that has a positive charge and usually yields hydrogen ions when dissolved in water. Hydrogen ions are positively charged. The stronger the acid, the better it dissolves in water. The pH scale (1-14) is a common measure of soil reaction. The lower the number, the greater the acidity. The midpoint of the pH scale is neutral (7.0), a good level for the growth of most plants.

Changes in soil reaction, as measured by pH, have significant effects on metals in soil. Metal toxicity to plants and animals increases in strongly acid soils with a low pH (3.5). Metals in these soils are released from negative sites back into soil solution. At a higher pH (8.5), the metals often are sequestered in the soil. The term “sequestered” indicates that the positively charged metal ions are bound tightly to

negatively charged sites in the soil. These sites may be on clays, mineral compounds, or organic matter, including the surfaces of some micro-organisms. These strong, tight bonds restrict the availability of metals for plant uptake and reduce the risk of animal consumption or human skin contact.

Soil Organisms and Biochemistry

Soil is made up of mineral particles and organic matter, the decomposed remains of living things. Bacteria, fungi, and other micro-organisms are largely responsible for breaking down dead plants and animals in the soil. Small organisms (microbes) have negatively charged sites where soil nutrients and metals can bind to form soil aggregates and compounds. Earthworms and larger animals eat and digest organic materials and minerals, transform them into soil aggregates, and deposit them as waste. Soil aggregates are loose groupings of many different soil components in a structure allowing water and air movement as well as biochemical reactions for energy production and nutrient cycling (figure 4.5).

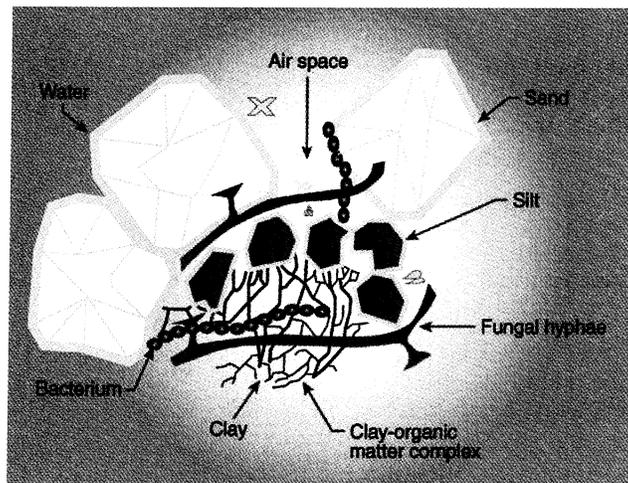


Figure 4.5 : Soil components at a microbial scale.

Soil as a Filter and Buffer for Waste

Managing compost and organic waste is important for plant nutrition and for the biological degradation and conversion of contaminants into inactive forms in the soil. Two key ways to manage waste are filtering and buffering. Waste is filtered when it flows through the soil and is slowly trapped and bound to soil particles. Soil buffering traps waste particles and transforms them into inactive forms.

Composting and using septic systems are examples of waste management in urban soils. Organic materials are needed to hold water and nutrients in the soil for plant growth. In urban parks and community gardens, as well as suburban home gardens and yards, composting can recycle most of the leaves and grass clippings (figure 4.6). This management alternative provides inexpensive soil conditioner that increases porosity and improves the rooting environment for plants.

The major considerations in applying yard and garden waste after composting are plant nutritional needs and the potential of the compost to contain weed seeds or contaminants. Existing resources from the Cooperative Extension Service provide guidelines for managing compost in a manner that maximizes the nutrient content and minimizes the transfer of diseases or contaminants. The same practices work for



Figure 4.6: Composting barrels or traditional fenced piles fit different management intensities in home gardens.

organic waste whether from urban or agricultural sources, and the economic benefits of recycling apply to both.

Understanding the role of soils in septic systems helps residents of small towns or remote housing developments to manage the return of some nutrients to the soil. The liquid septic effluent can provide nitrogen and phosphorus for use by the roots of lawn grasses. Lawn areas receiving liquid drainage from poorly designed or failing septic systems may appear darker green and have thicker grass than surrounding lawn areas. Lakes surrounded by intensive development using septic systems may have water-quality problems, such as algae blooms or high phosphorus levels, if the systems become overloaded.

Conversion of summer cottages to year-round homes may lead to septic system failure or excessive drainage of nutrient-rich septic effluent to lakes or streams. Upgrades, cleanouts, and enlargements of septic systems are needed to accommodate the amount of human waste produced and to make sure that the waste does not pollute surface water or the ground-water supply for wells. Soil properties affecting septic system design and installation include slope, depth to bedrock, permeability, depth to the water table, plasticity of the soil (possible expansion when the soil is wetted and then dried), soil texture and structure, and potential for corrosion of steel or concrete pipe.

Identifying Problem Sites From Historical Records

Metals in soils come from various sources. They may have been present in the geologic rock, or they may occur as atmospheric additions of copper, mercury, lead, and zinc. Metals also may have been deposited by past industrial activities, such as battery production, brass and steel manufacturing, mining, and many different processes involving nickel, cadmium, copper, and lead. Lead is especially evident near roadways because of automobile emissions before the availability of unleaded gasoline, and automobile demolition areas may contain a variety of metals that were commonly used in older cars. As lead paints and some window blinds and soldered pipes used in houses before 1978 wear out and deteriorate, they add lead to nearby soils.

Other ongoing sources of metals and organic waste material are landfills and dump areas that are poorly maintained or unregulated. Landfill materials eventually decompose and form a highly variable type of urban soil. The volunteer vegetation may be dominated by phragmites, as is shown in figure 4.7. These sites can be reclaimed for limited recreational or industrial use.

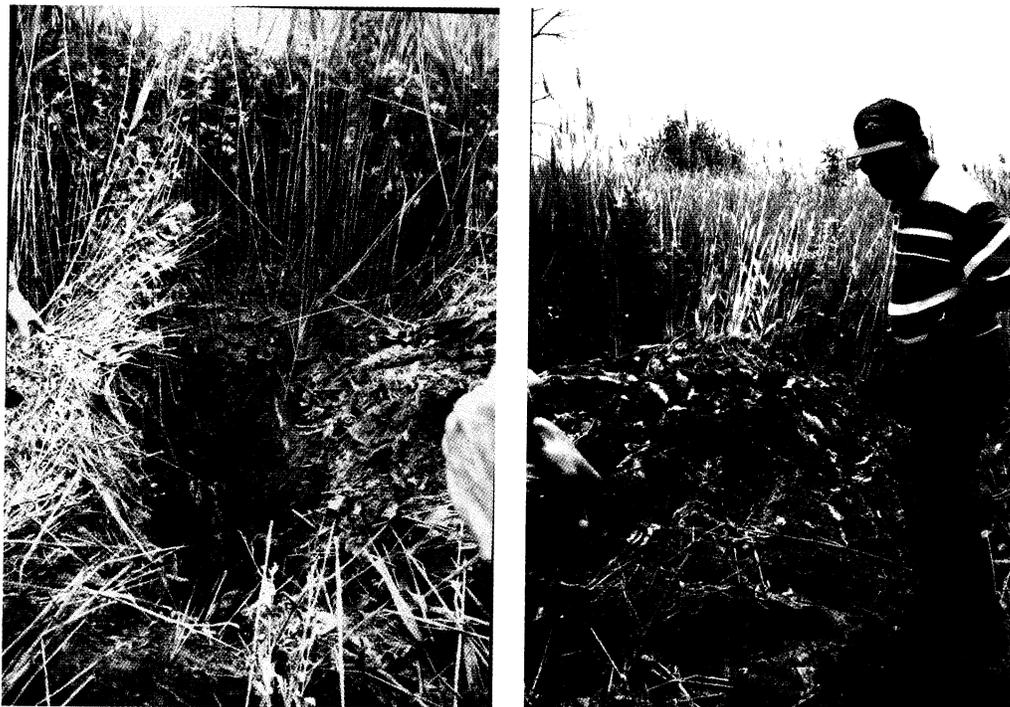


Figure 4.7: An older landfill with phragmites.

Areas affected by city fires may have concentrated metals buried in the soils. These concentrations are discovered only by referring to historical records or by digging into the soils (figure 4.8). Major fires may leave surface residue high in contaminants. A variety of plants may still grow well, but careful evaluation of each site is needed to determine the risk to human health.

Marine sediments may be dredged and used as fill in low-lying urban areas. Contaminants in the dredged material may be moved onto a site. Other problems with water movement and root resistance may result from compaction of a subsurface layer of very fine sand.



Figure 4.8: Soil profile with a buried layer of ash and refuse.
This site was burned by a city fire.

Identifying Problem Sites by Visual Clues

Metal contamination on a site may be evidenced by plant growth, animal behavior, or paint flecks containing lead from older buildings. Many plants simply cannot grow where the level of certain metals is high. Other plants grow well in contaminated soil but fail to set seed or do not grow as well as expected. Absence of any plant growth is a warning sign that a site may be severely contaminated. Caution during sampling is needed.

Metals may be present at a site but not be a high risk for gardening or recreation, depending on the soil properties, drainage, and vegetation at the site. A human health risk from mosquitoes can occur not only in areas of standing water but also in any areas near homes or on city streets with stagnant water. Compaction is often the main problem causing water to pool on the surface without infiltrating into the soil. Mixing the soil when it is just a little moist can increase the porosity (air space between particles) and allow water to soak in. Other options are to divert the water away from low spots and to create channels for storm water to flow around the site or in specific streams or ditches across the site.

Precautions for Community Gardens, Playgrounds, and Parks

Outdoor recreation and gardening are popular activities on urban soils. The risk to human health varies among the sites used for these activities and even between the soils on the same site. A careful study of the area and consideration of key soil properties are needed (table 4.2)

Community and home gardens on contaminated soils may not be a health risk if the garden vegetables supply a very small proportion of the vegetables in the overall human diet. Caution is advised, however, when produce grown in contaminated soils is eaten. Often, the garden supplements the produce bought at grocery stores and for most of the year the nutritional needs of the growers are met elsewhere. Buying vegetables at farmer's markets or school fundraising gardens is another way to dilute the dietary intake of contaminated plants by any one person

Caution is needed in areas of bare ground or leaking water near past industrial sites, dumps, or older homes. Gloves should be worn during soil sampling. Dust from contaminated sites may be dangerous if inhaled by humans or animals. Extended skin contact or hand-to-mouth activities may allow metals to enter children's bodies and interfere with growth and mental development. Pets may collect contaminated dust or mud and carry it into the home.

Prolonged skin contact with contaminated gardens can endanger young children. Raised bed gardens built with a liner on the soil surface and carefully selected fill materials provide a relatively safe and productive alternative. For many residents of urban areas, a community garden is a desirable opportunity for physical exercise, visiting with neighbors, supplementing vegetables, and relaxation.

Table 4.2: Human Health Risks

potential health risks
◆ dust inhaled
◆ soluble lead for plant intake
◆ mud puddles that attract children and increase skin contact
soil chemical properties influencing relative risks
◆ strongly bound and insoluble forms of contaminants
◆ prevalence of active clay surfaces for binding
◆ organic carbon in various active forms for binding
◆ other cations, electrical conductivity, pH, and salts
soil physical properties influencing relative risk
◆ drainage
◆ infiltration and permeability
◆ erosion potential for runoff and sediment loss
◆ particle sizes and water in soil pore space

Historical Tidbits on Waste Management

Night soil was a traditional material in monasteries and in urban areas without sewer systems. Human waste was recycled into gardens and agricultural areas as fertilizer. It was usually emptied from storage pots each morning. Thus, it was called “night soil.”

Kitchen gardens were located near cooking areas to provide vegetables and herbs convenient for food preparation. These often were fertilized with night soil. Many historical discard areas are uncovered by the efforts of archaeology and give us insight into the foods people ate, the cooking vessels they used, and the ways they recycled waste materials.

Chapter 5: Soils as Building Material and Structural Support

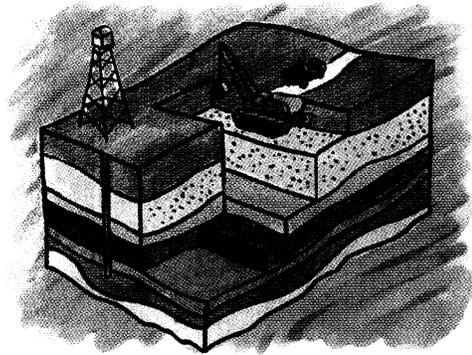


Figure 5.1a

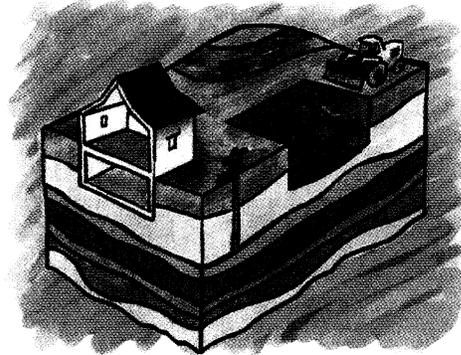


Figure 5.1b

Soil is used as raw material in urban construction activities. Sand, gravel, and clay are mined and used as important materials for many purposes, such as constructing foundations and roadbeds, leveling and filling building sites, and lining ponds and lakes where porous materials require sealing. Soil provides structural support for the houses, schools, shopping malls, churches, industrial parks, and parks and recreation fields that are part of urban areas. Not all kinds of soil are suitable for the many urban uses that are required. Sandy soils are better drained than clayey soils, and some soil layers that are exposed during construction have low strength and are easily compacted. When exposed, bedrock and hardpans are difficult to manage. Knowledge of the soils on the site is needed prior to construction.

Topics in this chapter:

- Site preparation
- What happens when soil is disturbed?
- Management after disturbance
- Special care of plants in islands within paved areas
- Sinkholes
- Artificial landscapes
- Building material
- Materials that allow water to infiltrate
- Open space in planned developments
- Reclaiming contaminated sites and vacant lots

Site Preparation

One goal of construction activities in urban areas is to provide material that supports buildings, streets and roads, ballfields, tennis courts, golf courses, parks, and gardens. Another goal is to use soil and other land resources wisely. Each construction site has different needs from the standpoint of supporting structures to be

built and then providing materials for landscaping the site after construction is completed. Some sites are left in their natural condition, but many are leveled, drained, shaped, and compacted. These activities help to overcome the engineering and construction limitations affecting building foundations or concrete slabs for building floors, parking lots, athletic fields, or other uses. Soil or even bedrock must be moved or removed when a construction site is leveled or graded. When bedrock or hardpans are involved, drilling and blasting may be needed to loosen the materials. Large machinery, such as an earthmover (figure 5.2), is used to move soil material from one place to another on the site.



Figure 5.2: An example of construction machinery.

Soil materials that are moved from one construction site to another or to a different location on the same site must be compacted if they are to support the weight of buildings. Machinery is used to reduce the number and size of soil pores and increase soil strength (figure 5.3). When soils are not compacted or when sites are unstable, project failures occur. Figure 5.4 shows a house foundation that is unstable. The electric meter was torn from the house as the soil next to the foundation settled. In figure 5.5 settling around a house has torn the outside step away from the patio doors. The red line on the foundation is the original level of the patio. Figure 5.6 shows damage to a road built on an unstable soil.

Soil compaction often occurs in areas where sidewalks were not built along the preferred footpaths (figure 5.7). This compaction is unintentionally caused by people after construction is completed. Because of soil sealing at the surface, vegetation cannot grow in compacted areas. Compaction below the surface may be evidenced by puddles on the surface or trees that are blown over by heavy winds because of shallow root systems. Compaction often is caused by the heavy machinery used by builders and contractors (figure 5.8). The use of large machinery to move materials around on a building site when the soil is wet compacts surface and subsurface horizons in the soil. These compacted horizons, which are characterized by reduced pore space and increased density, alter soil drainage, root penetration, and even microbial communities on the site.

Unintentional soil compaction is a symptom of soil mismanagement and can be a cause of excessive runoff, with or without sedimentation. Compaction occurs when soil particles are packed tightly together as heavy forces (including vehicles, foot traffic, or even glaciers) are applied to wet soils. Compaction is reflected in decreased

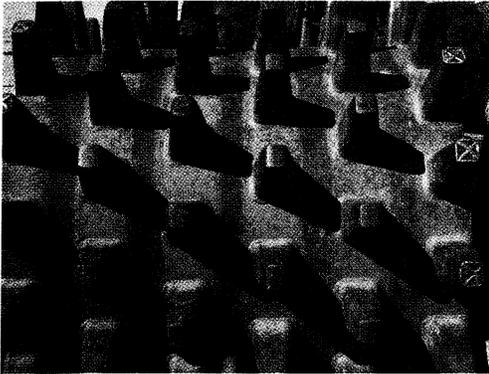


Figure 5.3: Sheepfoot rollers compact soil.

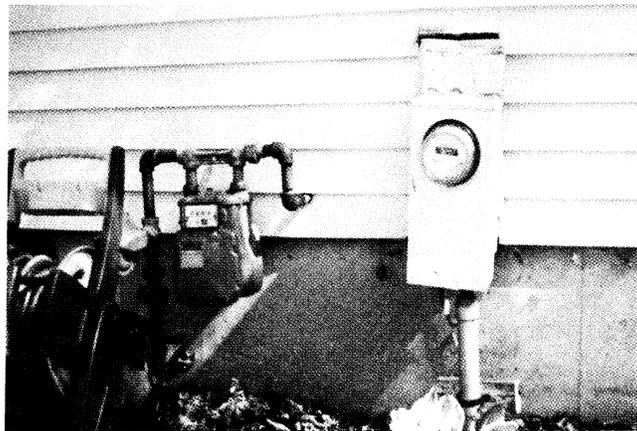


Figure 5.4: An electrical service box torn from a home because of soil settling.

1.34v



Figure 5.5: A home damaged by soil settling.



Figure 5.6: A road constructed on an unstable soil.



Figure 5.7: Compaction in a footpath.



Figure 5.8: Compaction caused by the use of heavy machinery during wet periods.

water infiltration, limited internal water movement, and the inability of plant roots to grow through a restrictive soil layer.

After soils are modified and used for urban projects, the landscape must still function as a natural system. In other words, the soils must still regulate, partition, and filter air and water; sustain biological diversity and productivity; and support structures. This is the challenge. Soils in densely populated urban areas are dramatically different from soils naturally occurring in forests, on rangeland, in agricultural areas, or at the urban fringe. The functions of urban soils often are modified (figure 5.9), sometimes in a positive way and sometimes in a negative way.

Urban soils range from slightly disturbed to completely manmade. Natural soils can occur in urban areas where site preparation has not been extensive. Urban soils present unique challenges to landscape architects, horticulturalists, engineers, and urban planners. The general types of soil disturbance in urban areas include intentional cutting and filling; vehicular or foot traffic, which can cause compaction; introduction of manufactured soils for raised bed gardens and containerized plantings; and special preparation of sites for parks, gardens (figure 5.10), athletic fields, and golf courses (figure 5.11). Large-scale soil disturbance includes leveling through cutting



Figure 5.9: A modified urban landscape.

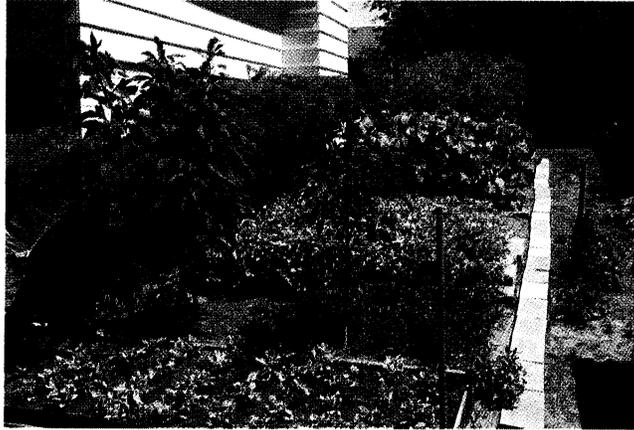


Figure 5.10: A garden near a home foundation.



Figure 5.11: Golf course.

and filling or through grading in certain areas, such as sites for buildings or athletic fields; filling of wet areas or areas that have undesirable soil characteristics; and filling of unused or abandoned areas in preparation for waste disposal.

Disturbed soils differ from soils in natural areas because their horizons have been mixed, destroyed, or removed; natural soil structure has been destroyed; compaction has occurred because of heavy machinery use; water transmission rates have probably been reduced because of soil compaction and loss of soil structure; and runoff and soil erosion rates typically have been increased.

What Happens When Soil is Disturbed?

Humans are probably the most important organisms of the soil-forming factors in urban areas. Urban soils have been disturbed by human activity in some manner and to some degree. This disturbance has changed the properties of the soils, and the soils should now be managed in a different manner. Mixing different parts of more than one soil can result in a new soil that may be better suited to a certain use than the original soils. Some soils have to be altered before they are suitable for certain uses. An example is a soil in an area where preparing a roadbed requires mixing and

deliberately compacting soil material. Topsoil commonly is piled up and then spread on top of the altered soil after construction. In some strongly sloping areas, soil may be moved from one area to another to fill low-lying areas and level the site for construction. In some areas soil material is created on the site by mixing manmade and/or natural materials from various sources. The materials may be mixed as they are moved by heavy construction equipment.

Soils in urban areas are used for many purposes even if they are compacted and/or contaminated. Contaminated soil material is sometimes buried because of the need to protect those who work or play on the site. This contaminated material may be exposed during construction activities. Old dump sites for petroleum and chemicals are now being exposed as urban redevelopment occurs in many cities. The buried materials have leached into other soil layers or even into the ground water, and cleanup costs are extremely high. In some areas cleanup may be impossible. Some soils are unintentionally compacted prior to their use. This compaction causes problems after construction. Soils that have been compacted or contaminated create special problems for certain uses or for the people who live or work on them. A soil scientist and specialists in other disciplines can provide valuable information to help people use soils properly and to address existing problems in urban areas. It is important to get advice and help from soil scientists before projects are started.

These facts help us begin to understand that urban soils are very different from soils in natural areas. Even in undisturbed areas, no two soils are exactly alike. Thus, it is important to know all one can about a soil before it is used for any purpose, including urban projects. Most soil-related limitations can be overcome if enough money is available to correctly design, install, and maintain a project. Costs to overcome project errors are often higher than the original project costs.

Management After Disturbance

After disturbance, the surface layer of urban soils should have the characteristics needed for good plant growth. Management includes overcoming physical and chemical root restrictions, providing nutrients by managing soil fertility and acidity (pH), and reducing the likelihood of contamination or disease problems. In areas where the climate is dry, a water supply for the site also is needed.

Special Care of Plants in Islands Within Paved Areas

Urban plants may grow on small islands within disturbed or paved areas. Overland waterflow to the vegetation is limited on these islands. Large soil pores that connect to the surface are critical if water is to move to the deep roots of the plants. The soil in the island of vegetation should extend below the pavement and should provide enough volume for root growth in proportion to the above-ground height of the trees and shrubs. Trees and flowerbeds along streets may require more frequent applications of fertilizer and water than backyards or gardens.

Sinkholes

Sinkholes severely limit urban uses. They form where water has been pumped from underlying geologic formations, leaving the surface soil without support; where limestone bedrock is dissolved in water and removed below the soil during geologic weathering; and where underground volcanic lava tubes collapse after geologic weathering (figure 5.12).



Figure 5.12: A sinkhole where a lava tube has collapsed.

Artificial Landscapes

Many urban parks were once deep ravines. These ravines were filled with construction materials and refuse during the process of land leveling. Examining a pit dug into the soil under the vegetation helps soil scientists to determine the soil properties controlling the way water moves through the soil and the way nutrients are released to plants (figure 5.13).



Figure 5.13: Soil scientists examining urban soils.

Building Material

Soils in urban areas are more often the recipients of excavated and dredged materials than the source of those materials. Some areas do have large deposits of sand or gravel that can easily be mined and transported to other areas. The pits left behind when quarries in urban areas are closed are sometimes used for water-based recreation or are refilled with other material, such as garbage or road debris.

Fill material can be natural soil (derived locally or moved onsite), waste (e.g., coal ash, dredged spoil, and construction debris), or a mixture of both (figure 5.14). Soils in urban areas may have cultural artifacts (garbage), construction debris, and various waste products.

