



CHESAPEAKE ENVIRONMENTAL PROTECTION ASSOCIATION, INC.
P.O. Box 117, Galesville, Maryland 20765

NEWSLETTER

Spring 2019

PRESIDENT'S MESSAGE

By Al Tucker



Recently, I attended a conference on the impact of climate change on the Patuxent River watershed. A paper¹ caught my eye. It was quite technical and was presented from the viewpoint of an analyst talking to other scientists and analysts. Its focus was more about explaining the analytical process rather than the results. But one of its pilot studies was an analysis of the Patuxent watershed. From my perspective, the talk would have been better titled, "Growth in the Patuxent Watershed in the Face of Increased Precipitation Will Make the Goals of the Watershed Implementation Plans Impossible." Or even better "We Can't Get There from Here." That would have been a showstopper. Anticipated climate change coupled with projected population growth makes achieving the 2035 TMDL goals and beyond for the watershed highly unlikely.

The paper's analytical process differs from the current modeling approaches in that it uses a "backward" analysis of watershed implementation plans. "Rather than beginning with a set of assumptions about the future, [the process] begins with a proposed plan or plans, uses analytics to stress-test them over many futures, and concisely summarizes the conditions in which each plan will work." The results capture the uncertainty of the assumptions of stormwater Best Management Practices (BMP), their cost-effectiveness, as well as the impact of future land-use patterns on these practices under conditions of precipitation change.

The results of the pilot study of the Patuxent watershed are unequivocal. Under current assumptions of historical hydrology, current land-use, and assumed population change, the Phase II WIP will meet the TMDL target. But when climate change is factored in with increased precipitation deviating from historical trends, these targets cannot be met. The surprise is how small
(cont'd on Pg.2)

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CEPA FORUM

The Future of Sustainable Water Supply in Anne Arundel County and Southern Maryland

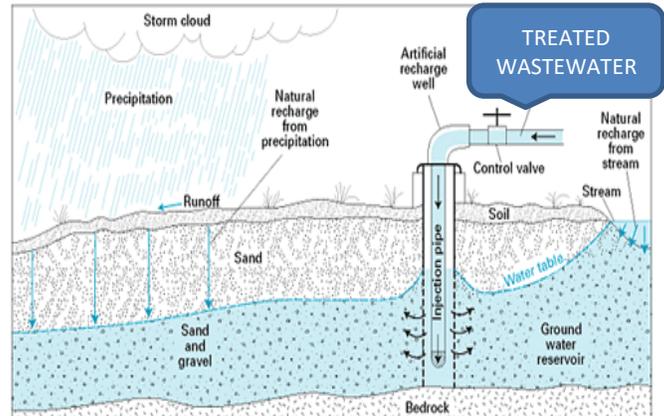
Friday, May 10, 2019, 7:00 to 9:00 p.m.
Anne Arundel Community College
Ctr for Applied Learning and Tech (CALT) Rm 100
101 College Pkwy, Arnold, MD 21012

Featured Speakers:

Chris Phipps, AA County Director of Public Works
Ted Henefin, Hampton Roads Sanitary District
Mark Williams & J.P. Stokes, Earth Data

This forum will describe how **Managed Aquifer Recharge** (pumping treated wastewater into aquifers) can:

- Assist aquifer sustainability
- Reduce aquifer saltwater intrusion
- Help meet mandated Bay TMDLs



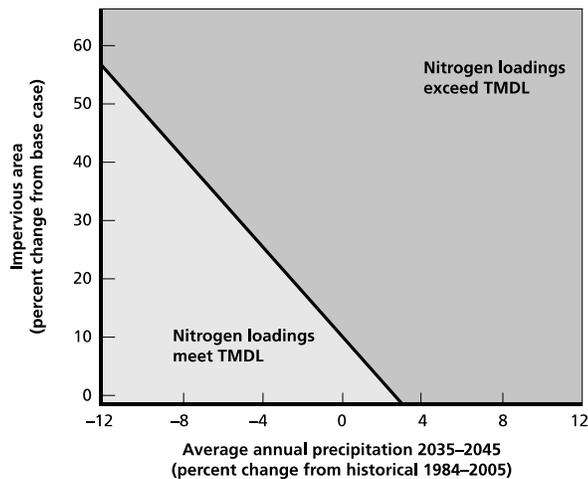
The Hampton Roads Sanitary District is operating a demonstration plant, and a representative will discuss that program. Mr. Phipps has been leading an effort to evaluate the practicality of Managed Aquifer Recharge for Anne Arundel County. The concept has been used in California and in other parts of the world for some time and is being explored in other jurisdictions of the U.S.

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a deviation of land-use or an increase in precipitation causes a failure to reach the goals. A figure from the report illustrates one of the primary conclusions for the Nitrogen TMDL goal.