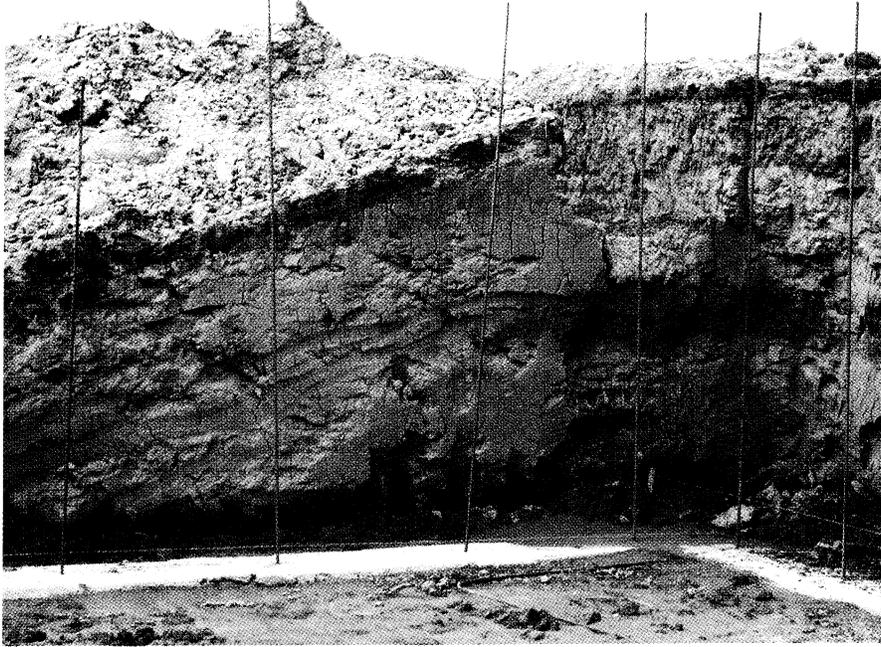


Figure 5.14: A filled area excavated for a home foundation.

Soil material is sometimes made on a site by mixing manufactured materials with natural materials from various sources as both of the materials are moved around by heavy construction equipment. This process may result in hardpans or compacted layers that impede foundation drainage under extensive fill material added for home construction. The potential problems associated with disturbed urban soils include a scarcity of organic material for plant nutrition and biological soil-building reactions, the presence of artifacts that damage construction equipment or release contaminants, and significant variability between soil layers. The variability between the soil layers affects water movement and the stability of the soil under weight.

Materials That Allow Water To Infiltrate

Urban renewal may include removing old culverts and pipes and thus restoring a natural stream, as in a park with trees and picnic areas. Restoration of stream corridors for recreation, flood control, and wildlife may require rebuilding of streambanks with such material as rock or gabions (rock baskets, as shown in figure 5.15) that can withstand the erosive force of floodwater (FISRWG, 1998). Pavement may be removed from parking lots near the reconstructed stream so that more water can infiltrate into the soil and thus raise the stream level. Porous building materials may be added to the surface of streets (figure 5.16), parking lots, or sloping areas that require greater stability. The porous materials permit water to move into the soil instead of running off the site. Also, plants growing through the materials help to control erosion (figure 5.17).



Figure 5.15: Rock baskets.



Figure 5.16: Brick street in an historic district.

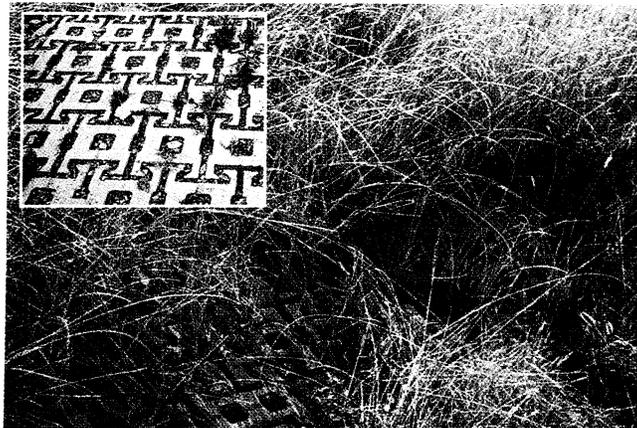


Figure 5.17: Soil surfaces may be covered with products that provide strength for slope stability and still allow water to infiltrate and plants to grow.

Open Space in Planned Developments

Planting beds may be constructed in parking lots, around playgrounds, and near nature trails to allow a wider variety of plants to flourish with frequent watering and intensive fertilizing. Urban planning can combine housing and open space needs for a community through consideration of the soil resources of the larger urban area (figures 5.18 and 5.19).



Figure 5.18: Aerial view of planned development.



Figure 5.19: A subdivision.

Building suburban houses on slight or moderate slopes and establishing lawns minimize erosion. The houses generally have gutters that channel runoff from roofs into storm drains. Very little space is left between houses, but larger lawn areas are in the backyards, where mowing and fertilizing can be coordinated among suburban owners. The soils around the houses should be characterized by good infiltration. They should slope away from the foundation, so that basements are not flooded. A level soil with moderate infiltration and good drainage is desirable in areas near swimming pools and play structures.

Reclaiming Contaminated Sites and Vacant Lots

In the more densely populated urban areas, a vacant lot may be the only site available for recreation and gardening. This restriction forces residents to use soils that may be compacted and contaminated or filled with unknown materials. Reclaimed mine areas provide land for urban housing and recreation after soil reconstruction measures are applied for water movement, structural stability, and plant growth. Raised bed gardens built with composted leaves and grass provide a plant rooting space of minimal risk to children and adults in many urban areas (figure 5.20).



Figure 5.20: A raised bed garden.

Chapter 6: Soils Preserve Natural and Cultural History

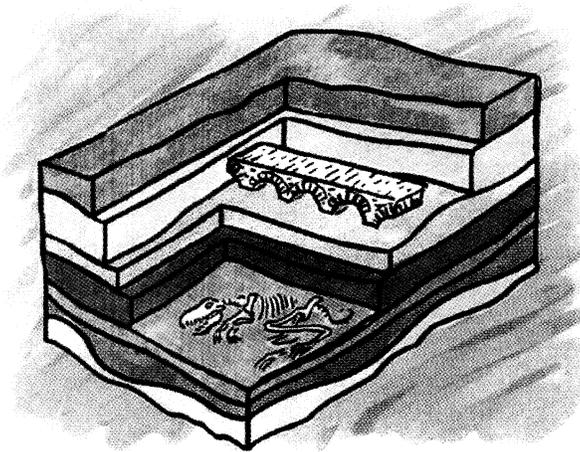


Figure 6.1

Soils can tell us much about our past. They are derived from a variety of parent materials and are transported by wind, water, ice, gravity, or humans. Soil material has been transported to its present location over very long to very short periods of time. What occurs in or under a soil can indicate how old a buried soil layer is and even how it got to its present location. For example, glaciers from the Canadian ice sheets moved down into the northern part of the United States about 12,000 to 15,000 years ago. Rocks otherwise found only in Canada are within the soils impacted by these glacial events. Soils can be dated by the plant pollen or artifacts within them. Layers of garbage or dredge material also can indicate the age of the soils. In addition, they help to preserve artifacts of culture and history.

Topics in this chapter:

- Urban site preparation
- Intentional burial
- Catastrophic events

Urban Site Preparation

When most sites for urban projects are prepared, soil excavation is required to allow the construction of building foundations, roads, and streets and to shape the lot for construction activities. Excavations vary in depth and size, depending on the building project. Very deep excavations are required when skyscrapers or other large buildings are constructed or when roads and streets are built on strongly sloping land. As soil material is removed by excavation, objects that have been buried, either by natural

processes or by humans, are sometimes uncovered and must be dealt with before construction begins.

The objects that are discovered in the soils during excavation may have been accidentally lost, intentionally discarded or buried, or buried by catastrophic events. Coins and jewelry are examples of the buried items that are discovered. Old dumps, hazardous materials, fossils, or artifacts of past civilizations also may be exposed during site preparation.

Intentional Burial

Landfills and garbage dumps are examples of intentional burial sites (figure 6.2). Construction debris, garbage, and other items are often placed in dumps or low-lying areas and then covered by soil or dredge materials. Operators of most landfills are required to cover each layer of garbage with a layer of soil on a daily basis. When old landfills are discovered during project excavations, the content may appear to be a stack of debris and soil in layers. In the past, old dumpsites and burial areas were not marked on maps. Radioactive materials or carcinogens may have been buried in some areas before landfill regulations were in place. These areas can be avoided if their location is known, but the location is not always known. The buried materials can be very dangerous when exposed during construction activities. If areas such as these are discovered on a homesite or building lot, the discovery should be reported to the proper authorities.

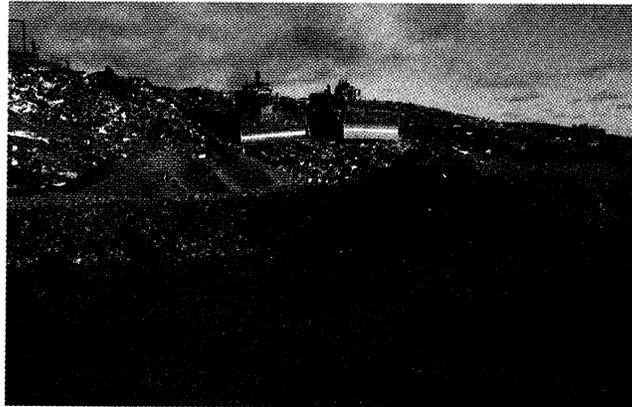


Figure 6.2: Bulldozers working in a landfill.

Liquid materials, such as oil and oil products, pesticides, and other pollutants also have been placed in landfills and garbage dumps. These materials are in various kinds of containers that eventually corrode, degrade, and begin to leak (figure 6.3). The pollutants may leak into the ground water or out onto the surface in areas downslope from the landfill or dumpsite. In our Nation's past, dumpsites in many rural areas were unregulated. Toxic or hazardous waste material was deposited on these sites along with household garbage. As towns and cities grow and expand, these sites are often uncovered and must be cleaned up before use.

Small towns or a few buildings are sometimes intentionally covered by water impounded by large dams. Over time, sediment that settles out of the water buries the buildings and streets. The dam may be filled with sediment and abandoned. If the site is later used for another purpose, the buildings and debris material may be exposed during site preparation.



Figure 6.3: Barrels containing hazardous material.

Current technology helps us to design safe dumps and landfills. Liners made of impervious materials are now used under garbage and waste materials in dumps to contain the waste materials and keep the by-products of decomposition from leaving the site and leaking into ground water. Cover material placed on top of the garbage can keep odors and hazardous gases from escaping into the atmosphere. Most dumps now require permits. Strict monitoring helps to ensure that hazardous material is not deposited in the dumps. When dumps and landfills are closed, monitoring plans require that the sites be checked on a regular basis.

Catastrophic Events

Catastrophic events, such as earthquakes, volcanoes, landslides, dust storms, and large floods, bury objects unintentionally (figures 6.4, 6.5, and 6.6). An object discovered during urban development is sometimes a surprise. The exposed objects may be skeletons of prehistoric plants and animals, old buildings, human artifacts from earlier civilizations, footprints, leaf imprints, or even pollutants and contaminants that were buried during past disposal activities. Some project sites must be altered when pollutants or contaminants are exposed during excavation. On other sites, changes in project and/or construction plans are needed because of artifacts or hazardous materials uncovered during construction.

Soil horizons are important time markers and are used to help date items discovered when sites for urban projects are excavated. Newspaper articles tell of human and animal bones that were disturbed during excavations in urban areas. In some areas excavation is stopped until the bones can be identified so that the remains of members of ancient civilizations are not disturbed prior to study and cataloging. When the conditions and soil properties are right, buried artifacts and remains are well preserved for long periods of time. Not all kinds of soil, however, preserve artifacts and plant and animal remains. Some soils are so acid that they dissolve the buried materials. In some areas of wet soils, organisms living in the water consume the buried materials as food.

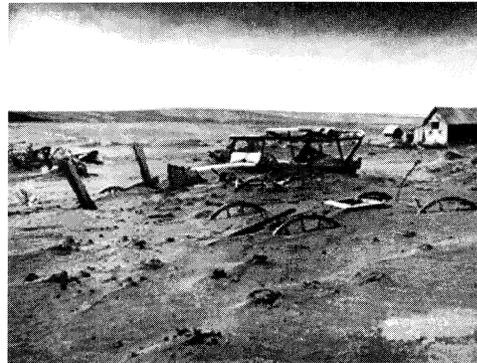


Figure 6.4: Human artifacts buried by windblown dust.



Figure 6.5: Animal skeletons buried by volcanic ash.



Figure 6.6: 1994 landslide (USGS photo).

Locating existing information about a site before site preparation begins can save the owner a great deal of time and expense. Soil survey reports commonly provide information about historic sites and past land use activities as well as information about soils. Soil survey information regarding slope stability, restrictive layers in the soils, and water transmission rates can help builders and landowners to avoid problems and save money. The costs of repairing, rebuilding, or relocating structures can be avoided, and the life expectancy of projects can be enhanced.

Chapter 7: Soil Management for Recreation and Renewal

Many cities and towns maintain botanical gardens or arboretums for use by their citizens and visitors. Some of these gardens and arboretums are very well known and draw people from all over the United States and the world. Some are used for large gatherings of people celebrating special community or holiday events. Unmanaged use of parks, gardens, and arboretums can cause damage to plants and severe soil compaction, which restricts the movement of water into the soil. The result is increased soil erosion, poor plant vigor and growth, increased runoff and offsite sedimentation, and renovation costs.

The most common kinds of urban parks and gardens are meditation gardens, rooftop gardens, rain gardens, butterfly gardens, outdoor classrooms, desert gardens, kitchen gardens, victory gardens, pocket parks, riverfront parks, green space, open space, medicine circles, labyrinths, and peace parks (figures 7.1, 7.2, 7.3, 7.4, and 7.5). The kinds of plants in these areas vary because of differences in soil properties. Additions of special types of nutrients (plant foods or soil conditioners) to the soil or containers in which the plants can grow may be needed.



Figure 7.1: Butterfly garden at an elementary school.

Schoolyards are ideal spots for building butterfly gardens and outdoor classrooms. These areas can also serve as small neighborhood parks. The soil and site history in the areas can show whether contamination is likely and whether protective measures are needed to minimize exposure. Soil testing is needed before the projects begin.

Applications of basic environmental science in urban areas can quickly become complicated and may require special contributions from scientists in many fields. A garden site surrounded by buildings may be hotter and drier than expected because rainwater is channeled in roof gutters and street drains away from the site, nearby concrete walls and streets stay hot longer, and the buildings cut off breezes. In some parts of the country, the added heat can extend the short growing season for

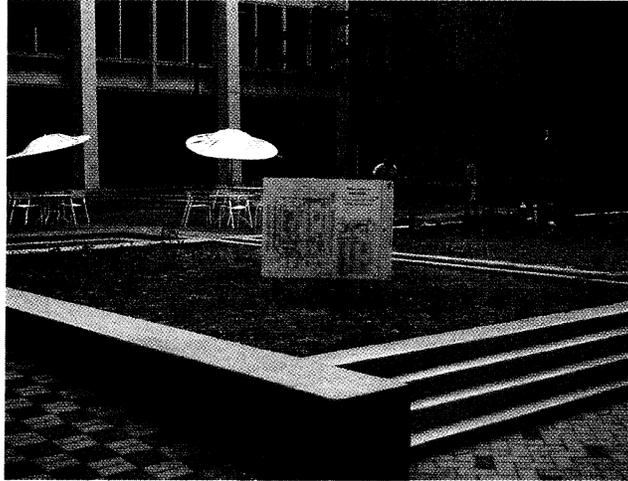


Figure 7.2: An urban pocket park under development.



Figure 7.3: A developed urban pocket park.

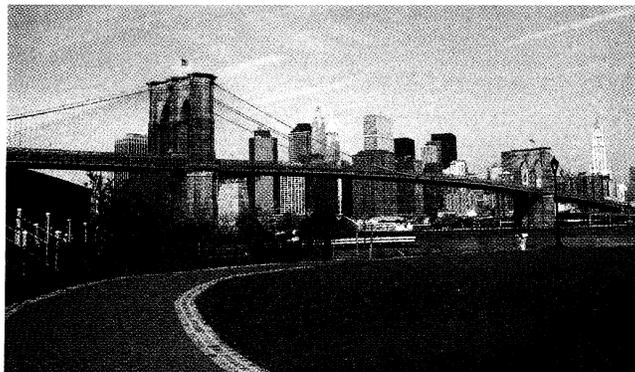


Figure 7.4: An urban riverfront park.



Figure 7.5: Intensively managed ballfields after soil reconstruction.

vegetables, but in the warmer regions, it can make a garden site undesirable for some plants.

Careful planning of lawns and picnic areas is needed because of the possibility of heavy foot traffic during wet periods. Urban parks commonly have a combination of paved areas and manufactured soils that can withstand trampling.

Conversion of a vacant lot into a ballfield or picnic area may be delayed if the site was used in the past as a garbage dump. Soil contamination, bad smells, uneven ground surfaces, and other problems may be caused by buried garbage that is slowly decomposing. Some former landfills provide space for parks and ballfields, but they must be carefully planned and managed for intensive use by many people in variable weather.

A few basic soil management practices can help to maintain existing parks or reclaimed recreation areas over time. A soil-based site management plan might include ways to balance water content and movement. Compost leaves and grass add organic materials and thus increase the supply of plant nutrients. Also, they help to maintain soil porosity and thus reduce the likelihood of compaction. In general, gardens and parks in urban areas require careful initial site selection followed by intensive maintenance of the vegetation in lawns and landscaped areas. A soil scientist may need to dig a pit so that the soil properties that affect management can be investigated (figures 7.6 and 7.7).



Figure 7.6: A backhoe used for digging a soil pit.

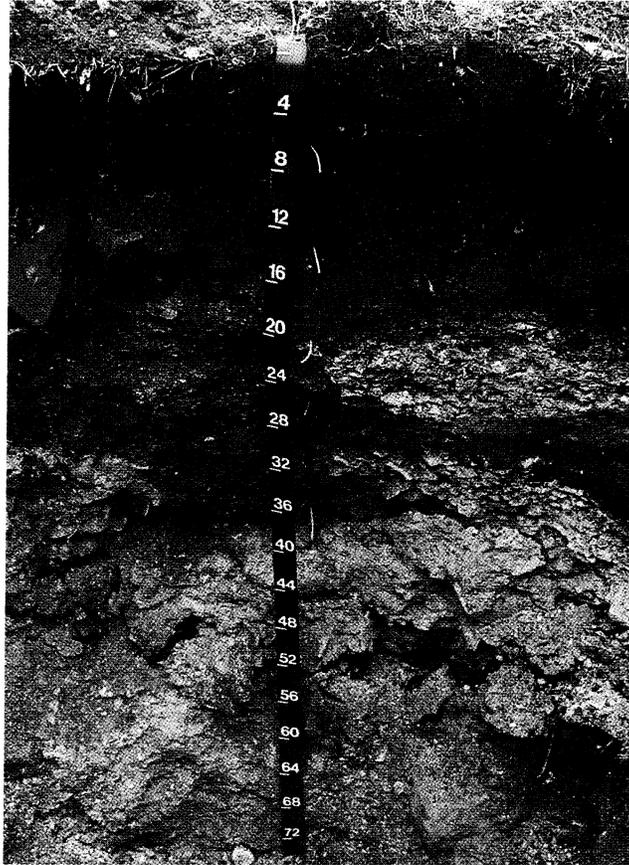


Figure 7.7: Human artifacts buried in a soil pit.

Schools, parks and recreation departments, and garden centers often employ people with training in soils and landscaping. Many recreation areas and parks are heavily used for more than one purpose throughout the year (figure 7.8). Maintenance plans are needed in these areas. These plans can be used as templates for planning smaller pocket parks and gardens that comply with local regulations.



Figure 7.8: High school playing fields are used for sports and for band and music competitions or performances.

Chapter 8: Help Is Nearby

Many of the conservation practices used in agricultural and forested areas can be adapted to work in urban areas or small towns. The Backyard Conservation Program of the Natural Resources Conservation Service (NRCS) helps urban people to plan, establish, and maintain simple waterways and plantings around homes, schools, and small parks. Team-building skills across disciplines, among generations, and among cultural groups are essential for successful urban conservation programs. These skills have been combined with the science behind NRCS field-office conservation planning. The Backyard Conservation Program has improved the ability of NRCS to serve customers using ecosystem concepts in urban areas.

Topics in this chapter:

- **Soil surveys in urban areas**
- **Naming soil series and soil map units**
- **Help in evaluating your soil and urban site**

Soil Surveys in Urban Areas

The program responsible for mapping all soils in the United States is called the National Cooperative Soil Survey (NCSS). It has been ongoing for more than 100 years. The NCSS is a partnership that combines the resources of Federal agencies, including the Natural Resources Conservation Service (NRCS), the U.S. Forest Service (USFS), the National Park Service (NPS), and the Bureau of Land Management (BLM), and the resources of State and local agencies and universities. In the earliest years of the soil survey program, soil surveys were focused on lands that were or could be important for agriculture. At that time, urban areas were broadly mapped or sometimes even ignored as soil surveys were completed.

The NCSS program has nearly completed the initial mapping of all nonurban land within the Nation and is now turning its attention to updating and maintaining existing soil survey data, to mapping lands managed by certain Federal and State agencies, and to mapping urban areas. Some urban areas have already been mapped, while others are just beginning soil surveys. Table 8.1 lists several completed and published

Table 8.1: Examples of Soil Surveys in Urban Areas

Soil Survey of the San Diego Area, California, 1973
Soil Survey of Suffolk County (Long Island), New York, 1975
Soil Survey of Washington, District of Columbia, 1976
Soil Survey of St. Louis County and St. Louis City, Missouri, 1982
Soil Survey of Charlotte County, Florida, 1984
Soil Survey of Cumberland and Hoke Counties, North Carolina, 1984
Soil Survey of Montgomery County, Maryland, 1985
Soil Survey of Nassau County (Long Island), New York, 1987
Soil Survey of South LaTourette Park, Staten Island, New York, 1997
Soil Survey of Baltimore City, Maryland, 1998

soil surveys of urban areas. Soil survey activities currently are either planned or underway in several other urban areas.

Mapping urban areas can be difficult because the present land use restricts the access to sites needed for observation of soil profiles and because land use can quickly change. Observing the soils in these areas is difficult because impervious layers of concrete and asphalt are commonly on the surface and because most people do not want holes dug in their yards or gardens.

An urban soil classification scheme based mostly on the use or intended use of the soils could be developed. Urban soils can be investigated for commercial, residential, industrial, and greenbelt uses. For a satisfactory design of each use, there are key soil properties that must be known and understood. The NCSS program maps and classifies soils according to National standards and collects soil property data to be used in developing soil interpretations helpful in wise land use planning.

The emphasis on mapping urban areas results from the increasing size and density of the urban areas, a more environmentally aware clientele, the fact that nearly all rural areas have already been mapped once, and the need for more and better land resource data within and adjacent to urban areas.

NCSS soil survey information is useful for general planning activities. Because of the map scale, however, this information is not adequate for most site-specific activities. Most activities in urban areas are site specific, apply to areas of land smaller than those generally shown on soil maps, and involve highly intensive uses. Site-specific examinations are needed to provide the accurate and detailed data needed for most urban projects.

Naming Soil Series and Soil Map Units

Table 8.2 lists some soil series in urban areas and the type of material in the upper part of the soils and in the underlying substratum. Each soil that is mapped in the NCSS program is given a name that distinguishes it from other soils. Each has a set of chemical and physical soil properties that are different from those of other soils. Groups of soils having profiles that are almost alike, except for differences in the

Table 8.2: Examples of Urban Soil Series

Series	Survey area	Depth and type of surface fill	Substratum
Harvester	St. Louis, MO	12-40" fill or reworked loess	< 20% glass, brick
Fishpot	St. Louis, MO	up to 48" fill or reworked loess	< 20% glass, brick
Matlacha	Charlotte Co., FL	35" dredge spoil	natural sand
St. Augustine	Charlotte Co., FL	30" dredge spoil	natural sand
Bragg	Cumberland and Hoke Cos., NC	20-81" sandy clay loam fill	buried loamy sand
Greatkills	Staten Island, NY	7-24" mod. coarse texture	garbage
Canarsie	Staten Island, NY	10-39" mod. coarse texture	dense glacial till
Foresthills	Staten Island, NY	10-39" mod. coarse texture	buried soil
Greenbelt	Staten Island, NY	40-80" mod. coarse texture	same fill
Centralpark	Staten Island, NY	40-80" very gravelly material	same fill

texture of the surface layer, are called soil series. For example, the soils of one series may have bedrock or a layer of garbage at a depth of 24 inches, while the soils of another series may have bedrock or a layer of garbage at a depth of 75 inches. Other soil series are separated on the basis of chemical properties or, more often, on the basis of a combination of physical and chemical properties. Soils usually are named by the soil scientists who map them. Most are named after landmarks, geographic areas, rivers, mountain peaks, cities, or towns. Examples are the Centralpark series (named after Central Park in New York City) and the Seattle series (named after Seattle, Washington). In a few instances, the names are simply made up.

Urban soils form in different types of human-deposited material, including a) loamy fill over natural sand, b) dredged spoil, c) coal ash, and d) construction debris (figures 8.1a, 8.1b, 8.1c, and 8.1d).

Nonsoil areas are given such names as Rock outcrop, Urban land, Dumps, Water, and Rubble land. Urban land is defined as areas with a specific percentage of pavement, driveways, and buildings (impervious cover). Collectively, nonsoil areas are classified as miscellaneous areas.

Soils are mapped either as a single soil series or a group of soil series and/or miscellaneous areas. For example, one group could be mapped as "Urban land-Charlton complex, 2 to 8 percent slopes." A single soil map unit could be mapped as "Seattle loam, 1 to 3 percent slopes." The end of this soil name ("2 to 8 percent slopes") is an example of additional information called "soil phase" criteria. Soil phase criteria may be related to such characteristics as slope, texture of the surface layer (e.g., loam), and flooding.

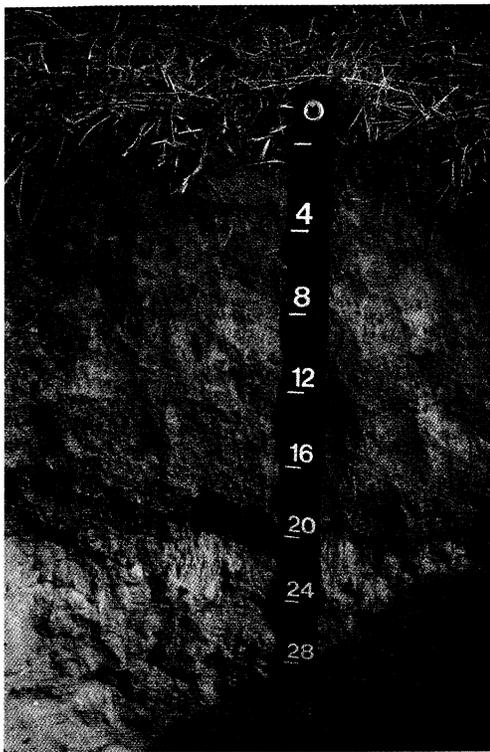


Figure 8.1a: Profile of a Verrazano soil, which formed in loamy fill over natural sand.

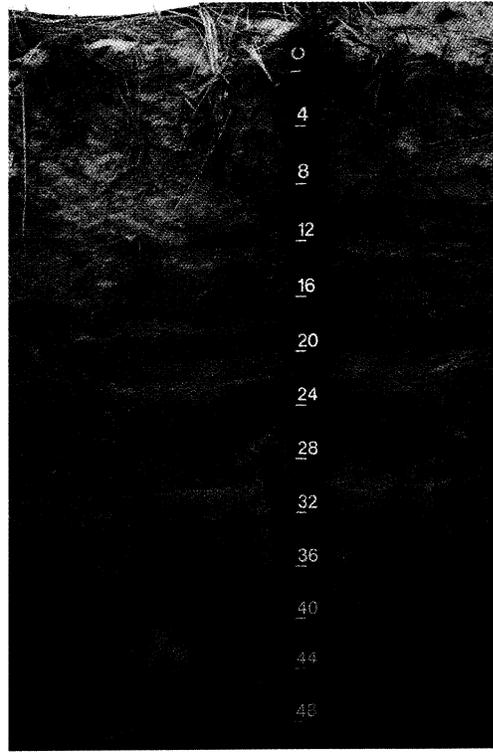


Figure 8.1b: Profile of a Big Apple soil, which formed in dredged spoil.



Figure 8.1c: Profile of a Riker soil, which formed in coal ash.



Figure 8.1d: Profile of an Inwood soil, which formed in construction debris.

Soil maps are usually made with aerial photographs as the background. Figure 8.2 is an example of a soil map of a dominantly urban area. By carefully examining the background aerial photograph, one can observe the streets and buildings of the urban area. The light blue areas are lakes or reservoirs. The soils delineated on the map have been separated from one another by black lines. Every delineation on the map has a set of letters that identifies the map unit. Examples of these map symbols are Ur, Urb, UpC, and CrC. The list of map unit symbols and map unit names is called a legend. The legend is very important because it can be used as a link to information or data about the map units. Those who need soil information must have the soil map, the legend, and the soil data or interpretations to make effective use of the soil information in planning onsite investigations for specific projects at the proper scale.

Help Evaluating in Your Soil and Urban Site

Local resource information can be obtained from soil scientists, professional gardeners or garden clubs, science teachers, city planners and planning boards, Master Gardeners, landscape contractors, private soil consultants, and local people with expertise gained through work on schools, outdoor worship areas, and parks. A field tour that involves a combination of these experts can be an effective learning experience (figure 8.3).

Local resource specialists can better assist you when you know some of the vocabulary that applies to urban soils, such as the terms used in this primer. Questions about site planning, landscaping, composting, and urban waste management may lead to a search of city laws and regulations including scientific terms. Management intended to reduce the risk to human health may require micro-engineering for urban sites and selection of certain plants that can grow well on the sites.

Urban Soils

-  Uf, Urban land
-  UhB, Urban land-Charlton complex, 2 to 8 percent slopes
-  UIC, Urban land-Charlton-Chatfield complex, rolling, very rocky
-  UID, Urban land-Charlton-Chatfield complex, hilly, very rocky
-  UpB, Urban land-Paxton complex, 2 to 8 percent slopes
-  UpC, Urban land-Paxton complex, 8 to 15 percent slopes
-  UrB, Urban land-Ridgebury complex, 1 to 8 percent slopes
-  UvB, Urban land-Riverhead complex, 2 to 8 percent slopes
-  UwB, Urban land-Woodbridge complex, 2 to 8 percent slopes

Nonurban Soils

-  CrC, Charlton-Chatfield complex, rolling, very rocky
-  Ff, Fluvaquents-Udifluvents complex, frequently flooded
-  RdB, Ridgebury loam, 3 to 8 percent slopes
-  Ub, Udorthents, smoothed
-  Water



Figure 8.2: A map of dominantly urban soils.



Figure 8.3: A stop on a field tour of soils in Central Park, New York City.

The local Cooperative Extension Service provides brochures explaining how you can collect samples for soil testing and can help you to locate the nearest public university offering soil fertility tests at a low cost. The Cooperative Extension Service also trains Master Gardeners, local volunteers who can help you to manage garden plants and related insects and diseases (figure 8.4).



Figure 8.4: Adult working in a community garden plot.

The Urban Soil Quality Card includes some basic soil tests that you can perform before you plant a garden or vegetation in a park. The card was developed in Connecticut by local community groups with assistance from NRCS soil scientists and community planners. It is designed to be printed and used as written or with changes that you make to help you evaluate your specific site. It is available on the Internet (http://soils.usda.gov/sqi/soil_quality/assessment/cardguide.html).

Other sources of local soil expertise and assistance are youth program leaders and handbooks from organizations, such as Girl Scouts, Boy Scouts, 4H Clubs, Envirothon teams, the Science Bowl, school science fairs, the National Science Teacher's Association, the Future Farmers of America, and Vocational Agriculture Curriculum (figures 8.5, 8.6, and 8.7). Many of these resources are listed under the heading "References and Resources" in this primer.

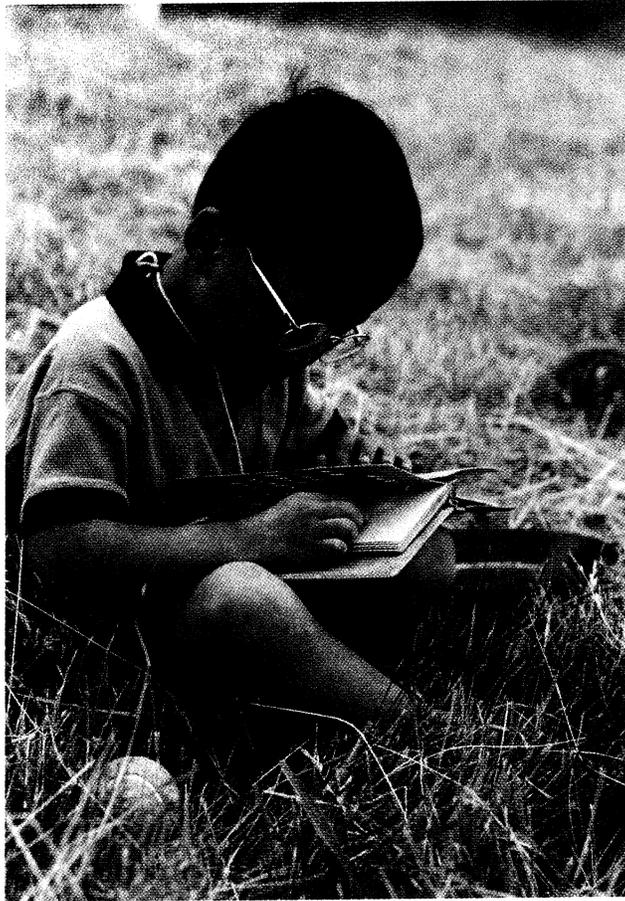


Figure 8.5: A boy with a soil color book.



Figure 8.6: Boys and girls testing soil.



Figure 8.7: Preliminary examination of soil in a backyard.

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Glossary

- Aggregate, soil.** Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.
- Bedrock.** The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.
- Catena.** A sequence, or “chain,” of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.
- Cation.** An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.
- Cation-exchange capacity.** The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value.
- Clay.** As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.
- Compaction.** Creation of dense soil layers when the soil is subject to the heavy weight of machinery or foot traffic, especially during wet periods.
- Composting.** Managing the decomposition of organic materials, such as leaves, grass, and garden waste.
- Container gardens.** Gardens planted in pots, concrete boxes, brick or stone basins, or other isolated rooting areas within paved areas.
- Contaminated soil.** A soil that has high concentrations of trace metals or organic waste that is toxic or a high risk to people or animals.
- Drainage class (natural).** Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained.*
- Drainage, surface.** Runoff, or surface flow of water, from an area.
- Erosion.** The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.
Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.
- Fertility, soil.** The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

- Gravel.** Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.
- Hard bedrock.** Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.
- Heat islands.** Small areas of artificially drained urban soils surrounded by tall buildings that change soil temperature and moisture patterns. May also refer to an entire city with an artificial microclimate.
- Horizon, soil.** A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons of mineral soil are as follows:
- O horizon.*—An organic layer of fresh and decaying plant residue.
- A horizon.*—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.
- E horizon.*—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.
- B horizon.*—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.
- C horizon.*—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.
- Cr horizon.*—Soft, consolidated bedrock beneath the soil.
- R layer.*—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.
- Humus.** The well decomposed, more or less stable part of the organic matter in mineral soils.
- Hydrologic soil groups.** Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.
- Hydrologic unit or watershed.** In urban areas, a catchment area with an outlet in or affecting a densely populated area.
- Impervious soil.** A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.
- Infiltration.** The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.
- Landslide.** The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.
- Leaching.** The removal of soluble material from soil or other material by percolating water.
- Loam.** Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

- Low strength.** The soil is not strong enough to support loads.
- Nutrient, plant.** Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.
- Organic matter.** Plant and animal residue in the soil in various stages of decomposition.
- Parent material.** The unconsolidated organic and mineral material in which soil forms.
- Percolation.** The movement of water through the soil.
- Permeability.** The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity."
- pH value.** A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)
- Pocket park.** A relatively small area reserved for recreation or gardening and surrounded by streets or buildings.
- Profile, soil.** A vertical section of the soil extending through all its horizons and into the parent material.
- Raised bed gardens.** Gardens that are planted in boxes made of wood or other materials and have the rooting area above the ground surface. The boxes may be filled with composted materials mixed with uncontaminated soil.
- Reaction, soil.** A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline.
- Relief.** The elevations or inequalities of a land surface, considered collectively.
- Restrictive layer.** A compact, dense layer in a soil that impedes the movement of water and the growth of roots.
- Runoff.** The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.
- Sand.** As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.
- Sealed soil.** Soil that is covered with buildings, pavement, asphalt, or other material. Water and air do not enter the soil from the surface.
- Series, soil.** A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.
- Shale.** Sedimentary rock formed by the hardening of a clay deposit.
- Shrink-swell potential.** The potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.
- Silt.** As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.
- Sinkhole.** A depression in the landscape where limestone has been dissolved or lava tubes have collapsed.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil-forming factors. Five factors responsible for the formation of the soil from the unconsolidated parent material. The factors are time, climate, parent material, living organisms (including humans), and relief.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are platy, prismatic, columnar, blocky, and granular. Structureless soils are either single grained or massive.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand*, *loamy sand*, *sandy loam*, *loam*, *silt loam*, *silt*, *sandy clay loam*, *clay loam*, *silty clay loam*, *sandy clay*, *silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Topographic maps (USGS). Maps that show terrain, ridges, waterways, contours, elevations, and geographic locations. Also may show roads and buildings.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Peter Ferwerda 3rd
14 Ferwerda Lane
Warren Grove, N.J. 08005

August 8, 2010

Robert M. Smith, Chair
Senate Environmental and Energy Committee
New Jersey State House
PO Box 099
Trenton, NJ 08625-0099

RE: S-1410
Amendment to the SCS Laws

Dear Senator Smith:

I am writing you about the on going avoidance of implementing good soil erosion and sedimentation control practices by the land clearer or resource extractor. The findings of Governor Brendon Byrne's Pinelands Review committee issued a report on developing a management plan for the Pinelands National Reserve. In evaluating various uses of the land by humankind, the report's findings says the following:

Extractive Industries

Sand and gravel mining is a highly destructive form of land use in terms of protection of the environment. The complete destruction of natural vegetation and the yet unknown degree of impact that the removal of large amounts of water-filtering sands may have on the quality of the water in those parts of the Cohansey aquifer and the surface streams where such activity takes place are of particular concern. In addition to those impacts, there is aesthetic degradation, noise, dust, heavy truck traffic, and other undesirable impacts associated with sand and gravel mining. Some of the annoying impacts such as dust and noise can be lessened by the use of screening, proper site planning, and the wetting down of areas where dust is raised. Other impacts such as the scarring of the landscape and destruction of vegetation may not be easily dealt with in a satisfactory manner. Re-vegetation of stripped site, for example may be only partially successful and require constant and expensive maintenance for many years to prevent the site from reverting to a barren, desolate pocket of raw earth. Such impacts and subsequent problems present tempting reasons for declaring sand and gravel mining to be incompatible with preservation and protection of the Pinelands.

* * *

The Pinelands Review Committee believes that, * * *

In areas which will be devoted to the preservation of the Pinelands, it is the Committee's view that extractive industry must be considered to be a totally incompatible land use and should be prohibited."

On March 10, 1979, Governor Brendan Byrne implemented his Pinelands Review Committee's recommendations subject to legislation and related administrative rules. The State of New Jersey on July 10, 1980 adopted N.J.S.A. 13:18A-1 et seq. Based upon this authority, administrative rules were promulgated and adopted on January 14, 1981. N.J.A.C. 7:50-6, Part VI (aka N.J.A.C. 7:50-6.65) was implemented to achieve the goal of the Governor's Pinelands Committee. This regulation says that Resource Extraction is a Prohibited Land Use in the Preservation Area of the Pinelands. Via a Certification Process, in 1982 Little Egg Harbor became the enforcer of these rules. It literally adopted in its Planning and Zoning Ordinances the standards contained in N.J.A.C. 7:50-1 et seq. that was adopted on January 14, 1981 by the NJ Administrative Law process. Thus, the conclusions of the Governor's Pinelands Committee, based upon numerous Planning and

Zoning investigations, were achieved and the Resource Extraction Industry protected the Preservation Zone from destruction.

IN response to economic expectations of the Banking Industry, a compromise consisting of the gradual extinguishment of resource extraction or mining within the Preservation Zone was inserted into the CMP. Existing operations could continue but were limited in their impacts upon the sensitive eco-systems of the Pineland Preservation Zone. That legislative control was to be determined by the necessary permits for lands to be mined in the future being obtained by the titleholder prior to December 31, 1985. New tracts of land were prohibited from being mined and the ecological integrity of the Preservation Zone would be preserved.

However, the existing Soil Erosion Sedimentation and Erosion Control Laws of New Jersey do not facilitate the goal of protecting the Pinelands Preservation Area, the restoring and re-establishing the wildlife habitat that has been destroyed by this land use in other areas of our State. IN my community several years ago, I counted that 21 active or abandoned resource extraction site existed. These sites were abandoned due to the lack of the resource industry ability to make money are now toxic assets instead of profitable industrial ratables.

The after the fact cost to fix these problem locations is illustrated by the Stafford Township and Waretown sites that cost over 50 million dollars to fix and remove the parcels from the list of those towns toxic assets.

Another issues that is not fully resolved by these regulations and related codes is the problem of airborne silica dust and the prevention of a horrible disease known as Silicosis. The reason my concern is its adverse impact upon the health of my family, my neighbors in Warren Grove, and those of our County. Wind blown sediment is not healthy for humans. Silica dust is the primary causation of a lung disease known as Silicosis. Silica dust provides the source of humans becoming the victim of illegal exposure of sand and gravel particles.

Silica dust is a human carcinogen associated with and a causation of lung cancer that ultimately results in human fatalities. The disease begins with the human lungs absorbing fine particles of silica being trapped in the human lung. Next scars form around the silica particles to grow into a major health problem for the human.

When humans inhale crystalline silica, the lung tissue reacts by developing fibrotic nodules and scarring around the trapped silica particles [Silicosis and Silicate Disease Committee 1988]. This fibrotic condition of the lung is called silicosis. If the nodules grow too large, breathing becomes difficult and death may result. Silicosis victims are also at high risk of developing active tuberculosis [Myers et al. 1973; Sherson and Lander 1990; Bailey et al. 1974].

Thus, the basis for the modification of the enforcement of Chapter 251 of the Laws of New Jersey should focus on the public's need to have our government protect their health and safety. In the case of the resource extraction industry, it does not appear as though enforcement is being performed. Many resource extraction sites have soil erosion permits that require proving corrective measures are proper upon receipt of a Certificate of Occupancy. The view of many municipalities is that enforcement is exclusively the Soil Conservation District's obligation. This finger pointing does nothing to protect the health of people from Silica Dust. Prudent modification of the present SCS statute and codes could be a first step, but without enforcement, it is just decoration.

An adjacent resource extraction and soil removal operation adjacent to my residence has been the source of uncontrolled emission of silica dust into the air we breathe for years. This resource extraction operation defiantly and continuously violated the basic soil stabilization rule of stabilizing a disturbed area greater than 5,000 square feet not subject to traffic. If this occurs for a period in excess of 30-days, the rules require that adequate soil stabilization measures be established. Stabilization measures included temporary vegetation, paving the surfaces with bituminous concrete, the covering of material piles with tarps or in the case of large material storage pile the construction of a permanent structure to prevent the soil medium from becoming silica dust. This airborne transmission of dust is trapped in the lungs of humans and ultimately becoming the causation of a painful death known as lung cancer.

Attached hereto is a picture from the front page of the New York Times showing a recent forest fire in Warren Grove. A second picture is the aerial photograph from the internet showing the brown bear soil that remains exposed to erosion by wind. These photos are evidence of the violation of the aforementioned law and related criteria. In addition, it is proof of the Phoenix Pinelands lack of caring and being a good neighbor in protecting human life from harm and advancing the quality of life and human health by it implementing good soil erosion and sedimentation control policies.

If you look at the New York Times photograph, compare it to an internet aerial photographs taken three years later, you see is the expansion of resource extraction maintaining its defiance of the Land Stabilization regulations in an open and notorious fashion.

In reviewing S-1410, I have the following concerns and comments consisting of alterations or inclusions of criteria to protect the health and safety of the citizens of New Jersey. First, the following list of definitions needs to be made a part of this proposed legislation. These are:

1. "Application for Development" means the forms and accompanying documents required to obtain approval for a "Development" that requires a license or permit from a Federal, State or Local Authority having jurisdiction over the land use in question.
2. "Development" means the subdivision of a parcel of land into two or more parcels, the enlargement of several parcels of land into one parcel for the purposes of resource extraction or soil removal, the construction, demolition or modifications of existing structures, alterations to the physical slope of existing geology providing adequate support for existing land uses, and the use or erection of structures or machines related to the resource extraction industry.
3. "Erosion" means the detachment and movement of soil or rock fragments by movement of those materials by natural or artificial forces of moving water, air, ice and gravity individually or accumulatively.
4. "Plan" means the documents required for development to explain and depict the scheme which indicates land disturbance and stabilization measures (temporary or permanent), including a schedule of the timing for their installation, a maintenance manual relative to these measures to minimize or eliminate all soil erosion and sedimentation on a site, and which specifies the soil restoration measures, consistent with the standards established by the committee, that will be applied after the completion of a project.
5. "Project" means any disturbance of more than 5,000 square feet or in the case of the lands located in the Pinelands National Reserve a 1,000 square feet of the surface area of land:
 - (a) for the accommodation of construction or erection of a structure for the processing of geological materials and other activities for which the State Uniform Construction Code would require a construction permit, except that the construction of a single-family dwelling unit shall not be deemed a "project" under this act unless such unit is part of a proposed subdivision, site plan, conditional use, zoning variance, planned development or construction permit application involving two or more such single-family dwelling units,
 - (b) for the demolition of one or more structures,
 - (c) for the construction or reconstruction of a parking lot,
 - (d) for the construction of a public facility,
 - (e) for the resource extraction or soil removal and the related processing operations of any mining or quarrying activity, or
 - (f) for the clearing or grading of any land for other than agricultural or horticultural purposes.
6. "Sediment" means solid material, mineral or organic, that is in suspension, is being transported, or has been moved from its site of origin by movement of those materials by natural or artificial forces of moving water, air, ice and gravity either individually or accumulatively.
7. "Responsible person" means the organization or individual assigned to render regular and effective supervision; empowered by any applicant, corporation or land owner; who shall be responsible for implementing and maintaining on-site land disturbance activities and

soil restoration measures for soil erosion and sediment control associated with a project. This individual shall be knowledgeable and competent in directly and materially affecting the quality of the soil removal and stabilization process. The person who is directly responsible for these activities shall be trained and certified by the committee, or an organization designated by the committee.

Next, the State Department of Agriculture in consultation with the New Jersey Agricultural Experiment Station at Rutgers, the State University, the Secretary of Agriculture and the Commissioner of Environmental Protection, shall prepare and have adopted standards pursuant to the "Administrative Procedure Act," P.L.1968, c.410 (C.52:14B-1 et seq.) which shall include the following:

1. Identification of the optimal physical, chemical and biological functions for specific soil types for the purpose of defining a full-functioning soil;
2. Soil amendment specifications and soil restoration standards for disturbed or compacted soil necessary to restore soil to the moisture-holding capacity of original undisturbed soil native to the site with enhancements if needed to establish traditional wildlife habitats to the maximum extent practicable based on the forest, agricultural, land uses and soil usage within the completed project;
3. Restoration methods that achieve maximum public safety, fully protect the public health, provide for pre-disturbance land uses, suitable new land uses and wildlife habitat;
4. Procedures for post-disturbance maintenance, periodic inspections and certification of compliance with the soil restoration standards prior to the renewal of a Soil Erosion and Sedimentation Permit renewal, project completion or the issuance of a Certificate of Occupancy; and
5. Provide for continuing education to the land disturbance community such as engineers, planners, land surveyors, contractors, miners, and other persons in responsible charge of land disturbances.

In addition, the committee, in consultation with the New Jersey Agricultural Experiment Station at Rutgers, the State University, shall establish a soil health training and certification program for persons who will be responsible for supervising on-site land disturbance activities and soil restoration measures for sediment control associated with a project. The certification program shall provide responsible persons with training and information concerning at least the following:

1. The impact of disturbed and compacted soils on water quality; and
2. The standards established to restore and sustain functioning soils on disturbed lands.
3. Methods to mitigate the adverse impacts of land disturbance and soil removal processing devices designed to protect the health, safety and welfare of the public.
4. Establish a curriculum and criteria for the certification and continuing education relative to who is required to attend the aforesaid training, their attendance, their completion of approved training courses in soil erosion and sediment control and soil restoration, and the completion of reports to responsible auth for responsible persons, including criteria for continuing education or recertification.
5. Provide for the issuance of continuing education or professional development hours for course completed.

Finally, approval of an application for development for any project by the State, any county, municipality, or any instrumentality thereof shall be conditioned upon certification by the local district of a plan for soil erosion and sediment control. Any person proposing to engage in any project not requiring approval by the State, any county, municipality, or any instrumentality thereof shall, prior to commencing such project, receive certification by the local district of a plan for soil erosion and sediment control. Any public utility, municipality, county or the State

or any agency or instrumentality thereof, other than the State Department of Transportation, which proposes a project shall, prior to the construction of such project submit to and receive certification by the district of a plan for soil erosion and sediment control. The State Department of Transportation shall certify a plan for any project that it proposes to construct and shall file such certification with the district. Certification by the Department of Transportation shall be pursuant to soil erosion control standards developed jointly by the Department of Transportation, the Department of Environmental Protection and the committee and promulgated by the Department of Transportation.

I believe that a plan for soil erosion and sediment control shall:

1. Include measures for post-construction soil restoration which are harmonious with the neighborhood environment, protect and restore existing eco-systems,
2. Fully comply with the standards adopted by the State Committee within the Department of Agriculture.
3. Provide the name, address, and telephone number shall be provided to the Local Soil Conservation District, the local engineer, and the local police department for notification of any condition that may result in erosion that requires immediate corrective measured due to it threatening the life and safety of people of the person in immediate charge of the project.
4. Shall insure the protection of the health, safety, and welfare of the public.
5. Shall insure that habitat restoration occurs in sites where wildlife habitat has been destroyed or eliminated by the project.