Futures in Which Phase II WIP Meets and Misses Nitrogen TMDL



RAND RR720-5.2

This result shows that precipitation would have to decline in the future to accommodate future growth (note: impervious surface is a surrogate for growth). A small change in precipitation from the norm (+3.5%) with no increase in impervious surface causes failure of the TMDL goals. The Maryland Climate Commission predicts our state will have wetter futures. If perchance the futures are drier, even smaller increases of growth will cause failure with smaller increases in precipitation. When the cost-effectiveness of BMPs is factored in, the results indicate that the most effective ones are cost-prohibitive or not enough land exists to implement lower cost alternatives.

The Patuxent watershed is considered to be an urban watershed and can represent a proxy for other watersheds dominated by impervious surface. Since sprawl creates more impervious surface than urban development, the dominant land-use options in the watershed need to shift to even more urban compactness. But as the analysis illustrates there is little room or time left in the face of climate change to implement any of the improved strategies.

Given the uncertainty and variability of the future, why should we give weight to this analysis? The technical approach addresses this “deep uncertainty” by computing hundreds of future climate and growth scenarios. From these the main parameters that affect the TMDLs emerge. It is not a surprise that impervious surface would be a dominant factor, but the ability to compare land use patterns and the impact and cost-effectiveness of BMPs within a local watershed reveals that our choices to mitigate the effects of climate change are shrinking rapidly with time.

These results are disheartening. First, not enough land in the watershed is available to implement most of the BMPs and second, the cost of implementation is beyond the reach of the watershed’s jurisdictions and third, getting political consensus among the river’s seven counties with different economic development goals is high to impossible.

The public needs to have specific information for their watersheds, especially regional ones like the Patuxent. When the idea of “cleaning up the Bay” started, climate change was not a large factor, however, population growth was. The

uncertainty surrounding the reality of climate change has decreased over the last decade with noticeable effects for everyone to see.

Hence, decision makers will be faced with the dilemma of either restricting growth or spending more money on stormwater mitigation. Or even worse, continuing on the present course to failure. It will be a shame if the latter outcome occurs without knowledge of the consequence of climate change.

¹Fischbach, Jordan R., et.al, *Managing Water Quality in the Face of Uncertainty: A Robust Decision-Making Demonstration for EPA's National Water Program*. Santa Monica, CA: RAND Corporation, 2015.
https://www.rand.org/pubs/research_reports/RR720.html

GREEN NEW DEAL AND REALITY

By Gary Antonides



When the Green New Deal was proposed, it was accused of advocating doing away with cows, planes, and automobiles and requiring all buildings to be torn down and rebuilt. A congressman even made a public statement while eating a hamburger to show his contempt for the resolution. In order to find how true these accusations are, you are encouraged to read the actual resolution at

<https://www.congress.gov/bill/116th-congress/house-resolution/109/text>. This article contains the part of the text dealing with the goals and actions, but does not have all the “Whereas” clauses always present in legislative bills. However, it does summarize that portion.

The Green New Deal references the October 2018 report entitled “Special Report on Global Warming of 1.5 °C” by the Intergovernmental Panel on Climate Change and the November 2018 Fourth National Climate Assessment, which describes the existing and expected problems caused by climate change, and finds that human activity is the dominant cause of climate change. It also outlines the drastic effects of surpassing the goal of 1.5 °C and reaching 2.0 °C. (sea level rise, storms, droughts, mass migration, economic disaster, wildfires, loss of coral reefs, food shortage, etc.). Most importantly, it finds that to meet the 1.5 °C goal, we need global reductions in greenhouse gas emissions from human sources of 40 to 60 percent from 2010 levels by 2030; and net-zero global emissions by 2050.

The Green New Deal also states that because the U.S. has been responsible for a disproportionate amount of greenhouse gas emissions, and since we have a high technological capacity, we must take a leading role in reducing emissions.

It lists other problems the U.S. is experiencing, primarily affecting the disadvantaged, in that clean air, clean water, healthy food, and adequate health care, housing, transportation, and education, are inaccessible to a significant portion of the U.S. population, while wage stagnation and antilabor policies have resulted in the greatest income inequality since the 1920s.

The resolution states that a new national, social, industrial, and economic mobilization on a scale not seen since World War II and the New Deal era should be undertaken to create millions of good, high-wage jobs in the United States, provide unprecedented levels of prosperity and economic security for all, and to counteract systemic injustices. The resolution portion of the bill as introduced in the House as a nonbinding resolution is as follows:

Now, therefore, be it *Resolved* that it is the sense of the House of Representatives that—

(1) it is the duty of the Federal Government to create a Green New Deal—

(A) to achieve net-zero greenhouse gas emissions through a fair and just transition for all communities and workers;

(B) to create millions of good, high-wage jobs and ensure prosperity and economic security for all people of the United States;

(C) to invest in the infrastructure and industry of the United States to sustainably meet the challenges of the 21st century;

(D) to secure for all people of the United States for generations to come: (i) clean air and water; (ii) climate and community resiliency; (iii) healthy food; (iv) access to nature; and (v) a sustainable environment.