I expect this amendment to the Soil Erosion and Sedimentation rules to require the State Soil Conservation Committee to adopt standards for the temporary and permanent restoration of optimal soil conditions, to the maximum extent possible, during and after the completion of projects subject to the "Soil Erosion and Sediment Control Act." I hope that the committee will establish procedures for inspection during and after construction assure and certify compliance with these soil restoration standards.

I anticipated during the work and after completion, the applicant will provide reports as to the fitness of these measures and the Soil Conservation organization will provide for a zero tolerance inspection program that includes reports from various developers and/or applicants while disturbing our lands. Additionally, the bill should provide for bonding being provided to the State Conservation Committee for all temporary and permanent measures employed to achieve the standards promulgated henceforth. These standards should require that plans for soil restoration be included in any plan for development. Those plans in their entirety shall include adequate soil erosion and sediment control measures for approval in connection with any development project subject to the act. Finally, the bill requires that the committee establish a training and certification program for project supervisors identified in the plan as responsible persons in order to ensure compliance with soil restoration standards.

Erosion and sedimentation present serious problems to the health of our State's citizens by their inhalation of silica dust, tarnishment of the quality of our water resources, and allowing the creation of dangerous conditions on the land through out the State by these projects.

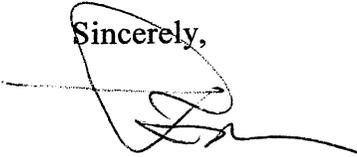
The removal of a stable ground cover in conjunction with the increasing of airborne particulate materials, the decrease in the infiltration capability of soils resulting from the removal of the natural soil erosion and sedimentation control mechanisms to create additional impervious areas accelerates the process of soil erosion and sediment transportation and deposition. This activity results in Silicosis and water pollution. In certain situations, some of these impervious surfaces are created from the soil mass itself, resulting from compaction and glazing due to the removal of

topsoil and the weight of heavy machinery traveling over the land during development. If the soil is not prevented from becoming airborne or water borne material, the result will be decreased water infiltration and increased storm water runoff, leading to further pollution of the State's waterways. These land disturbance activities must be scientifically managed to minimize them from becoming hazardous to our quality of life. By establishing standards for the temporary and final restoration of soil health during and after land disturbance activities, water pollution will be reduced, and the State's air and water resources will be protected for our present population and future generations.

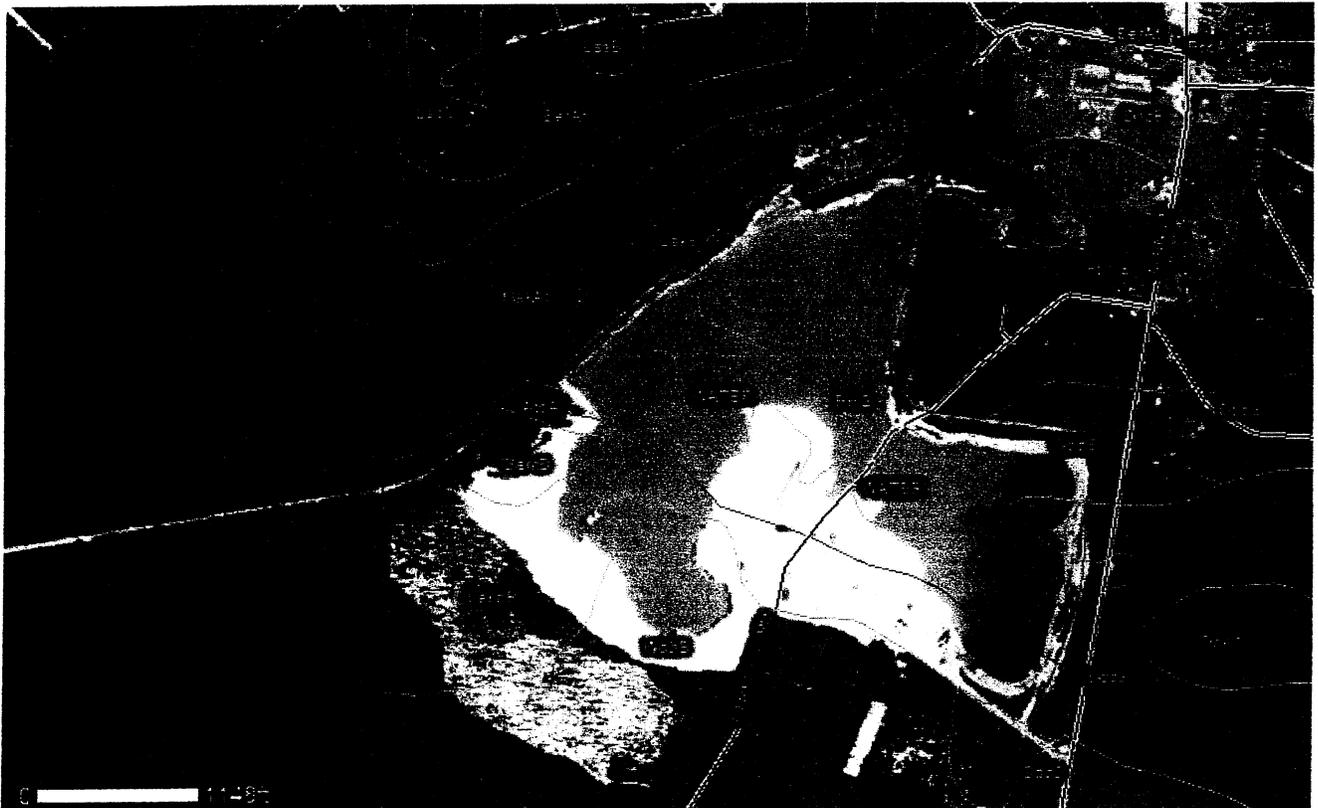
I shall be pleased to meet with you to provide you with additional considerations based upon my education, over 35 years of experience and knowledge. Presently, I am planning to attend your hearing on S 1410 in Toms River. I will be at Town Hall at 33 Washington Street at 10 am. At that time, I would appreciate an opportunity to give you a brief overview of my interest. I shall express to your committee the basis for my concerns. I shall tell you why I think we must adopt laws that protect the people rather than providing loopholes for the forces of "Greed" to be the predator on our quality of life.

I hope to hear from you that immediate measures to protect the health, safety and general welfare of the community in which these land disturbances are located have been initiated. If require any additional information, please feel free to contract me.

Sincerely,



Peter Ferwerda 3rd



Aerial Photo with Soil Groups Circa 2008



Warren Grove Wildfire Circa 2007



**Doug O'Malley, Field Director
Environment New Jersey
August 12, 2010**

Environment New Jersey fully supports S1411/A2290, S1410/A2501, S1815/A2577, S1856/A2606 and urges committee members to support all four bills.

Barnegat Bay is the jewel of the Shore, and from Cape May to Closter, the public knows that the Bay is in trouble. When we talk to people at their doorsteps, they immediately understand the problem – and they want the Legislature and the Governor to start cleaning up the Bay.

Our ecosystem is telling us the Shore – especially in Barnegat Bay – is getting sick. Nutrient loading in the Bay is leading to drastic thinning of sea grasses, and is likely one of the main causes for the jelly-fish invasion of recent summers.

This development binge to hit the Shore far exceeds the state average. According to Rutgers, NJ's four coastal counties, (Monmouth, Ocean, Atlantic and Cape May) accounted for over 28% of the state's growth earlier this decade. Ocean Co. took top prize with over 10,000 acres, and Monmouth was a close second with 9,000. The more impervious cover, the more stormwater created which flushes pollution onto our coast. That trend has only accelerated over the last few years, with the Barnegat Bay watershed reaching up to 33% impervious cover (up from 19% in the 1970s).

The economy of Ocean County is built around the Bay, and its ecological health. That economy is calculated to be worth at least \$3.5 billion annually. The value of real estate is estimated to be \$20 billion. The Bay hosts over 1.5 million visitors each year – visitors seeking clean water to swim in, clam in and fish – water free from algae blooms and the recent herds of stinging jellyfish. The Bay used to provide jobs for over 900 watermen – no more. The alarms are going off in the Bay – and the ecological sickness is starting to affect the Bay's economic vibrancy.

We welcome the support of Rep. Adler on the Congressional level for the Bay, but we can't shirk the responsibility on the state level to take the strongest positions to tackle the source of run-off pollution: overdevelopment. We need to stop digging our hole deeper. The state and the DEP have historically failed to address one of the largest problems for our marine waters: nitrogen pollution.

From reducing pollution in fertilizers to setting up a pilot stormwater utility to ensure new development doesn't increase water pollution going into the Barnegat Bay, these four bills are the first steps towards reducing polluted run-off and improving water quality. Making sure new development helps clean up the Bay, not simply increases polluted run-off requires planning: developing a comprehensive plan for identifying and fixing existing sources of pollution, and by creating a program for assessing a fee on any new development within Barnegat Bay watershed to help with this challenge. This will help finance the Bay's cleanup.

Untitled

**JERSEY sHORE nnCLEAR wATCH
Edith Gbur 732-240-5107
gbur1@comcast.net**

The proposed Fertilizer Bill will help save Barnegat Bay and will help Save the Environment and save money.

An extensiive Federal Geological Survey found that fertilizer was poisoning our wells . with Radium .

As a result filers are used to screen out radium in our public water supply in Toms River.

This is an expensive process. Some wells are owned by the Municipality and are an innecessary expnse to our government.

Some private wells are not subject to the same scrutiny and pose an immediate health risk.

See enclosed Philadelphia Inquirer article . and quote below.

' The study also found that the radium, which occurs naturally, gets into the water because of pollution from fertilizer and lime used on residential and agricultural land. When chemicals from the fertilizers seep into the aquifer, they help move radium deposits into the water, according to the USGS.

The radium-tainted water is in the Kirkwood-Cohansey aquifer, a groundwater supply that contains 17 trillion gallons of water

Untitled

under 3,000 square miles of southern and central New Jersey. According to the New Jersey DEP, about 200,000 private wells draw water from the Kirkwood-Cohansey aquifer.' "

Stafford Township has an ordinance on the use of Fertilizer.

While the bill may help save Barnegat Bay , Oyster Creek Nuclear Plant is the largest of Barnegat Bay according to a Generic Impact Study (GIS) . Oyster Creek is killing marine life and discharging radioactive chemicals in to Bay. The ultimate solution is to shut down Oyster Creek Nuclear Plant.

However, restrictions must be placed on Fertilizers now.

It

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ORDINANCE 2009-50

**ORDINANCE OF THE TOWNSHIP OF STAFFORD,
COUNTY OF OCEAN, STATE OF NEW JERSEY,
CREATING A NEW CHAPTER 105 OF THE
TOWNSHIP CODE, TO BE ENTITLED
“FERTILIZER APPLICATION REQUIREMENTS”**

WHEREAS, it is the desire of the Mayor and Township Council of the Township of Stafford to promote and regulate matters that benefit the health, safety and welfare of the citizens of the community; and

WHEREAS, numerous scientific reports have demonstrated that the improper and excessive application of fertilizers and fertilizer products have an adverse impact on surface and groundwater sources; and

WHEREAS, the United States Environmental Protection Agency (EPA), New Jersey Department of Environmental Protection (DEP) and various environmental groups have recognized that the largest factor that is detrimentally affecting our lakes, streams, bays, lagoons, estuaries, marshes, freshwater wetlands, fish nurseries and groundwater is nonpoint source pollution, including runoff of chemicals and related substances from the improper application of fertilizer products; and

WHEREAS, the geological composition of the soils in Stafford Township consists primarily of sandy soil that has little ability to remove nitrates, phosphates nutrients and other common ingredients found in fertilizers; and

WHEREAS, common fertilizers, which are readily available in retail stores, are regularly applied on residential and commercial properties throughout Stafford Township by property owners and landscapers, but there are no federal, state, county or local laws that regulate or restrict the application of such products; and

WHEREAS, all potable water in Stafford Township comes from wells and thus depends on clean, uncontaminated groundwater; and

WHEREAS, Stafford Township, as well as communities surrounding Stafford Township, have documented, in shallow public and private wells, the degradation of surface and groundwater from contaminants and chemicals frequently found in common fertilizer products, which can be harmful to our drinking water supply; and

WHEREAS, the entry of excess phosphorous, a common element in many fertilizers, into our waterways causes elevated growths of algae and aquatic vegetations, which interferes with the designated use of water bodies for aquatic life, recreation, fisheries, agriculture and can pose a threat to marine communities as well; and

WHEREAS, the improper application of fertilizers has been documented to have detrimental effects on and in our waterways, including through oxygen depletion and temperature increases, that threaten individual animals and species as well as reduce the diversity of life living in those waterways; and

WHEREAS, a continuation of the adverse impacts of improper fertilizer applications on the Township's lakes, streams and other waterways, including the Barnegat Bay, could also have a detrimental affect on the economy of Stafford Township, as well as potential risks to the health of its citizens; and

WHEREAS, the Mayor and Council believe it to be desirable to enact an ordinance that will both restrict the improper application of fertilizer products and also educate the public and landscapers of the proper timing and methods for fertilizer application;

BE IT ORDAINED, by the governing body of the Township of Stafford, County of Ocean, State of New Jersey, as follows:

SECTION 1. The Township Code of the Township of Stafford is hereby amended to create a new Chapter 105, which shall be entitled "Fertilizer Application Requirements," and which shall read as follows:

CHAPTER 105

FERTILIZER APPLICATION REQUIREMENTS

105-1. Purpose.

The purpose of this ordinance is to regulate the outdoor application of fertilizer products so as to reduce the overall amount of excess nutrients from fertilizers entering waterways, thereby helping to protect and improve surface and groundwater quality. The ordinance is further intended to establish a procedure to educate the public and landscapers on the proper application of fertilizers.

105-2. Definitions.

For the purposes of this ordinance, the following terms shall have the meanings stated herein. The word "shall" is always mandatory and not merely directory.

- A. *Applicator* – any person who applies fertilizer products to soils or turf.
- B. *Buffer* -- the land area, 25 feet in width, adjacent to any waterbody.
- C. *Commercial Farm* – a farm management unit producing agricultural or horticultural products worth \$2,500 or more annually.
- D. *Fertilizer* – a fertilizer material, mixed fertilizer or any other substance containing one or more recognized plant nutrients, which is used for its plant nutrient content, and that is designed for use or claimed to have value in promoting plant growth, and which is sold, offered for sale or intended for sale.

- E. *Impervious surface* – a surface that has been compacted or covered with a layer of material so that it is highly resistant to infiltration by water. This term shall include any highway, street, sidewalk, parking lot, driveway or other location that prevents infiltration of water into the soil.
- F. *Landscape Professional* – a person or business that, in exchange for pay, goods, services or other consideration, applies fertilizer products to soil or turf.
- G. *Phosphorous fertilizer* – any fertilizer that contains phosphorous, expressed as P_2O_5 , with a guaranteed analysis of greater than zero; except that it shall not be considered to include animal or vegetable manures, agricultural liming materials or wood ashes that have not been amended to increase their nutrient content. The phosphorous percentage in a fertilizer product is included on the packaging, which contains three numbers (e.g. “26-0-3”), with the phosphorous percentage as the middle number. A zero in the middle means no phosphorous, while a “2” or a “3” means low phosphorous.
- H. *Soil test* – a technical analysis of soil conducted by an accredited soil-testing laboratory following the protocol for such a test established by the Rutgers Cooperative Research and Extension.
- I. *Waterbody* – a surface water feature, such as a lake, river, stream, creek, pond, lagoon, bay, canal, estuary and any marine waters.

105-3. Prohibited Conduct.

Applicators shall be prohibited from engaging in any of the following activities:

- A. The application of fertilizer to an impervious surface. Fertilizer inadvertently applied to an impervious surface must be immediately swept or blown back into the target surface or returned to its original container or another appropriate container for reuse or disposal.
- B. The application of fertilizer between December 15 and February 15 or if the ground is frozen.

- C. The deposit of grass clippings, leaves or other vegetative debris into waterbodies, retention or detention areas, drainage ditches or stormwater drains, or onto impervious surfaces except during scheduled cleanup programs.
- D. The use or application of fertilizer within any of Stafford Township's Wellhead Protection Overlay Zones.
- E. The application of fertilizer in excess of the manufacturer's recommended rate.
- F. The application of any phosphorous fertilizer except as demonstrated by a need for specific soils in accordance with a soil test and the associated annual fertilizer recommendation issued by the Rutgers Cooperative Research and Extension.

105-4. Exemptions from Prohibited Conduct.

The following activities shall be exempt from Section 105-3 of this ordinance:

- A. The application of fertilizer on commercial farms, although commercial farmers are expected to implement best management practices in accordance with conservation management plans or resource conservation plans developed for the farm by the Natural Resource Conservation Service and approved by the Soil Conservation District Board.
- B. The application of any phosphorous fertilizer when:
 - 1. Establishing vegetation for the first time, such as after land disturbance, provided the application is in accordance with the requirements established under the Soil Erosion and Sediment Control Act, N.J.S.A. 4:24-39 *et seq.* and implementing rules; or
 - 2. Re-establishing or repairing turf after substantial damage; or
 - 3. Applying phosphorus fertilizer that delivers liquid or granular fertilizer under the soils surface, directly to the feeder roots; or

4. Applying phosphorus fertilizer to residential container plantings, flowerbeds or vegetable gardens.
- C. The application of fertilizer products on a golf course, a park or recreation area, when implemented in accordance with the terms of a Turf Management Program that has been submitted to and approved by the Township, which shall be required on an annual basis, and which shall include the application of fertilizer on the property by a Landscape Professional.

105-5. Recommendations.

The following guidelines are recommended for use by any applicator.

- A. Drop spreaders, rather than broadcast spreaders or other type spreaders, are recommended for use when applying fertilizer.
- B. Fertilizers should not be applied within twenty-four (24) hours of any substantial rainfall, consisting of any storm generating one-half inch or rain or more within a twenty-four (24) hour period.
- C. The Township recommends that grass clippings remain on lawns wherever possible to promote water conservation. In those instances where leaving grass clippings on lawns is impractical, all excess grass clippings should be removed within eight (8) hours of mowing due to high phosphorous, nitrate and nutrient content in grass clippings that will act as a fertilizer if permitted to enter waterways. All grass clippings and organic material shall be removed from impervious surfaces.
- D. Only nitrogen-based fertilizers in slow-release formulas should be used absent a documented need for other fertilizer types.
- E. Soil testing should be conducted once every three (3) years to determine which nutrients, if any, are necessary before any fertilizers are applied. The County of Ocean provides soil testing services at no charge or a minimal charge.

- F. Fertilizers should be applied, if at all, no more than four (4) times per year on a single parcel of property.
- G. Fertilizer should not be applied to areas within the 25-foot buffer of any waterbody.

105-6. Fertilizer Education Course.

A. All Landscape Professionals who apply fertilizer to property in the Township shall be required to complete an educational course that is offered by Stafford Township, Department of Public Works, on the proper application of fertilizer, by January 1, 2011. The course shall be offered on a regular basis as established by the Department of Public Works, but not less than once per month, at a cost of \$20 for each Landscape Professional. The course shall take approximately one hour to complete. Members of the public shall also be permitted to attend any course session free of charge. The Department of Public Works shall publicly post a schedule of course sessions, including times and dates.

B. A Landscape Professional with more than one employee may designate a person to serve as the business's "Certified Fertilizer Applicator," which person shall complete the Fertilizer Education Course. Any employee of a Landscape Professional who applies fertilizer must work under the direct supervision of a Certified Fertilizer Applicator, who shall be responsible for the compliance of the Landscape Professional and its employees with the provisions of this Ordinance.

C. Upon completion, each Landscape Professional that attends and completes the Fertilizer Education Course shall be provided with a certificate of completion and a sticker to be placed upon vehicles used by the Landscape Professional to document the successful completion of the course.

105-7. Enforcement

This ordinance shall be enforced by the Stafford Township Code Enforcement Officer.

105-8. Penalties

- A. Any person found to be in violation of any provision of this Ordinance shall be issued a written warning by the Code Enforcement Officer. After the issuance of three (3) written warnings to an applicator, the Code Enforcement Officer shall issue a summons, which shall subject the violator to a fine not to exceed one hundred dollars (\$100.00).
- B. Any Landscape Professional who fails to successfully complete the Fertilizer Education Course as set forth in Section 105-6 herein by January 1, 2011 shall not be permitted to apply fertilizer to properties in Stafford Township. Any violation of the terms of this Ordinance shall subject a Landscape Professional to a fine not to exceed one thousand dollars (\$1,000.00).

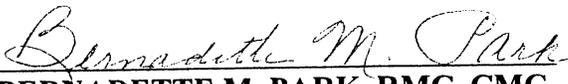
SECTION 2. This Ordinance shall become effective immediately upon final adoption and publication thereof according to law.

SECTION 3. This ordinance shall supersede any prior inconsistent ordinances.

SECTION 4. Each section, subsection, sentence and clause of this Ordinance shall be deemed an independent provision of the Ordinance, such that any finding or holding of any such portion of this Ordinance to be unconstitutional, void or ineffective for any reason shall not affect any other portion of this Ordinance.

NOTICE

NOTICE IS HEREBY GIVEN that the foregoing ordinance was introduced and passed by the Township Council on first reading at a meeting of the Township Council of the Township of Stafford held on the **1st** day of **December, 2009**, and will be considered for second reading and final passage at a regular meeting of the Township Council to be held on the **15th** day of **December, 2009**, at **7:00 pm** at the Municipal Building located at 260 East Bay Avenue, Manahawkin, New Jersey, at which time and place any persons desiring to be heard upon the same will be given the opportunity to be so heard.


BERNADETTE M. PARK, RMC, CMC
Township Clerk, Township of Stafford

CERTIFICATION

I, **BERNADETTE M. PARK**, Municipal Clerk of the Township of Stafford, do hereby certify that the foregoing Ordinance was duly adopted by the Stafford Township Council on second reading on the **15th** day of **December, 2009**.


BERNADETTE M. PARK, RMC, CMC
Township Clerk, Township of Stafford



WILLIAM R. HANNEMANN

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EASY TO INSTALL EASY TO MAINTAIN

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WORKING MODEL READY FOR INSPECTION**

Participating Organizations

- Alliance for a Living Ocean
- American Littoral Society
- Arthur Kill Coalition
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- Bayberry Garden Club
- Bayshore Regional Watershed Council
- Bayshore Saltwater Flyrodders
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- Ocean Wreck Divers, NJ
- Public Outing
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- Raritan Riverkeeper
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Clean Ocean Action Statement on the Fertilizer Bill (S1411, A2290) Joint Hearing of the New Jersey Senate & Assembly Environment Committees Toms River, NJ - August 12, 2010

Clean Ocean Action "COA" strongly supports the fertilizer bill, which will help reduce nutrient pollution and improve water quality.

New Jersey has seen record levels of coastal and watershed development where natural areas have been converted into commercial and residential areas with lawns, and this trend is projected to continue. To promote the growth of grass, people apply fertilizer that contains nutrients, which should stay on lawn. Unfortunately, not all of fertilizer does some of it ends up in stormwater run-off or groundwater and into waterways. Overapplied and misused fertilizers are contributing to choking of our waters with dangerously high levels of nitrogen and phosphorous – concentrations that have led to algal blooms, oxygen dead zones, declines in aquatic habitats, and impaired waters throughout the state. Barnegat Bay, in particular, has declined as a result of high nitrogen levels and additional stressors. Reducing fertilizer leaching, or loss, to runoff and groundwater is one of the most cost effective solutions to nutrient pollution.

Almost 90 million pounds of fertilizer was distributed in New Jersey in 2008 for lawns and gardens. This includes an estimated 21 million pounds of total nitrogen chemical (non-organic) fertilizer and almost 200,000 pounds of phosphate (non-organic) fertilizer. Assuming a conservative leaching rate of 5 % of the total nitrogen chemical fertilizer sold, over one million pounds of nitrogen fertilizer enters NJ's waterways and groundwater every year.

This bill effectively reduces nutrient pollution by using two approaches advocated by the experts to keep fertilizer on the lawn and out of the water creating consistent requirements for the entire state. The bill 1) restricts the amount of nutrients applied at one time and on an annual basis and 2) requires slow release nitrogen fertilizer for non-professionals.

COA supports that the bill contains a cap on the total nitrogen allowed in fertilizer bags and requires that all lawn fertilizer sold or used at retail in New Jersey contain at least 30% of its nitrogen in slow release form. Scientific studies show that the higher the slow release percentage is - the lower the amount of nitrogen leaching will occur. This difference is notably apparent during heavy rains or excessive watering, when lawns are being established, and on sandy soils which are common in NJ's coastal watershed. Based on science and concern for water quality, numerous universities have recommended 30% or more slow release fertilizers to reduce nitrogen leaching and pollution. By combining the 30% requirement with a limit on the total nitrogen, the fast release content is also consistent with Florida's Department of Environment Protection's recommendation of 0.5 lbs of fast release nitrogen fertilizer per 1000 square feet.

Based on science, many universities have recommended fertilizers with slow release contents of 30% or more to reduce the amount of nitrogen that is lost to groundwater and runoff and to protect water quality:

- Cornell University 70%, University of Maryland 40%, University of New Hampshire 30-50%, and University of Florida 30%^{i,ii,iii,iv}

Cornell, Penn State, Virginia Tech, University of Maryland, North Carolina State University and others have also specifically recommended slow release fertilizers for sandy soils which have higher infiltration rates and more readily leach nitrogen than non-sandy soils.^{v,vi,vii,viii} For fresh waters, Michigan State University recommends 25-35% slow release nitrogen for waterfront turf areas (no application in buffer zone).^{ix} The University of Connecticut and University of Maine extensions recommend not fertilizing unless needed, and if needed using slow release nitrogen fertilizers.^{x,xi}

In contrast to other states that have banned phosphorus and thereby banned many organic products as well, the NJ bill provides exceptions so that together with the slow release requirement organic products are in effect promoted. Products with organic matter help improve soil conditions, supporting grass and reducing watering needs.

COA also recognizes the importance of training and certifying professional landscapers in the proper use and hazards of fertilizer application and that the bill includes fines for violations.

COA is encouraged by the bill's promotion public education on the perils of over-use and misapplication of fertilizers. This includes critical provisions that prohibit fertilizer application from November 15th through March 1st or on frozen ground and application on impervious surfaces or when a heavy rainfall is forecast. COA would prefer wider buffer zones between turf and waterways than required in the bill, as wider and more vegetated buffers result in less nitrogen runoff and leaching.

COA strongly backs this bill, which will help keep fertilizer on the lawn and out of our treasured rivers, lakes, and coastal waters, including Barnegat Bay.

ⁱ <http://www.gardening.cornell.edu/homegardening/scenc7de0.html> Last visited March 30, 2010.

ⁱⁱ <http://extension.umd.edu/publications/pdfs/HG65.pdf> Last visited March 31, 2010.

ⁱⁱⁱ http://extension.unh.edu/resources/representation/Resource000494_Rep516.pdf Last visited Aug. 2, 2010

^{iv} http://livinggreen.ifas.ufl.edu/landscaping/fertilizers_and_pesticides.html Last visited March 31, 2010.

^v <http://turf.psu.edu/extension/factsheets/turfgrass-fertilization.pdf> Last visited March 30, 2010.

^{vi} <http://www.gardening.cornell.edu/homegardening/scenc3de4.html> Last visited March 30, 2010.

^{vii} <http://pubs.ext.vt.edu/430/430-011/430-011.html> Last visited March 30, 2010.

^{viii} http://www.turffiles.ncsu.edu/Water_Quality/Default.aspx#AR000809 Last visited March 30, 2010.

^{ix} <http://www.turf.msu.edu/maintaining-waterfront-turf-to-preserve-water-quality> Last visited Aug. 4, 2010

^x <http://extension.umaine.edu/waterquality/lid/lawns/fertrec/> Last visited Aug. 4, 2010

^{xi} <http://www.sustainability.uconn.edu/Lawnfertilizerrecommendations.html> Last visited Aug. 4, 2010

Statewide Fertilizer Bill (S1411, A2290)

Primary Sponsors Senator Smith and Assemblyman McKeon, co-sponsored by Senator Beck

- Fertilizer has been shown to contribute to nutrient pollution through stormwater run-off and groundwater. Fertilizer is a combination of nutrients that are added to soils.
- **Reducing fertilizer leaching, or loss, to runoff and groundwater is a cost effective solution to nutrient pollution.**

New Jersey has Impaired Coastal Waters, Rivers, Lakes and Drinking Water Supplies Due to Nutrients

The nutrients, nitrogen and phosphorus, both can negatively affect our marine and fresh waters.

Nitrogen is a nutrient that especially affects marine waters.

Coastal waters, such as Barnegat Bay, have excessive nitrogen loadings that have harmed the marine life and decreased the habitat value of the ecosystem. Barnegat Bay has been described in peer reviewed publications as highly eutrophic and is among the worst coastal lagoons in the country, with high levels of macroalgae, harmful algal blooms, loss of important seagrasses, loss of seafloor creatures such as hard clams and bay scallops, and low dissolved oxygen conditions in the northern portion of the bay.^{i,ii,iii}

Nitrate, a form of nitrogen, is a serious concern in drinking water as it is associated with causing "blue baby syndrome", a potentially fatal condition that occurs when an infant's blood cannot transport sufficient oxygen."^{iv}

2 % of assessed waterways exceeded Drinking Water Supply Criteria for Nitrate^v

2.7 % of private wells tested in 2002-2007 exceeded Drinking Water Supply Criteria for Nitrate^{vi}

Phosphorus is a nutrient that especially affects fresh waters.

27 % of assessed waterways (freshwater only) exceeded the numeric phosphorus standard^{vii}

Additional Aquatic Life Impacts from Nutrients

24 % of assessed waterways exceeded the dissolved oxygen standard^{viii}

Universities Recommend Slow Release Nitrogen Fertilizer:

Several universities have recommended fertilizers with slow release contents of 30% or more to reduce the amount of nitrogen that is lost to groundwater and runoff and to protect water quality:

- Cornell University 70%, University of Maryland 40%, University of New Hampshire 30-50%, and University of Florida 30%^{ix,x,xi,xii}

Cornell, Penn State, Virginia Tech, University of Maryland, North Carolina State University and others have also specifically recommended slow release fertilizers for sandy soils which have higher infiltration rates and more readily leach nitrogen than non-sandy soils.^{xiii,xiv,xv,xvi} For fresh waters, Michigan State University recommends 25-35% slow release nitrogen for waterfront turf areas (no application in buffer zone).^{xvii} The University of Connecticut and University of Maine extensions recommend not fertilizing unless needed, and if needed using slow release nitrogen fertilizers.^{xviii,xix}

Fertilizer Distribution for New Jersey Non-Farm Use in 2008:^{xx}

- Almost 90 million pounds of fertilizer
 - An estimated 21 million pounds of total nitrogen chemical (non-organic) fertilizer
 - Almost 200,000 pounds of phosphate (non-organic) fertilizer

- One million pounds of nitrogen enter NJ's waterways and groundwater every year - assuming a very conservative runoff and groundwater leaching rate of 5 % of the total nitrogen chemical fertilizer sold. Higher nitrogen loading rates of 8-15 % are likely in sandy soils found in NJ's coastal watersheds.

Statewide Fertilizer Bill (S1411, A2290) Summary

This bill includes application requirements, nutrient limitations, and promotes education to reduce nutrient loadings from fertilizers used on lawns (and does not apply to agriculture use).

Nitrogen

- For consumers: Requires the use of slow-release nitrogen (which is more protective of water quality) in retail sale fertilizers and a 0.75 lbs total nitrogen limit per application.
- For professionals: Allows greater flexibility in product types with a 0.7 total soluble nitrogen limit; 1 lb total nitrogen per application/ 1000 sq ft.; 4.25 total annual nitrogen cap.

Phosphorus

- Prohibits the sale of phosphorous-containing fertilizers sold at retail and sold for use by professional landscapers, with some limited exceptions (including for organically-derived fertilizers, application on new lawns and turf repairs, and based on soil testing results).

Additional requirements

- Requires that professional landscapers be trained and certified in the proper use and hazards of fertilizer application and includes fines for violations.
- Promotes public education on the perils of over-use and misapplication of fertilizers, prohibits fertilizer application from November 15th through March 1st, prohibits on impervious surfaces or when a heavy rainfall is forecast, and sets buffer zones between turf and waterways, with exemptions for golf courses.

ⁱ Bricker, S. The Coastal Bays in Context In Dennison et al. 2009. *Shifting Sands Environmental and Cultural Change in Maryland's Coastal Bays* Univ. of Maryland Center for Environmental Science, Cambridge, MA.

ⁱⁱ Kennish et al. 2007. Barnegat bay-Little Egg Harbor Estuary: Case Study of a Highly Eutrophic Coastal Bay system. *Ecological Applications* 17:5:S3-S16.

ⁱⁱⁱ New Jersey Department of Environment Protection (NJDEP 2009), Final Integrated Water Quality Monitoring and Assessment Report 2008. http://www.state.nj.us/dep/wms/bwqsa/2008_final_IR_complete.pdf Last visited Aug. 5, 2010.

^{iv} *Id.*

^v *Id.*

^{vi} NJDEP Well Test Results for Sept. 2002 – April 2007, New Jersey Private Well Testing Act Program July, 2008 Report

^{vii} See footnote 1, *supra*.

^{viii} *Id.*

^{ix} <http://www.gardening.cornell.edu/homegardening/scene7de0.html> Last visited March 30, 2010.

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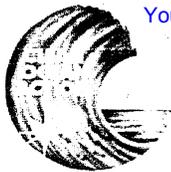
^{xviii} <http://extension.umaine.edu/waterquality/lid/lawns/fertrec/> Last visited Aug. 4, 2010

^{xix} <http://www.sustainability.uconn.edu/Lawnfertilizerrecommendations.html> Last visited Aug. 4, 2010

^{xx} <http://www.nj.gov/agriculture/pdf/agchemreport.pdf> Last Visited Aug. 9, 2010.

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Clean Ocean Action Statement on the Soil Health Bill (S1410, A2501) Joint Hearing of the New Jersey Senate & Assembly Environment Committees Toms River, NJ - August 12, 2010

Clean Ocean Action strongly supports the Soil Health Bill.

Mistreated soils and construction-project area displacements of natural vegetation are leading to the compaction and deleterious alteration of our natural New Jersey soils – changes that exacerbate the impacts from storms and fertilizer because we are reducing the ability of the soils to carry out their functions.

This bill is designed to develop standards for restoration of soil destroyed during construction activities, and to protect soils from excessive and unnecessary compaction, removal, and alteration. Without such protection, environmental damage results and homebuyers can be stuck with unhealthy yards that are difficult and expensive to improve.

Heavy construction equipment can compact soils to the degree that they become similar to concrete and are unable to absorb water, sustain living organisms in the soil, or support vegetation due to limited root growth.

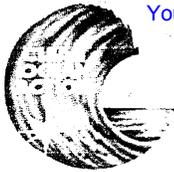
Un-compacted, healthy soils perform critical functions that contribute to healthy waters and thriving watersheds. Soils support plant growth and reduce stormwater-runoff volume and related pollution. Less stormwater and greater water infiltration in turn reduces erosion and improves stream flows. Healthy soils also reduce the need for fertilizer and pesticides, and they also have higher removal rates of nutrients and contaminants than unhealthy soils. Healthy soils, streams, and waterways support wildlife as well as trees and wetlands.

Healthy soils also help conserve water by storing more water and increasing groundwater recharge, thereby reducing the volume of water extracted from groundwater for irrigation.

In conclusion, healthy soils have many environmental and economic benefits and need to be protected.

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- Berkeley Shores Homeowners Civic Association
- Cape May Environmental Commission
- Central Jersey Anglers
- Citizens Conservation Council of Ocean County
- Clean Air Campaign, NY
- Clearwater of New Jersey
- Coalition Against Toxics
- Coalition for Peace & Justice/Unplug Salem
- Coastal Jersey Parrot Head Club
- Communication Workers America Local 1034
- Concerned Businesses of COA
- Concerned Citizens of Bensenville
- Concerned Citizens of COA
- Concerned Citizens of Montauk
- Concerned Students and Educators of COA
- Eastern Monmouth Chamber of Commerce
- Fisher's Island Conservancy
- Fishermen's Conservation Association, NJ Chapter
- Fishermen's Conservation Association, NY Chapter
- Fishermen's Dock Cooperative, Pt. Pleasant
- Friends of Island Beach State Park
- Friends of Liberty State Park, NJ
- Friends of the Boardwalk, NY
- Garden Club of Englewood
- Garden Club of Fair Haven
- Garden Club of Long Beach Island
- Garden Club of RFD Middletown
- Garden Club of Morristown
- Garden Club of Navasink
- Garden Club of New Jersey
- Garden Club of New Vernon
- Garden Club of Oceanport
- Garden Club of Princeton
- Garden Club of Rumson
- Garden Club of Sea Girt
- Garden Club of Short Hills
- Garden Club of Shrewsbury
- Garden Club of Spring Lake
- Garden Club of Washington Valley
- Great Egg Harbor Watershed Association
- Green Party of Monmouth County
- Green Party of New Jersey
- Highlands Business Partnership
- Hudson River Fishermen's Association
- Jersey Shore Captains Association
- Jersey Shore Parrot Head Club
- Jersey Shore Partnership
- Jersey Shore Running Club
- Junior League of Monmouth County
- Keypoint Environmental Commission
- Kiwanis Club of Mansquan
- Kiwanis Club of Shadow Lake Village
- Leonardo Party & Pleasure Boat Association
- Leonardo Tax Payers Association
- Main Street Wildwood
- Mantoloking Environmental Commission
- Marine Trades Association of NJ
- Monmouth Conservation Foundation
- Monmouth County Association of Realtors
- Monmouth County Audubon Society
- National Coalition for Marine Conservation
- Natural Resources Protective Association, NY
- NJ Beach Buggy Association
- NJ Commercial Fishermen's Association
- NJ Environmental Federation
- NJ Environmental Lobby
- NJ Main Ship Owners Group
- NJ Marine Education Association
- NJ PBIG Citizen Lobby
- Nottingham Hunting & Fishing Club, NJ
- NYC Sea Gypsies
- NY State Marine Education Association
- NY/NJ Baykeeper
- Ocean Wreck Divers, NJ
- Paddle-Out.org
- Picatinny Saltwater Sportsmen Club
- Raritan Riverkeeper
- Religious on Water
- Riverside Drive Association
- Rotary Club of Long Branch
- Rotary District #7340-Interact
- Saltwater Anglers of Bergen County
- Sandy Hook Bay Anglers
- Save Barnegat Bay
- Save the Bay, NJ
- SEAS Monmouth
- Seaweeders Garden Club
- Shark Research Institute
- Shark River Cleanup Coalition
- Shark River Surf Anglers
- Shore Adventure Club
- Sierra Club, NJ Shore Chapter
- Sisters of Charity, Maris Stella
- Sons of Ireland of Monmouth County
- Soroptimist Club of Cape May County
- South Jersey Dive Club
- South Monmouth Board of Realtors
- Staten Island Tuna Club
- Strathmere Fishing & Environmental Club
- Surfers' Environmental Alliance
- Surfrider Foundation, Jersey Shore Chapter
- TACK I, MA
- Terra Nova Garden Club
- Three Harbors Garden Club
- Unitarian Universalist Congregation/Monm. Cnty.
- United Boatmen of NY/NJ
- Village Garden Club
- Volunteer Friends of Boaters, NJ
- WATERSPIRIT
- Women's Club of Brick Township
- Women's Club of Keyport
- Women's Club of Long Branch
- Women's Club of Merchantville
- Women's Club of Spring Lake
- Zen Society



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Clean Ocean Action Statement on the Soil Health Bill (S1410, A2501) Joint Hearing of the New Jersey Senate & Assembly Environment Committees Toms River, NJ - August 12, 2010

Clean Ocean Action strongly supports the Soil Health Bill.

Mistreated soils and construction-project area displacements of natural vegetation are leading to the compaction and deleterious alteration of our natural New Jersey soils – changes that exacerbate the impacts from storms and fertilizer because we are reducing the ability of the soils to carry out their functions.

This bill is designed to develop standards for restoration of soil destroyed during construction activities, and to protect soils from excessive and unnecessary compaction, removal, and alteration. Without such protection, environmental damage results and homebuyers can be stuck with unhealthy yards that are difficult and expensive to improve.

Heavy construction equipment can compact soils to the degree that they become similar to concrete and are unable to absorb water, sustain living organisms in the soil, or support vegetation due to limited root growth.

Un-compacted, healthy soils perform critical functions that contribute to healthy waters and thriving watersheds. Soils support plant growth and reduce stormwater-runoff volume and related pollution. Less stormwater and greater water infiltration in turn reduces erosion and improves stream flows. Healthy soils also reduce the need for fertilizer and pesticides, and they also have higher removal rates of nutrients and contaminants than unhealthy soils. Healthy soils, streams, and waterways support wildlife as well as trees and wetlands.

Healthy soils also help conserve water by storing more water and increasing groundwater recharge, thereby reducing the volume of water extracted from groundwater for irrigation.

In conclusion, healthy soils have many environmental and economic benefits and need to be protected.



Surfrider Foundation®

Statement of John Weber, Surfrider Foundation Northeast Regional Manager at Joint Hearing of the New Jersey Senate & Assembly Environment Committee

Thank you for this opportunity. The Surfrider Foundation supports all of these pieces of legislation and urges you to pass them all. We especially want you to know about the seriousness of the issue of stormwater and polluted runoff. The members of Jersey Shore Chapter of the Surfrider Foundation have firsthand knowledge of the effects of polluted runoff. Unfortunately, that knowledge is manifesting itself as illnesses. Last year the chapter decided to collect information on people who got sick from going in the ocean. The results are sobering.

Chapter activists designed a survey and a website at www.njoceanillness.org to collect information on those who have become ill from going in the ocean. The website was launched in April of this year. Flyers were placed in surf shops, an email was sent to the Chapter membership list, and it was posted to the local surf-forecasting website. The chapter has already collected 33 surveys and here is how they break down.

Of the 33 surveys completed, 16 of those people say it has happened to them more than once. Specifically, it happened twice to 3 people, it happened three times to 8 people, and it happened more than three times to 5 people.

There were skin infections, gastrointestinal disorders, ear infections, sinus infections and more. Of the 33 people, 14 went to see a doctor. Four of these were diagnosed by physicians as MRSA infections. MRSA is a bacterium responsible for several difficult-to-treat infections in humans and it is resistant to penicillin-like antibiotics.

The Chapter will continue collecting data on ocean illnesses but we were surprised at the number of responses we received in such a short amount of time and with such little outreach.



Surfrider Foundation®

So we are encouraged by these two pieces of legislation concerning stormwater, but we are here to say this is not just so we can look at cleaner water. This is a serious issue that is making people sick. People are undoubtedly getting sick from going in the Ocean, and I imagine if we actually looked into this we would find people getting sick from going in the Barnegat Bay.

The Surfrider Foundation has developed a website called www.knowyourh2o.org. And while it largely deals with the issues of wasting water and water conservation, it has many tips for individuals on how to reduce storm-water runoff. It puts the issues of water conservation and water pollution in simple terms that everyone can understand.

One feature of the site is the animated film, *The Cycle of Insanity* which includes stormwater reduction tips ranging from using rain barrels, to planting ocean friendly gardens using native plants, to engineering our street and highways differently to reduce polluted runoff. There is also an associated blog at <http://knowyourh2o.blogspot.com/>.



MEMORANDUM

TO: The Hon. Bob Smith, Chair – Senate Environment & Energy Committee
The Hon. John McKeon, Chair – Assembly Environment & Solid Waste Committee

FROM: Conor G. Fennessy, Vice President of Government Affairs
Nicholas J. Kikis, Director of Regulatory Affairs & Research

DATE: August 11, 2010

RE: **S-1815/A-2577 – Ocean County Stormwater Management Sys. Demonstration Act**

In anticipation of this week's Joint Committee meeting in Toms River, Ocean County, and on behalf of the New Jersey Apartment Association (NJAA), we appreciate the opportunity to offer our recommended amendments to **S-1815/A-2577**, a proposal to establish a county-wide utility authority to address stormwater.

By virtue of their size, all professionally managed multi-family rental housing communities in Ocean County will be impacted by this legislation. NJAA members have been at the vanguard in installing proven and reliable conservation technologies to help our residents alter their personal usage habits, lowering consumption, and helping to conserve our supply of fresh, clean drinking water.

Unfortunately, in New Jersey, we are faced with two unsettling realities:

- 1) Water and sewer rates in many communities are not based upon actual flow, but are levied as flat-rates, often on a *per unit* basis. This per unit basis is discriminatory to multi-dwellings, as the water and sewer use by a single apartment unit is less than that of a single-family home;
- 2) New Jersey remains the lone remaining hold-out of the 50 states in prohibiting the introduction of sub-metering technology in rental housing settings. Although the NJ BPU allows this technology to be used in condos and co-ops, their prohibition on its application in rental housing effectively denies property owners and our residents the knowledge on personal usage habits that would ultimately promote greater awareness and conservation. Sub-metering was prominently mentioned as a rule in need of revision in the Lt Governor's Bi-Partisan Red Tape Report, and both sponsors of **S-1815/A-2577** are also prime sponsors of the Water Conservation & Metering Act, **A-2216** and **S-1758**. The NJAA thanks the sponsor for their support and we look forward to working with them to help make New Jersey the 50th state to allow sub-metering in multi-family rental housing.

Ever rising water and sewer rates exert upward pressure on the costs associated with bringing new, or keeping the current, quality rental housing in the market. Higher costs exert upward pressure on rents charged, and higher rents have an obvious negative affect on affordability.

In today's challenging economy unemployment is remains above 9 percent while rents charged have fallen to 2007 levels. Any policy action by government which pushes operational costs higher is unwise and not in the best interests of sound public policy. **Rising costs and declining rents represent an untenable economic model.**

Under **S-1815/A-2577**, developing the base rates and the apportionment of user fees are the most challenging component of developing a fair, equitable, and effective storm water utility. The bill assigns this delicate task directly to the Department of Environmental Protection without first offering guidance on the format this rate structure shall take. Accordingly, the owners of real estate have little insight into the rate structure that will develop if this legislation were to become law.

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Dense multifamily development – with limited impervious cover per dwelling unit compared with single-family homes – should be rewarded by the chosen rate structure. It is imperative that the structure of rates for stormwater service do not exacerbate the disproportionate share of the cost of sewer service that multifamily properties shoulder. Unfortunately, in developing sewer service rates, many sewer service authorities have ignored using consumption as a criterion, and as such, have created a system of unchecked waste where those who conserve water subsidize those who do not.

Additionally, the NJAA seeks clarification allowing owners of rental properties and their residents to determine in the lease who is ultimately responsible for paying fees established under this act. The suggested amendments clarify that contractual arrangements are permitted between owners and residents via residential lease agreements.

Respectfully, and with an eye towards the ultimate goal of holding-the-line on ever increasing costs, the NJAA would like to recommend amendments to Section 4, Section 11 and Section 15.

We would recommend that **Section 4** be amended to read:

4. (New section) a. The governing body of Ocean County may by resolution establish, provide, and maintain a stormwater utility for the purpose of creating a stormwater management system to manage the stormwater runoff of the county.

b. Every municipality, county, or authority that creates and operates a stormwater utility is hereby authorized, **but not required**, to charge and collect fees or other charges for direct or indirect use or services of the stormwater management system. The stormwater service charges may be charged to and collected from the owner or occupant[, or both,] of any real property. **Stormwater services charges paid for by the owner of rental property shall be exempted from any local rent control ordinance governing allowable rent increases, and may, upon agreement of landlord and tenant in a lease for residential property, be collectable as additional rent.** The owner **or occupant** of any real property shall be liable for and shall pay these charges to the municipal stormwater utility at the time when and place where such stormwater service charges are due and payable. The fees and charges shall be determined in a manner consistent with the guidance provided in the stormwater utility guidance manual created by the Department of Environmental Protection pursuant to section 5 of P.L. , c. (C.) (pending before the Legislature as this bill). Any fee or charge assessed pursuant to this subsection shall be calculated in a manner consistent with the guidelines established in the stormwater utility guidance manual created pursuant to section 5 of P.L. , c. (C.) (pending before the Legislature as this bill).

Section 11 be amended to read:

11. (New section) a. Every municipal authority is hereby authorized, **but not required**, to charge and collect rents, rates, fees or other charges for stormwater management on any owner or occupant, or both, of any real property situated in a constituent municipality to be determined in a manner consistent with the stormwater utility guidance manual created by the Department of Environmental Protection pursuant to section 5 of P.L. , c. (C.)