(E) to promote justice and equity by stopping current, preventing future, and repairing historic oppression of indigenous peoples, communities of color, migrant communities, deindustrialized communities, depopulated rural communities, the poor, low-income workers, women, the elderly, the unhoused, people with disabilities, and youth (referred to in this resolution as “frontline and vulnerable communities”);

(2) the goals described in subparagraphs (A) through (E) of paragraph (1) (referred to in this resolution as the “Green New Deal goals”) should be accomplished through a 10-year national mobilization (referred to in this resolution as the “Green New Deal mobilization”) that will require the following goals and projects—

(A) building resiliency against climate change related disasters, such as extreme weather, including by leveraging funding and providing investments for community-defined projects and strategies;

(B) repairing and upgrading the infrastructure in the United States, including: (i) by eliminating pollution and greenhouse gas emissions as much as technologically feasible; (ii) by guaranteeing universal access to clean water; (iii) by reducing the risks posed by climate impacts; and (iv) by ensuring that any infrastructure bill considered by Congress addresses climate change;

(C) meeting 100 percent of the power demand in the United States through clean, renewable, and zero-emission energy sources, including: (i) by dramatically expanding and upgrading renewable power sources; and (ii) by deploying new capacity;

(D) building or upgrading to energy-efficient, distributed, and “smart” power grids, and ensuring affordable access to electricity;

(E) upgrading all existing buildings in the United States and building new buildings to achieve maximum energy efficiency, water efficiency, safety, affordability, comfort, and durability, including through electrification;

(F) spurring massive growth in clean manufacturing in the United States and removing pollution and greenhouse gas emissions from manufacturing and industry as much as is technologically feasible, including by expanding renewable energy manufacturing and investing in existing manufacturing and industry;

(G) working collaboratively with farmers and ranchers in the United States to remove pollution and greenhouse gas emissions from the agricultural sector as much as is technologically feasible, including: (i) by supporting family farming; (ii) by investing in sustainable farming and land use practices that increase soil health; and (iii)

by building a more sustainable food system that ensures universal access to healthy food;

(H) overhauling transportation systems in the United States to remove pollution and greenhouse gas emissions from the transportation sector as much as is technologically feasible, including through investment in: (i) zero-emission vehicle infrastructure and manufacturing; (ii) clean, affordable, and accessible public transit; and (iii) high-speed rail;

(I) mitigating and managing the long-term adverse health, economic, and other effects of pollution and climate change, including by providing funding for community-defined projects and strategies;

(J) removing greenhouse gases from the atmosphere and reducing pollution by restoring natural ecosystems through proven low-tech solutions that increase soil carbon storage, such as land preservation and afforestation;

(K) restoring and protecting threatened, endangered, and fragile ecosystems through locally appropriate and science-based projects that enhance biodiversity and support climate resiliency;

(L) cleaning up existing hazardous waste and abandoned sites, ensuring economic development and sustainability on those sites;

(M) identifying other emission and pollution sources and creating solutions to remove them; and

(N) promoting the international exchange of technology, expertise, products, funding, and services, with the aim of making the United States the international leader on climate action, and to help other countries achieve a Green New Deal;

(3) a Green New Deal must be developed through transparent and inclusive consultation, collaboration, and partnership with frontline and vulnerable communities, labor unions, worker cooperatives, civil society groups, academia, and businesses; and

(4) to achieve the Green New Deal goals and mobilization, a Green New Deal will require the following goals and projects—

(A) providing and leveraging, in a way that ensures that the public receives appropriate ownership stakes and returns on investment, adequate capital (including through community grants, public banks, and other public financing), technical expertise, supporting policies, and other forms of assistance to communities, organizations, Federal, State, and local government agencies, and businesses working on the Green New Deal mobilization;

(B) ensuring that the Federal Government takes into account the complete environmental and social costs and impacts of emissions through: (i) existing laws; (ii) new policies and programs; and (iii) ensuring that frontline and vulnerable communities shall not be adversely affected;

(C) providing resources, training, and high-quality education, including higher education, to all people of the United States, with a focus on frontline and vulnerable communities, so that all people of the United States may be full and equal participants in the Green New Deal mobilization;

(D) making public investments in the research and development of new clean and renewable energy technologies and industries;