(pending before the Legislature as this bill). The owner **or occupant** of any real property shall be liable for and shall pay the stormwater service charges to the municipal authority at the time when and place where these charges are due and payable. The rents, rates, fees and charges shall be determined in a manner consistent with the stormwater utility guidance manual created by the Department of Environmental Protection pursuant to section 5 of P.L. , c. (C.) (pending before the Legislature as this bill). **Stormwater services charges paid for by the owner of rental property shall be exempted from any local rent control ordinance governing allowable rent increases, and may, upon agreement of landlord and tenant in a lease for residential property, be collectable as additional rent.**

b. Any stormwater service charge imposed pursuant to subsection a. of this section shall be calculated in a manner consistent with the guidance provided in the stormwater utility guidance manual created by the Department of Environmental Protection pursuant to section 5 of P.L. , c. (C.) (pending before the Legislature as this bill)**], and shall not be a flat-fee.**

And, replace **Section 15** in the bill to read as follows:

15. Section 44 of P.L.1957, c.183 (C.40:14B-44) is amended to read as follows:

44. In the event that a sewer or stormwater service charge of any municipal authority with regard to any parcel of real property shall not be paid as and when due, the municipal authority may, in accordance **this act, submit an application to the Department of Health and Senior Services for authorization to cause the supply of water to such parcel by any county, municipality or other person to be stopped or restricted until such service charge and any subsequent service charge with regard to such parcel and all interest accrued thereon shall be fully paid to the municipal authority. Such application may be filed only after municipal authority has delivered, via regular and registered mail, written notice to the occupant, occupants or owners of real property that sewer or stormwater service charge are past due and have been given 45 days, in addition to any standard grace period provided by the municipal authority, to make payment on any outstanding service charges and all interest accrued. When considering the municipal authority’s application to stop or restrict the supply of water, the Department of Health and Senior Services shall hold a public hearing to consider application and shall offer the opportunity for all affected parties to testify and offer evidence. Before any hearing is scheduled, the Department shall require certification be provided by the municipal authority that the authority has satisfied the above written notice requirements and 45 day grace period in full. Department may, at its discretion, allow an additional 45 day grace period for**



occupant, occupants or owners of real property to make payment in full. Department shall issue a decision within 10 business days of public hearing date, and Department shall notify all affected parties, in writing, via regular and certified mail, of decision to grant or deny application. If decision is issued in favor of the municipal authority application, the municipal authority may itself shut off or restrict such supply and, for that purpose, may enter on any lands, waters or premises of any county, municipality or other person.

Again, we appreciate your consideration of our recommended amendments. The NJAA is pleased to offer our support, expertise, and resources to Chairman Smith and Chairman McKeon, as well as all Senate and Assembly Committee members any housing, land use or economic development issues the two Committees may be looking to tackle this session.

The NJAA represents over 500 multi-family rental housing providers and associated businesses throughout New Jersey. We are a statewide organization dedicated to maintaining, improving and building new and affordable rental housing for New Jersey's working families, young couples and seniors.

My name is Dr. Stephen J. Souza. I am the President of Princeton Hydro, LLC, which is located in Ringoes, NJ. I am here today representing the American Littoral Society.

I want to begin by stating that I fully support the passage of Senate Bill 1141 and Assembly Bill 2290. We feel that it is mandatory for the protection and restoration of Barnegat Bay to establish via legislation requirements that lawn fertilizer products sold in New Jersey have a mandatory slow-release element and specify a total application limit. We support the slow release requirement of 30% and the total application limit of 0.75 lbs/1,000ft², as specified in the draft legislation currently being considered for passage.

As you are all aware, Barnegat Bay's water quality and ecological problems are directly linked to the negative processes associated with eutrophication. It is clearly established in the scientific literature, whether one is discussing Barnegat Bay or other estuarine systems and coastal bay environments, that eutrophication, and the negative consequences that result from eutrophication, are accelerated by land development related activities. Essentially, increasing levels of development lead to increases in nutrient loading. As nutrient loading increases there is not only an increase in productivity, but a shift in the overall ecology of the ecosystem. Algae blooms become more frequent and intense, water clarity decreases and submerged aquatic vegetation declines in vigor, distribution and abundance. As all of us in this room know, this has created over time a cascading negative effect on the Bay's overall food chain, with the most obvious impacts being declines in the Bay's fishery and shell fish community. Algal blooms also impact the recreational use of the Bay and detract from the Bay's aesthetic attributes. Overall, eutrophication is at the root of most of the Bay's problems.

For coastal systems, the control of eutrophication comes down to limiting nitrogen loading, the nutrient recognized as limiting in such ecosystems. Whether we talk about decreasing the influx of nitrogen on a per storm, seasonal or annual basis, it is clear that the control and reversal of the Bay's eutrophication and related water quality and ecosystem problems requires the aggressive management of this nutrient.

Both S1141 and A2290 provide an excellent means of addressing nitrogen loading and, if passed, will result in a huge positive step in the restoration of Barnegat Bay. Instituting a regulatory control over the amount of nitrogen applied and the formulation of nitrogen in lawn fertilizer, while perhaps not popular with the fertilizer manufacturers, is especially meaningful to those who care about the protection of Barnegat Bay and its long-term management.

Why are we so fixated on fertilizer controls? On the most basic level we can agree that nitrogen enters the Barnegat Bay system as a result of groundwater loading, point-source loading, atmospheric deposition, and non-point source loading, with the majority of the latter tied directly to stormwater runoff. If we examine these sources of nitrogen loading to the Bay it is clear that of the various sources, stormwater generated influxes represent one of the more feasibly managed components of the Bay's annual nitrogen load. Again,

research shows that of the various sources of nitrogen directly linked to stormwater runoff, urban and suburban runoff represents a potentially highly manageable source. However, a reduction in urban and suburban related runoff is not as easily achieved as it may appear. First, the existing stormwater management rules in place at the State and local level do not include a mandatory nitrogen reduction performance standard. Second, even if they did, it is clear if one reviews the projected nitrogen removal rates for NJDEP approved stormwater best management practices (BMPs) that the most we can achieve in terms of nitrogen removal by means of BMPs is roughly 30%. Furthermore, such reductions are only possible with some of the types of BMPs that have been promoted by the NJDEP since 2004. This means we only stand a chance of reducing nitrogen loading in the stormwater generated from relatively new development. This therefore leaves a large amount of our existing urban and suburban developed areas with little opportunity for any nitrogen reductions by means of what I call "delivery control" practices; that is stormwater BMPs.

That leaves us with no choice, if we are serious about reducing nitrogen loading to the Bay, than to implement what I call "source control" practices; that is measures intended to reduce the total amount of nitrogen entering the Bay by decreasing how much is generated in the first place. We know that there are number of factors that come into play with respect to controlling runoff from urban and suburban lawns, playing fields and open areas. One of these is the maintenance of good soil health; another measure that is supported by the ALS and being considered in the form of legislation. But again, the maintenance of good infiltrating soils is something that will prove beneficial for new development, but will not do anything to address existing development. Fertilizer controls however provide a means of reducing N loading from both existing and future development sites. As such, it is a measure that can have significant long term benefits for the Bay.

For evidence of the positive benefits associated with fertilizer controls one only need to look at the positive impacts gained in freshwater ecosystems through the control, and in some cases, the actual ban on phosphorus containing fertilizers. While nitrogen drives productivity and eutrophication in estuarine ecosystems, phosphorus is the driving nutrient in freshwater ecosystems. Recognizing the link between lake eutrophication and fertilizer related phosphorus loading, numerous lake communities have supported the use of non-phosphorus containing fertilizers and some communities have actually passed local ordinances banning the use of such products. Does it make a difference? Yes, it certainly does! Research just completed in the Lake Hopatcong watershed showed that the difference in the phosphorus content in the runoff generated from lawns fertilized with phosphorus containing fertilizers was two orders of magnitude greater than that measured in the runoff collected from lawns fertilized with non-phosphorus containing products.

Given the role of nitrogen loading in the eutrophication of the Bay and the opportunity at hand to definitively reduce fertilizer related nitrogen loading, full consideration must be given to the passage of S1141 and A2290.



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OCEAN COUNTY
IZAACK WALTON
LEAGUE

Testimony of William deCamp Jr., Chairman

Before New Jersey Senate Environment Committee
and Assembly Environment and Solid Waste Committee

CHAIRMAN

William deCamp Jr.

Restoring Barnegat Bay

EXECUTIVE DIRECTOR

Jennifer O'Reilly

Thursday, August 12, 2010

Toms River, New Jersey

VICE PRESIDENT

Britta F. Wenzel

TREASURER

Beth F. Nelson

Thank you, Chairman Smith and Chairman McKeon, for holding this hearing in the Barnegat Bay watershed and for your demonstrated strong commitment to the well being of Barnegat Bay.

SECRETARY

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Save Barnegat Bay supports all four bills under consideration today as written: *S-1410 / A-2501, Soil Erosion & Sediment Control Act; S-1411 / A-2290 Fertilizer Regulation; S-1815 / A-2577, the O.C. Stormwater Demonstration Act, and S-1856 / A-2606, the Stormwater Runoff Control Authority Act.*

We are extremely grateful that you have listened and acted to move the effort to address the nutrient pollution of Barnegat Bay and of every water body in the state out of the realm of talk and into the realm of action. Creating a law regulating the content of nitrogen in fertilizer that is sold and used in the State of New Jersey instead of passing a mere labeling law is, in our view, an extremely responsible step.

Save Barnegat Bay is a not-for-profit environmental group that receives contributions from approximately 1,500 families and businesses annually. Our mission is to conserve clean water and undeveloped natural land throughout the Barnegat Bay Watershed. Save Barnegat Bay was founded in 1971 as the Ocean County Chapter of the Izaak Walton League of America. We have an office in Lavallette.

Although you will hear many references today to Barnegat Bay, it should be emphasized that these four bills have actual and potential statewide implications, especially the fertilizer measure S-1411 / A-2290, which is statewide in its scope and national in its implications.

(next >)

ADVISORY COMMITTEE

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Nitrogen and Barnegat Bay in Brief: Four Policy Goals

Barnegat Bay is like a garden getting too much fertilizer and no weeding. The excess nutrition the bay receives is in the form of nitrogen from multiple sources. Fertilizer is not the largest source of nitrogen to the bay. It is merely the most accessible with respect to reducing the total load of nitrogen. This excess nitrogen produces algal blooms which severely disrupt the ecosystem to the point at which Barnegat Bay is currently one of the most threatened estuaries in the nation.

When a raindrop falls in the State of New Jersey, it already has too much nitrogen in it. By picturing that falling raindrop, one can name the four public policy goals that must be achieved if we are to address the excessive nutrient loading to our state's estuaries, whether they be the Delaware Bay and River Estuary, the Navesink and Shrewsbury Rivers, Newark Bay, or Barnegat Bay.

First, we must reduce the burning of fossil fuels so that the raindrop contains less nitrogen as it falls.

Second, we must restrain excessive development and conserve land in its natural state so that the nitrogen in the raindrop can be soaked up by a land plant rather than move over hard surfaces straight to the estuary where it becomes food for the algae.

Third, we must re-conceptualize and reconfigure storm water management. In the twentieth century we thought of successful storm water management as being achieved if there is no flooding after a storm event. In the twenty-first century we now know that for storm water management to be deemed successful there must, in addition to the volume of water being managed, be no excessive load of nutrients to the receiving water body. This means that as much stormwater as possible must be routed through planted areas where nitrogen can be removed before entering streams, rivers, lakes, and bays.

Fourth, we must not add more nitrogen once the raindrop has landed. This leads us to the subject of lawn fertilizer.

As I hope to elaborate in my spoken testimony, all four bills considered today address either the third or fourth of these policy goals, *i.e.*, reconfiguring stormwater management and properly regulating fertilizer. No one step can restore the nutrient balance in Barnegat Bay. Many steps must be taken. All four bills address vital components. Even taken together they are just a start.

While we strongly endorse all four bills, we wish to focus our testimony on the fertilizer bill because Save Barnegat Bay was instrumental in initiating its core concepts.

Why Require at least 30% Slow Release Nitrogen?

The basic concept of requiring a minimum of 30% slow release nitrogen for fertilizer sold or used in New Jersey began in Save Barnegat Bay's office in the form of a proposed Model Ordinance. This ordinance was endorsed by some of the leading marine scientists in the world including J. Frederick Grassle, founder and first Director of the Institute for Coastal and Marine Sciences at Rutgers, and Ivan Valiela of the Marine Biological Laboratory at Woods Hole, considered by some to be the leading authority on estuaries in the world.

We at Save Barnegat Bay are extremely grateful to the sponsors of S-1411 / A-2290 for incorporating our core concept into this legislation.

It is a commonplace of human experience that people seldom read labels. The New Jersey homeowner, with all the many factors she or he must balance in her or his life, cannot be expected to be an agronomist. He cannot be expected to:

- Read the directions, and
- Measure the area of his yard, and
- Measure the area taken up by his house and driveway, and
- Subtract one from the other, and
- Calculate the amount needed for his yard, and
- Set the spreader setting correctly, and
- Refrain from using any fertilizer beyond the amount calculated.

To the homeowner who does reliably undertake these steps, a blessing upon him. But common sense tells us that he is a rarity.

By ensuring that fertilizer with excessive water soluble content cannot be sold in our state, this law allows the homeowner to pull the bag off the retail shelf knowing that he is using a more environmentally responsible product.

Will many homeowners still over-apply fertilizer if the law limits the sale to products containing at least 30% nitrogen? Yes. But they will be over-applying a product less harmful to our water bodies. An analogy would be that if they are going to fire a weapon, let it be a bee-bee gun instead of a bazooka.

Who Recommends at Least 30%?

Among the agricultural schools recommending more than 30% slow release on their website are the following:

Cornell states that: "Soluble nitrogen sources are readily available to the plant, but on sandy soils there is the risk of leaching. A 50%-50% or 70%-30% mix of slow-release to quick-release N is less risky to the environment."

<http://www.gardening.cornell.edu/homegardening/scene3de4.html>

The **University of Maryland** recommends 40% slow release:

<http://extension.umd.edu/publications/pdfs/HG65.pdf>

The **University of Florida** recommends 30% slow release:

http://livinggreen.ifas.ufl.edu/landscaping/fertilizers_and_pesticides.html

Virginia Tech has 4 fertilizing programs. Two recommend more than 50% slow release. Two recommend less than 50% slow release.

<http://pubs.ext.vt.edu/430/430-011/430-011.pdf>

Penn State says: "A guarantee that 30% or more of the total nitrogen is water insoluble or controlled release nitrogen indicates a quality turfgrass fertilizer."

<http://turfgrassmanagement.psu.edu/MaintFert.html>

Print-outs of the relevant pages of these websites are attached.

The rationale given for these slow release recommendations is dual. The slow release nitrogen is less likely to go to the groundwater. And slow release is better for the grass, partly because makes it possible to fertilizer *less often*.

In order to convincingly argue that there is insufficient evidence to justify the 30% standard in S-1411 / A-2290, opponents must either argue that these five leading agricultural schools were all wrong in asserting that slow release nitrogen is less likely to make it to the groundwater than water soluble or they must argue that the groundwater is not a meaningful source of nitrogen transport to our streams and estuaries. Neither of these lines of thought is plausible.

Proponents of this Bill have bent over backward to be Reasonable

We have chosen the 30% slow release figure, *which is the lowest figure generally offered by those institutions making recommendations.*

We have agreed that lawn care professionals may be held to a more lenient standard as long as they become certified. This includes golf courses.

We have attended dozens of meetings in search of consensus, but we have been unable to bridge the gap between ourselves and those who favor a mere labeling law.

A final thought...

In looking at the features weighing on *both sides of the scale* we hope that those with the power to decide will consider this thought:

Barnegat Bay in its healthy state means many things to many people. It is a clammer making his living... It is a couple dining on clams... It is a small businessman making his living... It is a grandfather and a granddaughter crabbing together... It is friends out boating... It is fishing early on a Sunday morning... It is children swimming at a bay beach...

And on the other side of the scale? We ask you to remember... it is just grass.

Thank you for considering our views.

After listening to the testimony at this hearing, we may submit further written testimony on these four extremely important bills.

Attachments:

Letter of Endorsement from J. Frederick Grassle

Letter of Endorsement from Ivan Valiela

Graphic comparing Florida law to S-1141 / A-2290

Page from Penn State University website with statement on slow release

Page from University of Maryland website with statement on slow release

Page from Cornell University website with statement on slow release

Page from University of Florida website with statement on slow release

Page from Virginia Tech University website with statement on slow release

First and last page of one of the contracts between Rutgers University and its business partner Scott's MiracleGro



Institute of Marine & Coastal Sciences

71 Dudley Road / New Brunswick / New Jersey 08901-8521 / USA
Phone: 732.932.6555 / Fax: 732.932.8578 / Url: <http://marine.rutgers.edu>

William deCamp, Jr, Chair
Save Barnegat Bay
906-B Grand Central Ave.
Lavallette, NJ 08735

July 18, 2008

Dear Willie:

Being a member of the local and international scientific community, and having closely followed efforts to understand conditions in Barnegat Bay, I am pleased to learn that Save Barnegat Bay is ready to advocate for municipal regulations. I have reviewed the proposed ordinance to help remove nitrogen from the Bay and write to confirm my support for taking this action. Research can provide the necessary data for making informed and enlightened decisions, but governments and citizens hold the power to effect change.

Scientists at Rutgers' Institute of Marine and Coastal Sciences have focused decades of research on studying nitrogen inputs along the New Jersey coast and more globally. As noted in our enclosed bulletin, *Ocean Matters*, data indicate that an abundance of nitrogen from surface runoff causes harmful algal blooms, leading to decreased water quality and degradation of essential habitat for fish and shellfish. Regulating fertilizer usage represents one important way that the people of Ocean County can play a leading role in helping to mitigate increasing environmental problems in Barnegat Bay.

As the founding director of the Institute of Marine and Coastal Sciences, I am pleased to endorse the proposed ordinance. Best wishes for successful passage and thank you for helping to conserve our coastal assets.

Sincerely,

A handwritten signature in black ink, appearing to read "J. Grassle", written in a cursive style.

J. Frederick Grassle

MBL

Biological Discovery in Woods Hole

Ivan Valiela

Senior Research Scientist, The Ecosystems Center

MBL
7 MBL Street
Woods Hole, MA 02543
USA

p: 508.289.7515
f: 508.457.1548
ivaliela@mbl.edu
www.MBL.edu

William deCamp, Jr, Chair
Save Barnegat Bay
906-B Grand Central Ave.
Lavallette, NJ 08735

16 July 2008

Dear Mr. Decamp:

I was very happy to see the progress you and Save Barnegat Bay have made in proposing the Nitrogen Lawn Ordinance. As you know, we here in Woods Hole have been working for several decades on these issues, and have worked up nitrogen loads for Barnegat Bay, and elsewhere. We are more than pleased to see the results of our research implemented by the proposal to implement the Model Lawn Care Ordinance.

Given that wastewater nitrogen has more or less been addressed in Barnegat Bay, it is timely to face the next nitrogen input that we might reasonably have some control over, the use of fertilizers. The measures your Ordinance suggests are good steps to initiate the process. I might have added some restrictions on use of nitrogen fertilizers by golf courses, since these are major users and sources for coastal water bodies, but, in general, I believe your plan will improve water quality in the Bay, and help preserve that marvelous natural resource for future generations.

I completely support your efforts, and wish you the best in having the ordinance approved, and implementing the ideas.

Thank you for making this major effort on behalf of our coastal waters.

Sincerely,



Ivan Valiela

Fertilizer Reform

Needed Regulation

Right for New Jersey:

Prohibition on inappropriate content.

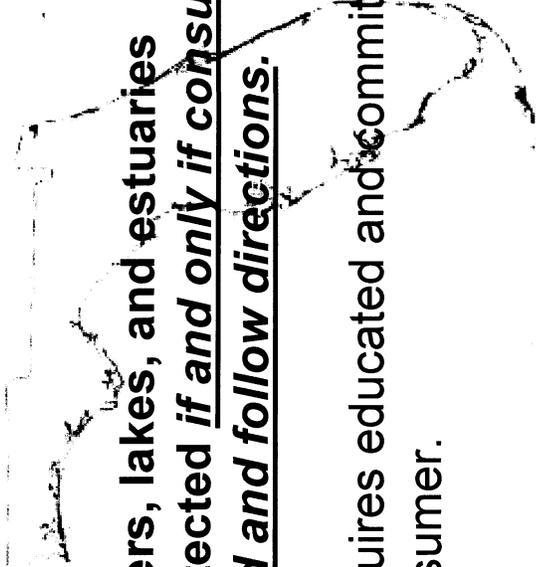
Ban sale and use of products without sufficient "slow-release" nitrogen.

Consumer will not find inappropriate products on the shelf.

Weak Regulation

Example: Florida

Labeling law.



Rivers, lakes, and estuaries protected if and only if consumers read and follow directions.

Requires educated and committed consumer.



Turfgrass Maintenance Fertilization

Department of Crop and Soil Sciences - Cooperative Extension

- Introduction
- Fertilizer Definitions
- Types of Nitrogen
- Recommended Fertilizer Programs

Introduction

A regular fertilization program is necessary to maintain good quality turfgrass. Dollar for dollar, fertilization does more to improve poor quality turfgrass or maintain good quality turfgrass than any other single management practice.

First, a soil test should be made to establish the basis for a regular fertilization program. Soil testing service is available from The Pennsylvania State University Soil and Forage Testing Laboratory and from private testing laboratories. Soil test mailing kits for University testing may be obtained from county Cooperative Extension Service offices at a nominal cost. The soil sample is forwarded to the University. After analysis, recommendations for fertilization are made.

Grass plants normally need nitrogen, phosphorus, and potassium (potash) in larger amounts than can be supplied naturally from the soil. Nitrogen, which is essential for vegetative growth and good green color, is a constituent of plant proteins, chlorophyll, amino acids, and other plant substances. Phosphorus is necessary for good root development and important in many vital growth processes. Potassium is required for physiological functions and promotes disease resistance and winter hardiness in grasses.

Fertilizer should be bought on the basis of its quality rather than on bag size and price. Value depends on the total amount of plant food contained in the bag and the source of the nitrogen-carrying portion of the fertilizer. The law requires that the total amount of plant nutrients be shown on the bag. The bag may or may not indicate the source of nitrogen used; ask your dealer or county agent. If the fertilizer contains slow release nitrogen materials, the percent water insoluble nitrogen (WIN) or controlled release nitrogen (CRN) must be stated on the bag. A guarantee that 30% or more of the total nitrogen is water insoluble or controlled release nitrogen indicates a quality turfgrass fertilizer.

Fertilizer Definitions

Complete fertilizer. A complete fertilizer contains the three major fertilizer elements - nitrogen, phosphorus (phosphate), and potassium (potash).

Fertilizer grade. The fertilizer grade designates the percentages of nitrogen, available phosphate, and water soluble potash in the product. A 20-5-10 grade fertilizer contains 20 percent nitrogen, 5 percent available phosphates, and 10 percent water soluble potash. Thus, a 40 pound bag of 20-5-10 contains 8 pounds of nitrogen (20 percent of 40), 2 pounds



MARYLAND
COOPERATIVE
EXTENSION
UNIVERSITY OF MARYLAND
COLLEGE PARK • EASTERN SHORE

Information

HG 65

Help the Chesapeake Bay

Prevent pollution and reduce runoff with a healthy yard. Use care when gardening to protect your local water supply, streams, rivers, and the Chesapeake.

Control Erosion & Improve Your Soil

- Plant gardens in raised beds with solid sides.
- Recycle nutrients and improve soil by adding compost to your garden.
- Cover bare soil with leaves or cover crops during fall and winter.
- On slopes, plant along the contour, not up and down; construct terraces to hold your soil.

Garden Cover Crops

Seed in fall; mow and dig into the soil 2 weeks before spring planting. Try these:

- Oats
- Crimson Clover
- Winter Rye
- Winter Wheat

Lawn Fertilizer

- **Test your soil first!** Only fertilize based on your soil's needs. Re-test every 3-5 years.
- If phosphorus level in your soil is adequate, use a low- or no-phosphate fertilizer.
- Select fertilizer that contains at least 40% of its nitrogen in a slow release form.
- Do not over-fertilize.
- Keep fertilizer off of paved surfaces.
- Do not apply fertilizer to frozen ground or dormant turf or before a heavy rain.

Mowing Guide

The proper mowing height reduces weeds by 50-80%!!!

	Spring & Summer	Fall & Winter
Tall fescue	2½ - 3½ inches	2½ inches
Kentucky bluegrass	2½ - 3½ inches	2 - 2½ inches
Fine fescue	2½ - 3½ inches	2 - 2½ inches
Bermudagrass	2½ - 3½ inches	1½ - 3½ inches
Zoysiagrass	2 - 3 inches	½ - 2 inches

Grasscycle! Leave grass clippings on the lawn. They return nutrients to your lawn and reduce the amount of fertilizer needed by 25-50%.

Keep mower blades sharp.

Watering

- In dry spells, allow an established lawn to go dormant.
- If turf looks blue-gray and you leave footprints after walking on it, water is needed.
- *Early morning* is the best time to water.
- Water slowly; wet to a depth of 4-6 inches.
- Avoid water run-off from the lawn.
- Light, frequent watering or watering in the evening can damage your lawn.
- Plant and maintain a landscape that will survive on natural rainfall amounts.

Control Pests with IPM

- Check plants regularly for signs of problems. Look at leaf undersides for spider mites and egg masses.
- Avoid routine application of pesticides. Spot treat affected areas only rather than spraying the entire lawn and landscape.
- When necessary, use environmentally friendly pesticides like horticultural oils and soaps, botanical insecticides, biological controls, and beneficial insects.
- Hand pick insects and diseased leaves and pull weeds, when possible.

What we do matters!

Our landscapes are connected to the Chesapeake Bay by a network of storm drains, streams, and rivers.

HAVE A LAWN OR GARDEN QUESTION? CALL THE HOME & GARDEN INFORMATION CENTER!

1-800-342-2507

Consultants available Monday-Friday, 8 A.M. to 1 P.M. Recorded information available 24 hours a day.

The Maryland Cooperative Extension's programs are open to all citizens without regard to race, color, gender, disability, religion, age, sexual orientation, marital or parental status, or national origin.

The Chesapeake Bay Trust funded the printing of this publication.



Cornell University

[Search Cornell](#)



[Home Gardening](#) > [Lawn Care Library](#) >

Fertilizing

8 of 20 [prev](#) [next](#)

Use only what you need, and avoid spring applications.

Just like people, lawns need a balanced diet, too. If you feed them too much, too little, or apply the wrong kind of fertilizer, they won't be healthy.

When you fertilize is critical, too. (Fall is better than spring.)

Test your soil. A soil test will tell you how much (if any) phosphorus (P) and potassium (K) fertilizer your lawn needs. Contact your local extension or the Cornell Nutrient Analysis Laboratory for more information.

If tests indicate that no P or K is needed, use nitrogen fertilizer sources that contain little or no P and K.

Adjust pH, if needed. Lawns should have a slightly acid pH, between 6.0 and 7.0. If your soil tests fall outside of this range, follow instructions for adding lime or sulfur to bring pH into this range.

Focus on fall. If phosphorus and potassium levels are adequate in the soil, nitrogen (N) is the most important nutrient for grass growth. Understanding [how grass grows](#) is important when making decisions about how much and when to apply nitrogen fertilizer.

For most low-maintenance lawns, a single application (1 lb. N/1,000 square feet) between Halloween and Thanksgiving (about 2 weeks after your last mowing) is the best time. Most home lawns with modest expectations do just fine with a single late-fall fertilization.

Do not fertilize during "Indian summer" - a warm period following hard frost. This may cause excessive topgrowth, reduce root storage and increase winterkill. The best window for fall application is after topgrowth stops, usually after 10 days with average daily temperatures below 50° F. Roots will continue growing and taking up fertilizer until the ground freezes.

Organic nitrogen sources are not a good choice for fall fertilization because they require warm soil and microbial action to release nitrogen. Soluble nitrogen sources are readily available to the plant, but on sandy soils there is the risk of leaching. A 50%-50% or 70%-30% mix of slow-release to quick-release N is less risky to the environment.

For higher maintenance lawns, you can also apply 1 lb. N/1,000 sq. ft. around Labor Day and/or Memorial Day. Avoid early-spring applications. Research shows that these applications do not really enhance spring green-up compared with late-fall applications. (Neglected lawns or sods thinned by winterkill may benefit from .5 lb. N/1,000 sq. ft. after the soil

- [Introduction](#)
- [Healthy Lawn Overview](#)
- [Why Lawns Matter](#)
- [Choosing a Lawn Care Service](#)
- [How Grass Grows](#)
- [Choosing Lawn Grasses](#)
- [Mowing](#)
- [Fertilizing](#)**
- [Watering](#)
- [Dealing with Leaves](#)
- [Coping with Shade](#)
- [Relieving Thatch](#)
- [Managing Lawn Weeds](#)
- [Managing Lawn Insects](#)
- [Preventing Lawn Diseases](#)
- [Salt Damage](#)
- [Repairing Dog Urine Damage](#)
- [Renovation and Establishment](#)
- [What's Wrong with This Image?](#)
- [Timely Tips](#)



Fertilizers & Pesticides

Fertilizer Use

Pesticide Use

Fertilizer Use

To grow properly, plants need nutrients (nitrogen, potassium, calcium, zinc, magnesium, iron, manganese, etc.) which normally can be found in the soil. Sometimes fertilizers are needed to achieve a desired plant growth, but they are not always used properly. Below are a few tips:

Apply compost

When added to the soil, compost creates a balanced medium for sustained plant health.

Apply a specific mineral

Talk to your local home garden center specialist for the right one.

Apply a packaged fertilizer

Choose a fertilizer that contains slow-release nitrogen and other nutrients. This is the most environmentally safe and cost-effective method and requires fewer applications. Look for a fertilizer with at least 30% slow-release nitrogen; you can figure this out by looking at the percent of water insoluble nitrogen, which indicates the percent of slow-release nitrogen (see [Figuring Out Fertilizer](#)). Plus, for most applications, only 0 - 2% phosphorus is needed.

Reading a fertilizer label

- For example, 10-2-10 means 10% of the bag is Nitrogen, 2% is phosphorus, and 10% is Potassium.
- Read labels closely to see if other nutrients are included.
- As a general rule, the first and third number should be the same.
- The middle number should be no more than half the total value of the other included nutrients.

Try to reduce the use of fertilizer

When over-applied, fertilizers can increase insect and disease problems. Rapidly growing plants are weak and without an adequate root system. The excess also increases run-off from yards and can contaminate waterways.

Pesticide Use

The use of pesticides has become the most common approach to pest control. This has resulted in pest resistance to pesticides, and the destruction of beneficial organisms.

Pesticides and other chemicals are often seen as essential tools to maintaining a beautiful yard. However, pesticides used in urban landscaping contain chemicals, such as [diazinon](#) (which is no longer available for purchase) and [chlorpyrifos](#), which can migrate through the ground and be toxic to a number of organisms, including fish and invertebrates. Most pesticides do kill their target pests but

Fertilizer Ratio - If the fertilizer analysis is 16-4-8, the fertilizer ratio is 4-1-2; similarly, a 14-7-14 analysis would have a 2-1-2 ratio. Mature lawns generally require more nitrogen than phosphorus and potassium; therefore, ratios of 4-1-2 or 4-1-3 are commonly recommended. Turf maintenance fertilizers vary in nitrogen content and may contain a portion of the nitrogen as water insoluble or slowly-available nitrogen.

Nitrogen Availability - The source of nitrogen in fertilizers influences nitrogen availability and turf response. There are two categories of nitrogen sources; quickly-available and slowly-available. Quickly-available materials are water soluble, can be readily utilized by the plant, are susceptible to leaching and have a relatively short period of response. Quickly-available sources include

ammonium nitrate, urea, ammonium sulfate and calcium nitrate. Slowly-available nitrogen sources release their nitrogen over extended periods of time and are applied less frequently and at somewhat higher rates than the quickly-available nitrogen sources. Slowly-available sources are less susceptible to leaching and are preferred on sandy soil types which tend to leach. Slowly-available sources include urea formaldehyde (UF), UF based products (methylene ureas), sulfur coated urea (SCU), IBDU, natural organics (bone meal, fish meal, dried blood, and animal manures) and activated sewage sludge.

If a fertilizer contains a slow release nitrogen source it will be listed on the label. For UF based fertilizers the portion of the nitrogen that is slowly-available is listed on the fertilizer bag as Water Insoluble Nitrogen (WIN).

Nitrogen Fertilization of Cool-Season Grasses

Program 1 - Nitrogen fertilization of cool-season grasses using predominantly quickly-available nitrogen fertilizers (less than 50% slowly-available nitrogen or WIN)

Nitrogen Application By Month

Quality Desired	Sept.	Oct.	Nov	May 15- June 15
	lbs N/1000 sq ft			
Low	0	1	0	0-1/2
Med	1	1	0	0-1/2
High	1	1	1	0-1/2

Program 2 - Nitrogen fertilization of cool-season grasses using predominantly slowly-available fertilizers (50% or more slowly-available nitrogen or WIN)

Nitrogen Application By Month

Quality Desired	Aug 15 to Sept 15	Oct 1 to Nov 1	May 15 to June 15
	lbs N/1000 sq ft		
Low	1.5	0	0
Med	1.5	1.5	0
High	1.5 to 2	1.5	0 to 1.5

Important comments about Programs 1 and 2:

1. Fine fescue perform best at 1-2 lbs of nitrogen per 1000 sq ft per year.
2. Applications in successive months should be approximately four weeks apart.
3. Natural organic and activated sewage sludge products should be applied early in the August 15 to September 15 and the October 1 to November 1 application periods to maximize their effect.
4. Up to 1 lb of nitrogen in Program 1 and up to 1.5 lb of nitrogen in Program 2 may be applied per 1000 sq ft in the May 15 to June 15 period if nitrogen was not applied the previous fall or to help a new lawn get better established.

Nitrogen Fertilization of Warm-Season Grasses

Program 3 - Nitrogen fertilization of warm-season grasses using predominantly quickly-available nitrogen fertilizers (less than 50% slowly-available nitrogen or WIN)

Nitrogen Application By Month

Quality Desired	April	May	June	July/ Aug
	lbs N/1000 sq ft			
Low	1	1	0	0
Med	1	1	1	0
High	1	1	1	1

Program 4 - Nitrogen fertilization of warm-season grasses using predominantly slowly-available nitrogen fertilizers (50% or more slowly-available nitrogen or WIN)

Nitrogen Application By Month

Quality Desired	April/May	June/July
	lbs N/1000 sq ft	
Low	2.0	0
Med	1.5	1.5
High	2.0	2.0

Important comments about Programs 3 and 4:

1. If overseeded for winter color add 1/2 to 1 lb of readily available nitrogen per 1000 sq ft in Sept./Oct. and/ or Nov.
2. Applications in successive months should be approximately four weeks apart.
3. Centipedegrass and mature zoysiagrass perform best at 1 to 2 lbs of nitrogen per 1000 sq ft per year.
4. Improved winterhardiness on bermudagrass will result from the application of potassium in late August or September.

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LICENSE AGREEMENT

This License Agreement is entered into between Rutgers, The State University, a specially chartered New Jersey institution of higher education, having principal offices at Old Queens, 83 Somerset Street, New Brunswick, New Jersey 08901 ("University") and The Scotts Company, an Ohio Company with offices at 14111 Scottslawn Road, Marysville, Ohio 43041("Licensee").

ARTICLE I - BACKGROUND

1.01 University owns patents, patent applications and University Material useful in the production of transgenic turfgrasses.

1.02 Japan Tobacco, with an address at JT Bldg. 2-1, Toranomom 2-chome, Minato-ku, Tokyo 105-8422, ("JT") has granted University rights to use and sublicense its intellectual property contained in JT Material and in JT Patents.

1.03 University, Licensee and Monsanto Company entered into a Research and Commercial Agreement dated February 21, 2004 ("Research and Commercial Agreement") in which University granted Licensee certain rights to conduct research regarding, applications of JT Material, JT Patents, University Technology, University Material and/or University Patents to develop herbicide resistant and/or dwarfing bluegrass and dollar spot resistant bentgrass, and to commercialize such bluegrass and/or bentgrass ("Existing Rights").

1.04 University and Licensee wish to enter into an agreement regarding research and commercialization rights related to JT Material, JT Patents, University Technology, University Material and/or University Patents other than the Existing Rights.

ARTICLE II - DEFINITIONS

As used in this Agreement, the following defined terms shall have the meanings set forth in this Article II.

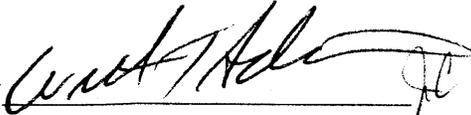
2.01 "Affiliates" means any company directly or indirectly controlled by that entity, "control" meaning in this context the direct or indirect ownership of more than fifty percent (50%) of the capital stock or the power to exercise more than fifty percent (50%) of the voting rights.

Agreement is executed by such party freely and voluntarily, and without reliance upon any statement or representation by the other party, or any of such other party's attorneys or agents except as expressly set forth herein.

IN WITNESS WHEREOF, the parties have caused this Agreement to become effective as of the date signed by the last signatory hereto.

RUTGERS UNIVERSITY

THE SCOTTS COMPANY

By 

By: Bob Harriman
Bob Harriman

Title DIRECTOR

Title: VP, Biotechnology

Date 2/27/04

Date: Feb. 21, 2004



Congress of the United States
House of Representatives
Washington, DC 20515-3003

COMMITTEE ON FINANCIAL SERVICES
Subcommittee on Capital Markets,
Insurance and Government
Sponsored Enterprises
Subcommittee on Domestic Monetary
Policy and Technology
Subcommittee on Oversight
and Investigations
COMMITTEE ON VETERANS' AFFAIRS
Subcommittee on Economic Opportunity
Subcommittee on Oversight
and Investigations

August 12, 2010

Dear Senator Smith, Assemblyman McKeon and Committee:

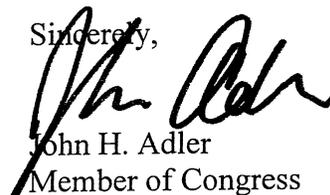
Creating a clean and protected Barnegat Bay has been one of my top priorities in Congress. Barnegat Bay provides more than \$3.3 billion in economic benefits annually to New Jersey. The Bay is critical to boaters, swimmers, fishermen, hunters, tourists, nature enthusiasts, tourism-based businesses and coastal communities. Because the Bay is such an important part of our community, I've brought together stakeholders from a wide-variety of backgrounds to work together to plan for the future health of Barnegat Bay.

I recently held a roundtable with businesses, recreational enthusiasts, environmentalists and researchers interested in the Bay's health. The round table discovered that inefficient stormwater basins and a lack of a database to monitor a basin's impact on bay water quality are major obstacles to Barnegat Bay's health. Effective stormwater basins can help Barnegat Bay with its major stormwater runoff problem. Stormwater runoff contains pollutants from fertilizers, pesticides, motor oil and other pollutants typically associated with residential and commercial development.

Using these facts, I introduced legislation in Congress that would create a competitive grant program for the 28 National Estuary programs to monitor, assess, research and restore estuaries with inefficient stormwater basins. The legislation to bolster stormwater basin systems will help treat stormwater runoff and ensure that much of it will not enter the Bay.

It's clear that our message of the importance of Barnegat Bay is resonating. In July of this year, Commissioner Bob Martin of the New Jersey Department of Environmental Protection unveiled the NJ DEP's top priorities and among the agency's chief goals was a long-term plan to restore and protect the ecological health of Barnegat Bay. I am so pleased at the bi-partisan cooperation between my office and groups on the state and local levels and I look forward to continue bringing all the parties together to ensure that Barnegat Bay remains clean and protected for generations to come.

Sincerely,



John H. Adler
Member of Congress

Washington Office
1223 Longworth House Office Building
Washington, DC 20515
(202) 225-4765
(202) 225-0778 FAX

Toms River Office
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(856) 985-2788 FAX



KENT MOUNTFORD, PhD
Estuarine Ecologist and Environmental Historian

Cove Corporation
10200 Breeden Road
Lusby, Maryland 20657

Voice Mail: 410-326-7101
Fax: 410-326-4767
E-mail: kentmountford@chesapeake.net

Dr Heather Saffert, Staff Scientist
Clean Ocean Action
18 Hartshorne Dr. Suite 2
Highlands, NJ -7732

Dear Dr Saffert:

I am an Estuarine Ecologist and Environmental Historian with roots in Barnegat Bay that extend back to 1946, and I commend your efforts and those of "Save Barnegat Bay" in attempting to reduce nitrogen inputs to this very troubled estuary.

My career as a *scientist*, with its earliest beginnings on Barnegat in 1964 extends throughout the period of rampant development and abuse of this estuary. I have watched all this happen over most of my lifetime with great consternation. As a property owner and taxpayer still heavily invested in the New Jersey Shore, it infuriates me to see the continual chipping away and emasculation of nitrogen reduction legislation by self serving industry and development interests. Equally disturbing is the outright ignorance of most elected State and Municipal Government representatives on the threat of nitrogen loading.

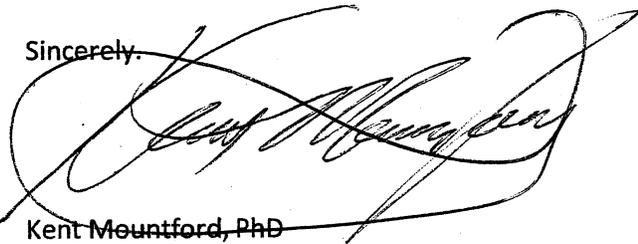
These self interested parties fly in the face of the very resource which has drawn people to the Jersey Shore since the last quarter of the 19th century. What does it take to quell the short term greed and attend to the needs of this Bay, which is at what I view to be a tipping point beyond which any ecological recovery is impossible?

Science first recognized the critical and limiting role which nitrogen plays in estuarine ecology in New Jersey's estuaries through the work of the late Dr. James Durand at Rutgers, Camden. *Over four decades ago*, in 1966, Rutgers' Dr. Harold Haskin, certainly the father of New Jersey estuarine shellfish ecology, taught every one of his students this valuable lesson from Durand's seminal work. It still took the USEPA (where much of my career was spent) over twenty years more to recognize the importance of reducing nitrogen in managing human waste effluents that entered saline waters. But now, the Chesapeake Bay one of human-kind's premier efforts at restoring an estuary has focused powerfully on nitrogen reduction from farms, homes, municipalities and industry. This is the only way forward.

This is also the only way forward for New Jersey and Barnegat Bay. What are legislators, municipal officials, industry and development interests thinking when they resist, rather than wholeheartedly embrace and augment nitrogen control at every turn? The appearance of sea nettle jellyfish (*Chrysaora quinquecirra*) in Barnegat several years ago was an astounding occurrence to me as an ecologist. Barnegat, with massive nitrogen fueled food supplies for this nuisance species was ripe for invasion. Now that it has occurred, the chances of ending the infestation in what is perfect sea nettle habitat, are very slim. You can blame this recreational disaster –who wants to swim with these stingers? - on bad luck, but the probability is very high that nitrogen has enabled this invader to prosper .

You have brought this upon yourselves, Jersey residents, through choices on Election Day, and by inattention to the cries for help Barnegat has made for a lifetime. At least take action against nitrogen and give some hope for the future.

Sincerely,

A handwritten signature in black ink, appearing to read "Kent Mountford", written over a large, stylized circular flourish.

Kent Mountford, PhD
Estuarine Ecologist and Environmental Historian
Osborn Cove, Breeden Rd, Lusby, MD 20657
And
425 Beachfront, Manasquan, NJ 08736

Resolution

Whereas the Borough of Point Pleasant is located on the Barnegat Bay, and;

Whereas many residents of Point Pleasant consider the Barnegat Bay to be one of our greatest natural resources, and;

Whereas the Barnegat Bay is under great ecological pressure from runoff of pollutants from its large watershed, and;

Whereas the economic well being of our town, and others that border the Bay, is in large part linked to the environmental health of the Barnegat Bay;

Now therefore be it resolved by a unanimous vote of the Mayor and Council of the Borough of Point Pleasant that we strongly support passage of Senate bill S-1411 and Assembly bill A-2290, the so called Statewide fertilizer bills, as the first of many steps that need to be taken to restore our precious Bay and preserve our natural heritage.

Resolved this date, August 9, 2010.

Martin C. Konkus, Mayor

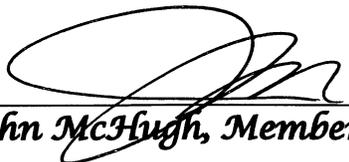


Susan Rogers, Council President

Bill Dikun, Member of Council



Christopher Leitner, Member of Council



John McHugh, Member of Council



Antoinette DePaola, Member of Council

Mitchell Remig, Member of Council





MBI•GluckShaw

Martin • Bontempo • Maticera • Bartlett, Inc.

212 West State Street • Trenton, NJ 08608 • Tel: 609/392-3100 • Fax: 609/392-6347

MEMORANDUM

TO: Members of the Senate Environment and Energy Committee
Members of the Assembly Environment and Solid Waste Committee

FROM: Scot Mackey, Partner

RE: A-2577/S-1815
A-2290/S-1411

DATE: August 9, 2010

On behalf of our client, the Garden State Seafood Association (GSSA), I am writing to ask you to vote in support of A-2577/S-1815 and A-2290/S-1411, sponsored by Assemblyman McKeon and Senator Smith when they come before you on August 12.

A-2577/S-1815 is the "Ocean County Stormwater Management System Demonstration Act." This bill would promote relief of waters in or bordering the State from pollution and promote public health and welfare through appropriate management of stormwater by permitting Ocean County, which incorporates both the Barnegat Bay and the Atlantic Ocean, to establish, provide and maintain a stormwater management system pilot project.

A-2290/S-1411 would establish standards for certain fertilizer application, provide for certification of professional fertilizer applicators and regulate the sale and labeling of certain fertilizers. This legislation is very important as it sets to inform local residents that the best management practices for fertilizing lawns is critical to reducing the pollutants washing into local rivers, creeks, wetlands and the Barnegat Bay.

As you know, the GSSA represents the commercial fishing industry in New Jersey. As you can imagine, the health of the Barnegat Bay is extremely important to the industry.

The commercial fishing industry ranks fourth among all eastern states in quantity and value of their catch, and Cape May ranks in the top ten ports in the entire nation. The value of this industry to the State of New Jersey – which equates to over \$2 billion to the State's economy, also boasts 1,200 commercial fishermen and 1,600 shore-side processing jobs.

As the GSSA stands ready to assist in efforts to help save the Barnegat Bay -- this very important New Jersey resource – the passage of these bills also play a role in this effort.

Thank you very much for your consideration.

2010



204 West State Street ♦ Third Floor ♦ Trenton, New Jersey 08608 ♦ 609-392-1181

Senate Energy and Environment and Assembly Environment and Solid Waste Committees
Written Testimony

Good Morning Chairmen Smith and McKeon and members of the Senate and Assembly Environment Committees. My name is Kelly Mooij and I'm the Director of Government Relations for the New Jersey Audubon Society. The New Jersey Audubon Society (NJAS) is a privately supported, not-for-profit, statewide membership organization. Founded in 1897 and one of the oldest independent Audubon societies, NJAS fosters environmental awareness and a conservation ethic, protects New Jersey's birds, mammals, other animals, and plants, especially endangered and threatened species, and promotes preservation of New Jersey's valuable natural habitats. The New Jersey Audubon Society has over 21,000 members.

I appreciate the opportunity to testify before you today on these important pieces of legislation. Significant expert testimony is available and has been provided already. NJAS supports the efforts of these dedicated groups who have worked tirelessly for many years to research and provide information about threats to the Bay. We are also grateful for the strong support of the sponsors and supporters of these pieces of legislation which we believe, combined, will begin to help heal the Bay and set an example for many other estuaries and watersheds.

New Jersey Audubon's significant interest in the Barnegat Bay is as one of 123 IBAs in New Jersey. Important Bird Areas are sites that provide essential breeding, wintering and/or stopover habitat for one or more bird species.

To qualify as an IBA, sites must satisfy at least one of the following criteria. The site must support:

- Species of conservation concern (e.g. threatened and endangered species)
- Restricted-ranges species (species vulnerable because they are not widely distributed)
- Species that are vulnerable because their populations are concentrated in one general habitat type or biome
- Species, or groups of similar species (such as waterfowl or shorebirds), that are vulnerable because they occur at high densities due to their congregatory behavior

Identification of a site as an IBA indicates its unique importance for birds. Nonetheless, some IBAs are of greater significance than others. A site may be important at the global, continental, or state level. The IBA identification process provides a data-driven means for cataloging the most important sites for birds throughout the country and the world. The use of a hierarchical classification system further helps to establish priorities for conservation efforts.

Barnegat Bay is a large shallow water estuary situated between Island Beach State Park and the mainland. At its southern end, the open waters encompass the Sedge Islands, a complex of salt marsh islands. Submerged aquatic vegetation beds composed of several species of seagrass dominate extensive areas of the bay. These nutrient-rich beds create food and cover for invertebrate species which are eaten by fish, waterfowl and larger invertebrates.

Barnegat Bay supports some of the largest and most diverse breeding colonies of birds in the state, possibly even along the northern Atlantic coast. The bay contains healthy nesting populations of Herring Gulls, Laughing Gulls, Common Terns, Least Terns as well as several species of herons, egrets and ibises among its beaches and salt marsh islands. It is also a critical foraging area for breeding Black Skimmers. During the winter, a wide variety of waterfowl including American Black Duck, Long-tailed Duck, Bufflehead, Greater Scaup and Brant migrate through or overwinter. Migrating shorebirds, passerines and raptors can be found throughout the Barnegat Bay system with the greatest concentrations in the fall.

Degradation of the Barnegat Bay's estuarine habitats and water quality is directly related to overdevelopment along the shoreline and in the watershed. The resulting habitat loss and non-point sources of pollution, such as runoff from septic systems, lawns and gardens, impairs the natural ability of the wetlands to purify and absorb water filtering into the bay. Combined with recreational boating, these activities severely impact the integrity of the seagrass beds that provide valuable benthic habitat for the prey of many bird species. Disturbance of waterbird colonies from human activities result in a decline in reproductive activity and suitability of habitat. Colonies of Least Terns and Black Skimmers are particularly susceptible to human disturbance as well as predation by gulls, foxes, raccoons, opossum, cats, and rodents. The establishment of the invasive common reed (*Phragmites australis*) also compromised habitat structure. A combination of outreach, education, signage, fencing and law enforcement has reduced disturbance of nesting waterbird colonies; however, current efforts should be expanded. Maintenance of natural coastal processes on the barrier islands such as inlet formation, overwash, dune building and erosion cycles are also essential. The coastal forests adjacent to the mainland marshes of Barnegat Bay provide important buffers for the bay and should be protected through acquisitions, conservation easements, regulations and appropriate management.

At the federal level, we have begun to recognize that we must treat our estuaries, watershed and river basins in a comprehensive approach regardless of geographic boundaries, recognizing that these areas are interconnected and must be protected (called the "Great Waters" Legislative Package which will hopefully include the Delaware River Basin). Along with preservation and acquisition of lands protecting the bay and legislation providing funding coordinated efforts, planned and comprehensive regulatory action is one of the best ways to protect these important, interconnected ecosystems.

The four bills which are before you today are critical and linked solutions that will help to protect and restore Barnegat Bay:

1) Reducing Fertilizer pollution (S1411/A2290) - Lawn fertilizers contain high concentrations of nutrients like nitrogen and phosphorus which pollute the Bay. This legislation contains strong and proven measures to **reduce the amount** of fertilizer used and restrict the most harmful forms from being used,

2) Protecting healthy soils (S1410/A2501) - Soil is the foundation of all natural systems. Keeping it healthy means protecting its ability to filter pollutants, support plants and filter water. When soil is incorrectly treated, it begins to act like concrete and increases harmful stormwater runoff. This legislation would require restoration of soils after construction to maintain well functioning and healthy watersheds.

3) Cleaning up polluted runoff (S1815/A2577) - There are over 2700 stormwater control basins in the Barnegat Bay watershed. Many are not functioning properly and simply pass polluted

runoff from development to the Bay, without removing pollutants such as nitrogen. To protect and restore Barnegat Bay, these basins must be improved, and "retrofitted" to clean the stormwater passing through them. This bill, the **Ocean County Stormwater Utility Authority Demonstration Act** authorizes the creation of a stormwater management authority by Ocean County (which contains most of Barnegat Bay's watershed) to manage stormwater runoff, (clean up) and restore polluting basins and insure that future stormwater does not pollute Barnegat Bay.

4) Making sure new development helps clean up the Bay, not simply add to its destruction (S1856/A2606) - This bill proposes an innovative plan to help clean up Barnegat Bay by authorizing Ocean County to develop a comprehensive plan for identifying and fixing existing sources of pollution, and by creating a program for assessing a fee on any new development within Barnegat Bay watershed to help with this challenge.

As in many other coastal environments in New Jersey, the link between a healthy environment and a vibrant economy couldn't be more clear and evident. From tourism and recreation to fishing and wildlife watching, the health of the Bay is integrally linked with the economic success of the area. This link is clearly seen throughout New Jersey with hunting, fishing and wildlife watching a 1.7 billion dollar economy supporting 37,000 jobs and significant state tax revenue.

We ask for your leadership and support in taking these science and research based steps to provide the tools necessary to begin to heal the Barnegat Bay and ask for your support on this package of bills.

Sincerely,
Kelly Mooij
New Jersey Audubon Society

**Statement by David J. McKeon, PP, AICP , Ocean County Planning Director,
on Senate Bills 1815 and 1856 and Assembly Bills 2577 and 2606**

**Joint Session of the Senate Committee on Environment and Energy and the
Assembly Committee on the Environment and Solid Waste
Toms River, New Jersey
August 12, 2010**

Thank you for holding this Joint Legislative Hearing and recognizing the importance of Barnegat Bay to our region and our State. Ocean County has worked with many partners for decades to address issues affecting the bay and the watershed.

Some of the actions taken to protect our resources include:

- Working directly with the State of New Jersey and the US EPA to have Barnegat Bay and the Manasquan River declared Federal No-Discharge Zones.
- Supporting C-1 stream protection for the Metedeconk and Toms Rivers.
- Participating on the NJ Clean Vessel Act Steering Committee to install over 65 pumpout stations throughout the bay to avoid direct discharges from boats into the water.
- Establishing the first mobile pumpout boat in New Jersey in 1998, and increasing the program to five boats which now operate from the Manasquan River to Little Egg Harbor Inlet.
- Acquiring over 10,000 acres of natural lands areas throughout the watershed, including portions of 27 sites listed within the 1995 Century Plan as critical ecological lands. A total of 57 percent of Ocean County is now protected through both public ownership and development restrictions of the Pinelands Preservation and Forest Districts.
- Creating a Stormwater Basin Restoration Program in partnership with the Ocean County Soil Conservation District and the NJDEP. This program is based primarily on growing concerns over compacted soils and soil health.
- Promoting public education campaigns on best management practices through brochures, public service announcements and web pages.

- Supporting the inclusion of the Barnegat Bay into the National Estuary Program in 1995 and continuing to actively work within its structure. The Barnegat Bay Partnership (BBP) has re-focused its efforts and is refining a list of priority research and implementation projects in partnership with a broad range of government, academic and citizen partners.
- Participating in the three regional stakeholder meetings held by the NJDEP earlier this year. The results of those meetings are expected to adjust NJDEP program priorities for Barnegat Bay in the near future.
- Finally, we can not forget the very different issues that threatened the bay in the 1960's and 70's when dozens of inadequate sewerage treatment facilities discharged directly into rivers and the bay, and failing septic systems were common along the shoreline. Hundreds of millions of dollars has been spent to develop a regional sewage treatment system under the Ocean County Utilities Authority. While regional treatment has evoked some concerns over secondary impacts, we can not dismiss the massive environmental and health issues that were resolved.

The proposed Ocean County bills regarding Stormwater Plans (A2606/S1856) and Stormwater Utilities (A2577/S1815) may be well intentioned, but are plagued by numerous concerns. First and foremost, Ocean County was not included or consulted in the development of both sets of legislation.

Regarding the Ocean County Planning Board legislation (A2606/S1856), many elements of the envisioned stormwater plan are underway or already completed. Ocean County has GIS mapped almost 10,000 stormwater inlets, 600 outfalls and 800 County-owned basins. New County stormwater basins are constructed using guidelines developed through the basin restoration project, and the County Planning Board is requiring developers to conform to the new construction standards where applicable. In addition, the County Planning Board already calculates and assesses drainage fees to developers for stormwater impacts.

We are working with Rutgers University and the Jacques Cousteau National Estuarine Research Reserve, the Soil Conservation District, the Mosquito Commission and NJDEP on a unique and growing database of stormwater facilities throughout the watershed. The database will be used to target future restoration and improvements efforts and to continue developing a long range strategy for stormwater related issues. This is being done without the need for additional legislation.

Regarding the Stormwater Utility bills (A2577/S1815), the County is being asked to establish another bureaucracy through a pilot program with guidelines developed separately by the NJDEP. It would include a new tax on all property owners based on an impervious cover formula yet to be developed. The NJEP would also get a percentage of the revenue collected.

There are numerous logistical issues to be considered including the ownership of infrastructure, liability for older infrastructure and the assessment of fees based on impervious coverage. We could also anticipate a complicated and lengthy appeals process from landowners who believe that the impervious cover calculations for their properties are inaccurate.

Last year when almost identical legislation was proposed (again without prior County input), Ocean County staff relayed identical concerns.

A pilot program by its very nature acknowledges that the proposal may not work. When a pilot program is developed without input from the central player, its success is highly in doubt. There is no interest in setting up a pilot Stormwater Utility Authority Program that (as stated in the legislation) uses Ocean County as a laboratory to demonstrate the feasibility of setting up a statewide stormwater management system.

Establishing this new bureaucracy would take years to implement at best and would require a tremendous commitment of resources which could otherwise be used to implement new actions. Lastly, the bill would create an additional financial burden on all property owners with no guarantee of return.

The Barnegat Bay is an area of statewide importance and an estuary of national significance. As a result, many programs are appropriately funded at the state and federal levels. In addition, the cost of many stormwater implementation programs is borne by Ocean County.

Stormwater inspections and cleaning when necessary occur at least annually for the 10,000 County stormwater inlets, outfalls and basins. Millions of dollars have been spent implementing the requirements of the recent NJDEP stormwater regulations and Ocean County has provided regional services to towns such as vehicle wash stations, street sweeping services and stormwater inlet cleaning. These efforts increased significantly in recent years and the impact of such measures has yet to be determined. This and other activities are a cooperative work in progress and are occurring without the need for additional legislation.

Maybe the biggest misconception under these bills is the belief that all stormwater basins in the County are failing - all 2,500+ of them. They are not all malfunctioning and, as stated before, we are already working with partners to map and prioritize problem areas. Some of the restoration work is being done in-house and others may be covered in the future through stormwater mitigation requirements. State and federal assistance has been important in this effort and should continue given the Bay's statewide and national importance. However, that does not require new legislation.

The future of Barnegat Bay is important to all of us and some of the causes of issues affecting the bay have yet to be determined. Likewise, the effectiveness of some measures, such as recent changes to stormwater regulations, has also yet to be determined.

Ocean County is not and will not be complacent on problems facing the Bay and will continue to work with its partners to adapt to new information and develop effective solutions.

As far as the proposed Ocean County legislation, there is not a need to authorize a new authority to developed new guidelines, collect fees, duplicate existing authority and efforts, and allocate money for some yet to be determined purpose.

I repeat my appreciation to the Senate and Assembly Committee's for recognizing the importance of Barnegat Bay and for coming here today. We welcome and appreciate all assistance in protecting and enhancing the bay and watershed, and we should continue to address issues together and not through measures developed independently without consideration of unintended consequences.



Wholesale Landscape Supplies
621 Edwards Rd. Parsippany NJ 07054
(973) 227-0552

Levitt's LLC is a landscape supply center based in Parsippany New Jersey. I currently employ 9 people at our Parsippany location. We have been selling fertilizers since 1928. Our customer base includes landscapers, lawn care companies, and municipalities. We sell a complete line of products for lawn & landscape including fertilizer.

I oppose the proposed legislation because it will limit the selling season for fertilizer, our main product. Most of our customers apply a late fall fertilizer in accordance with the guidelines of most University agricultural departments including Rutgers. Our customers cannot put down the last application until leaf pick up season is over. Leaf pick up season in northern New Jersey generally ends in early November but is variable based on weather. In a warm year leaf pick up season can run until the middle of November. Only then will landscapers, our primary customers, be able to apply fertilizer. Landscapers who continue leaf pick up into November will not be able to purchase or apply their last fertilizer application. Without the final application of fertilizer landscapers will lose revenue and be forced to furlough their workers earlier.

The effect of this proposed legislation would end our selling season at November 15th. Our season now continues usually to December 25th or later. By shortening our selling season approximately 40 days we would lose 15% to 18% of our total sales, at least \$200,000. This would also affect the State of New Jersey in lost sales tax revenue and business taxes. Currently I keep my staff employed for the whole year. With a shortened season I would then possibly need to layoff some our help rather than keeping them on over the winter. By curtailing the sale and use of fertilizer this proposed legislation hurts my bottom-line and the bottom-line of my customers.

Barry Levitt



**TO: MEMBERS OF THE ASSEMBLY ENVIRONMENT & SOLID WASTE COMMITTEE
MEMBERS OF THE SENATE ENVIRONMENT & ENERGY COMMITTEE**

FROM: THOMAS CRITELLI, PRESIDENT

DATE: AUGUST 12, 2010

**RE: ESTABLISHES STORMWATER MANAGEMENT PILOT PROGRAM
A2577 (MCKEON)/ S1815 (SMITH)**

The New Jersey Builders Association (NJBA) applauds the efforts of Chairmen McKeon and Smith to establish a pilot stormwater utility system to manage non-point source pollutants through the enactment of **A2577** and **S1815**. We also appreciate the efforts of both sponsors to address several concerns we had with previous versions of the legislation. However, we believe that for the bills to achieve their intended purposes, they must require authorities to accept the management of the stormwater basins.

Proper maintenance of stormwater basins is essential to the successful operation of stormwater utility systems. Current stormwater management rules, (N.J.A.C. 7:8), require increased use of stormwater management facilities beyond traditional basins. Unfortunately, these requirements have been coupled with a growing reluctance by governing bodies to accept the dedication and management of these basins. In some cases developers are being required to create homeowner associations – sometimes consisting of as few as a dozen homes – solely to own and maintain basins.

Authorities electing to establish stormwater utility systems should be required to accept and maintain stormwater basins and systems in accordance with the general understanding of the functions and purpose of regional government. It is inequitable to require property owners in a new development to pay taxes and fees to support public facilities and, concurrently, to pay private homeowner association fees to maintain public facilities that the county or authority refuses to accept.

For these reasons we ask that you vote **“YES”** on **A2577** and **S1815** with the inclusion of critical language to require authorities to accept the management of the stormwater basins.

THOMAS F. CRITELLI *President*
DOMINICK L. PARAGANO *Vice President* • WINFIELD E. ZIEGENFUSS, JR. *Treasurer* • ROBERT J. FALLONE *Secretary*
DAVID B. FISHER *Builder Vice President* • HOWARD VANNATTA *Associate Vice President* • JAMES R. DELAND, JR., P.E. *2nd Associate Vice President*
TIMOTHY J. TOUHEY *Chief Executive Officer/Executive Vice President*



**TO: MEMBERS OF THE ASSEMBLY ENVIRONMENT & SOLID WASTE COMMITTEE
MEMBERS OF THE SENATE ENVIRONMENT & ENERGY COMMITTEE**

FROM: THOMAS CRITELLI, PRESIDENT

DATE: AUGUST 12, 2010

**RE: ASSESSES FEES ON NEW DEVELOPMENT
A2606 (MCKEON) /S1856 (SMITH)**

While the New Jersey Builders Association (NJBA) believes it is necessary to protect the Barnegat Bay watershed, we cannot support **A2606** and **S1856** in their current form as they only assess fees on new development to support the creation of a pollution plan for the entire Barnegat Bay watershed. Although we applaud the sponsors for entertaining amendments to provide incentives to property owners to reduce runoff, we do not feel the legislation goes far enough in accounting for all activities which contribute to the health of the area.

The envisioned Plan provided through the legislation would “prevent pollution caused by stormwater runoff or nonpoint sources that could degrade the water quality of the Barnegat Bay and its tributaries, interfere with water-based recreation, or adversely affect aquatic, estuarine, and marine life.” Therefore, recreational and other business users, such as the marina and tourism industries, which rely on the Bay, should also contribute a fair share to the Plan’s development.

Current regulatory regimes fail to provide the tools to successfully and comprehensively address both stormwater runoff and the re-use of treated wastewater from existing developments. Specifically, NJBA supports using retrofits of onsite stormwater facilities and best management practices for existing developed communities as well as the re-use of treated wastewater from the Ocean County Utilities Authority’s three regional treatment plants. Such measures should be implemented to control potential problems, in contrast to simply curtailing future development.

For these reasons we ask that you defer voting on **A2606 and S1856** until the legislation provides a more equitable approach in ensuring the long-term well-being of the Barnegat Bay ecosystem.

THOMAS F. CRITELLI *President*
DOMINICK L. PARAGANO *Vice President* • WINFIELD E. ZIEGENFUSS, JR. *Treasurer* • ROBERT J. FALLONE *Secretary*
DAVID B. FISHER *Builder Vice President* • HOWARD VANNATTA *Associate Vice President* • JAMES R. DELAND, JR., P.E. *2nd Associate Vice President*
TIMOTHY J. TOUHEY *Chief Executive Officer/Executive Vice President*

8.12.10

THANK YOU. MY NAME IS DANIEL TEWS AND I AM A CITIZEN OUTREACH ADVOCATE AND CANALISE FOR ENVIRONMENT NEW JERSEY. I AM HERE TO REPRESENT OUR 20,000 MEMBERS STATEWIDE. FOR THE PAST SIX MONTHS I'VE BEEN KNOCKING ON DOORS EVERY DAY TO REDUCE RUNOFF POLLUTION AT THE SHORE. I'VE SPOKEN WITH ~~5,000~~ 5,000 ~~PEOPLE~~ NEW JERSEYANS AND EASILY 90% ~~PEOPLE~~ HAVE AGREED AND SUPPORT THESE EFFORTS. MEETING ENTIRE NEIGHBORHOODS, I'VE TALKED TO PEOPLE FROM ~~ALL~~ ALL WALKS OF LIFE AND A GREAT DEAL THAT ARE NOT POLITICALLY ACTIVE OR VOCAL, SAVE VOTING. EVERYONE FROM AGES 19 TO 90 CARE DEARLY ABOUT THE HEALTH OF THE SHORE. I'VE LEARNED THAT IT'S TIMELESS. IT BELONGS TO OUR GRANDPARENTS AND OUR GRANDCHILDREN ALIKE. IT REPRESENTS AN INCALCULABLE PORTION OF THE STATES CHARACTER. I'VE HEARD MANY STORIES, AND THEY'RE JUST LIKE MY OWN, AND I'M SURE YOUR OWN. I MYSELF HAVE GONE CAMPING WITH THE BOY SCOUTS AT SANDY HOOK, SWAM WI. MY GIRLFRIEND IN BEDMAR, AND WENT FISHING WITH MY GRAN FATHER IN LAVALETTE. BUT I'VE HEARD OTHER STORIES. EAR INFECTIONS, RASHES, M.E.R.S.A. THIS SUMMER, ENVIRONME NEW JERSEY HAS MET 40,000 RESIDENTS & VOTERS, AND COLLECTE 5,000 WRITTEN MESSAGES TO YOU. I AM IN FAVOR OF ALL FOUR BILLS, AND SO IS NEW JERSEY. THEY'VE HIRED YOU AND YOUR BOSS SAYS ITS YOUR JOB TO SAVE THE SHORE. THE PUBLIC WANTS THE BAY CLEANED UP.

THANK YOU,

OLSaideAEN

From: satzert1@verizon.net [satzert1@verizon.net] **Sent:** Sat 8/21/2010 1:15 PM
To: OLSaideAEN
Cc:
Subject: A2290-reduce fertilizer pollut
Attachments:

I attended the August 12 hearing on S1411/A2290 (Reduce Fertilizer Pollution).

Fertilizer manufacturers, fertilizer distributors and major fertilizer users (professional lawn care contractors and gulf course managers) all opposed the proposed percentage of slow release nitrogen and the proposed window for applying fertilizers. I think each group lost sight of the fact that the level of nitrogen in the soil is only one of many factors affecting lawn vigor.

I have provided links to two National Sustainable Agricultural Information Service (NSAIS) publications to give you an overview of the variety of things which affect lawn vigor. NSIAS a project of the National Center of Appropriate Technology (NCAT). NCAT has been helping people and communities adopt technology that saves energy and resources for over 30 years. Just this month the United States Department of Agriculture (USDA) awarded NCAT a \$500,000 grant to help integrate sustainable and organic agriculture approaches into the programs and practice standards of the USDA/Natural Resources Conservation Service (NRCS).

Sustainable Turf Care

<http://www.attra.org/attra-pub/turfcare.html>

Sustainable Soil Management

<http://attra.ncat.org/attra-pub/soilmgmt.html>

Each NSAIS publication points out the importance of maintaining and/or improving the soil and describes a number of recommended soil management actions. I'm sure that a number of the recommended actions could be taken during a portion of the proposed "no fertilizer" period. I think lawn care professionals could keep employees on the pay roll to provide the recommended soil management services and make a profit in the process. I think golf course managers could implement the soil management recommendations and actually improve the quality of gulf course turf.

A bonus of the recommended soil management practices is that they result in less fertilizer being needed on an annual basis. The less nitrogen applied in the Barnegat Bay watershed, the less nitrogen ends up in the Bay.

OLSaideAEN

From: satzert1@verizon.net [satzert1@verizon.net] **Sent:** Sat 8/21/2010 2:01 PM
To: OLSaideAEN
Cc:
Subject: Barnegat Bay Bill package
Attachments:

Dear Members of the Senate Environment and Energy Committee and Dear members of the Assembly Environment and Solid Waste Committee

Thank you for attending the special legislative hearing on August 12 on the bills to improve the condition of Barnegat Bay.

From May 1995 until July 2010, when I retired after 40 years of service for the U. S. Department of the Interior, I had the honor of being the Refuge Manager of the Edwin B. Forsythe National Wildlife Refuge. During that time I often worked with the Barnegat Bay Partnership, formerly known as the Barnegat Bay National Estuary Program, as well as others interested in protecting and restoring the bay. The Barnegat Bay Partnership named me the 2010 Guardian of the Bay this June. Today the refuge is the largest single land manager (about 25,000 acres) in Ocean County east of the Garden State Parkway. The refuge is a unit of the National Wildlife Refuge System. The Mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

I support the bills the committees voted out during the meeting. Here is my rationale.

- There are basically two world views on the environment and the economy.
 - o One is that protecting the environment costs jobs and hurts the economy; that somehow we need to balance the environment and the economy. Several persons at the hearing supported this supposition.
 - o The other that the environment is the foundation for the entire economy and all societies.
- I am convinced that the environment is the foundation for all economic activity and society.

1. The Natural Step (<http://www.naturalstep.org/>)

An international non-profit environmental education organization started in 1989 working to build an ecologically and economically sustainable society. The Natural Step has proposed four system conditions for an ecologically and economically sustainable society.

- 1) Material from the earth's crust must not systematically increase in nature (e.g., Mercury, Lead).
- 2) Persistent substances produced by society must not systematically increase in nature (e.g., DDT, PCB, plastics).

3) The physical basis for the earth's productivity (ecosystem services), natural cycles and biological diversity must not be systematically deteriorated.

4) There must be fair and efficient use of resources with respect to meeting human needs. (The richest 1/5 of people receives about 83% of the total world income. The poorest 1/5 of people receives about 1% of the total world income.)

2. The Value of the World's Ecosystem Services and Natural Capital (Robert Costanza et al. Nature, 1997)
(http://www.uvm.edu/giee/publications/Nature_Paper.pdf)

The paper estimated the value of 17 major ecosystem services at between \$16 and \$54 trillion per year, with an average of \$33 trillion per year. Total global GNP at the time was \$18 trillion.

Robert Costanza, Ph.D. is the Gordon and Lulie Gund Professor of Ecological Economics and Director, Gund Institute for Ecological Economics, Rubenstein School of Environment and Natural Resources, The University of Vermont.
http://www.uvm.edu/giee/about/Costanza_CV_01_09.pdf

Dr. Costanza's research has focused on the interface between ecological and economic systems. He has published on valuation of ecosystem services, biodiversity, and natural capital; and analysis of dysfunctional incentive systems and ways to correct them. He is the author or co-author of over 300 scientific papers.

3. Research on the Scientific Basis of Sustainability (RSBS)
(http://www.sos2006.jp/english/rsbs_summary_e/about-rsbs.html) RSBS was a five-month project (May 2005-October 2005) to investigate the scientific status in seven fields relating to environmental sustainability (climate systems, energy, resources, waste, food, water, and biodiversity). Based on an extensive review of global literature, interviews and questionnaires with some 170 leading experts and scholars in Japan, the US, and Europe, the report was compiled and released in late 2005.
"...our economy cannot function or even exist without ecosystem services. Our economy operates by extracting resources and energy from nature and emitting waste and emissions back into the ecosystem. Our very existence depends on whether or not we manage ecosystem services intelligently in our social and economic institutions and policies."

4. Aldo Leopold (1887 -- 1948) was an American ecologist, forester, and environmentalist. He was influential in the development of modern environmental ethics and in the movement for wilderness preservation. Leopold is considered to be the father of wildlife management in the United States and was a life-long fisherman and hunter.

"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. There is no other way for land to survive the impact of mechanized man, nor for us to reap from it the esthetic harvest it is capable ... of contributing to culture."

235x

I would add there is no other way for the human race to survive.

5. CASSE - Center for the Advancement of the Steady State Economy
<http://steadystate.org/>

In summary

We need to treat the environment with love and respect.

We need to fully capture the value of ecosystem services and natural capital in commercial markets or adequately quantify in terms comparable with economic services and manufactured capital. If we don't the value of ecosystem services and natural capital is given too little weight in policy decisions.

"Over the long haul of life on this planet it is the ecologists, and not the bookkeepers of business, who are the ultimate accountants." (Stewart Udall - Secretary of the Interior)

ADDITIONAL APPENDIX MATERIALS
SUBMITTED TO THE
SENATE ENVIRONMENT COMMITTEE *and*
ASSEMBLY ENVIRONMENT AND SOLID WASTE COMMITTEE
for the
AUGUST 12, 2010 MEETING

Submitted by David B. Friedman, District Director, Ocean County Soil Conservation District:

Low Maintenance Landscaping for the Barnegat Bay Watershed, Ocean County Soil Conservation District, Rutgers Cooperative Extension of Ocean County, Barnaget Bay National Estuary Program, 82005 Ocean County Soil Conservation District.

Submitted by Edith Gbur, representing Jersey Shore Nuclear Watch:

Maureen Graham and Fredrick Cusick, "Radium tainting water in N.J. wells," *The Philadelphia Inquirer*, August 9, 1998, 81998 *The Philadelphia Inquirer*.