(E) directing investments to spur economic development, deepen and diversify industry and business in local and regional economies, and build wealth and community ownership, while prioritizing high-

quality job creation and economic, social, and environmental benefits in frontline and vulnerable communities, and deindustrialized communities, that may otherwise struggle with the transition away from greenhouse gas intensive industries;

(F) ensuring the use of democratic and participatory processes that are inclusive of and led by frontline and vulnerable communities and workers to plan, implement, and administer the Green New Deal mobilization at the local level;

(G) ensuring that the Green New Deal mobilization creates high-quality union jobs that pay prevailing wages, hires local workers, offers training and advancement opportunities, and guarantees wage and benefit parity for workers affected by the transition;

(H) guaranteeing a job with a family-sustaining wage, adequate family and medical leave, paid vacations, and retirement security to all people of the United States;

(I) strengthening and protecting the right of all workers to organize, unionize, and collectively bargain free of coercion, intimidation, and harassment;

(J) strengthening and enforcing labor, workplace health and safety, antidiscrimination, and wage and hour standards across all employers, industries, and sectors;

(K) enacting and enforcing trade rules, procurement standards, and border adjustments with strong labor and environmental protections: (i) to stop the transfer of jobs and pollution overseas; and (ii) to grow domestic manufacturing in the United States;

(L) ensuring that public lands, waters, and oceans are protected and that eminent domain is not abused;

(M) obtaining the free, prior, and informed consent of indigenous peoples for all decisions that affect indigenous peoples and their traditional territories, honoring all treaties and agreements with indigenous peoples, and protecting and enforcing the sovereignty and land rights of indigenous peoples;

(N) ensuring a commercial environment where every businessperson is free from unfair competition and domination by domestic or international monopolies; and

(O) providing all people of the United States with: (i) high-quality health care; (ii) affordable, safe, and adequate housing; (iii) economic security; and (iv) clean water, clean air, healthy and affordable food, and access to nature.

Comments: By covering so many diverse issues, many of which are known to be controversial, it invites criticism and makes it less likely that people will support it. Since it is so broad in scope, it has been referred to nine committees in the House and thence to the appropriate subcommittees. Regardless of the fact that the bill has not been processed in the House, the Republican Senate voted on the unmodified bill just to ridicule it. We will not comment on the non-environmental portions of the bill, which, by themselves, also warrant much deliberation and examination.

Regarding the claim that it will allow zero CO₂ emissions, that would mean humans and animals won't breathe, and nothing will ever be burned. What the bill suggests is that we don't add to the level of CO₂ in the atmosphere. So the effects of our breathing, burning, etc. would be balanced by what plant life, soils and oceans absorb. At present, a lot of CO₂ is absorbed by the oceans, but this threatens maritime critters and cannot be sustained. This idea of *net-zero* emissions is not new. According to <https://www.carbon-neutrality.global/press-release-19-countries-now-on-board-to-build-a-carbon-neutral-world/>, Colombia, Costa Rica, Ethiopia, Finland, France, Germany, Iceland, Luxembourg, Mexico, Netherlands, New

Zealand, Norway, Portugal, Marshall Islands, Sweden, Canada, Denmark, Spain and the United Kingdom have all pledged to have net-zero emissions by 2050, as well as the following cities in the U.S.: Austin, Boston, Los Angeles, New York City, Philadelphia, Portland, San Francisco, Seattle, and Washington. Other cities all over the world have also made that pledge.

To absorb the CO₂, preservation of forests and other plant life is critical, but there are developing technologies that may also be able to absorb it. Either way, the CO₂ cannot keep increasing indefinitely without disastrous results.

To help reduce CO₂, the bill suggests 100% renewable energy for electrical power. This is possible, but weaning ourselves from fossil fuels for transportation is more difficult. So the bill suggests minimizing the use of fossil fuels, which means making planes, ships, trains, and vehicles more efficient, and developing a high speed rail system that would be much more efficient than planes and would be able to compete with air travel in terms of price and convenience. It would not be necessary to do away with cars, planes, lawn mowers, etc.

To briefly comment on some of the other claims -- the bill suggests we reduce gas emissions as much as possible from the agricultural sector. Since methane comes from the flatulence and belching of cows, critics say that means we can't have beef anymore. Reducing our consumption of beef, though, is wise with regard to our health, and, according to many environmentalists, raising cattle is very costly in environmental terms because it requires many more times the water and feed than other food sources do. Others, however, will disagree with the latter point.

The bill advocates upgrading existing buildings to make them more efficient, safer, etc., but not demolishing them and rebuilding.

BEACH EROSION AND PRESERVATION

By William T. Vosburgh



In many waterfront areas a decline in the size of beaches has impacted shorelines, roads, buildings and recreational use, forever changing our maps. The issue is compounded by our human expectation that these iconic beaches of our youth should be permanent.

In "Geologic Time" everything along a shoreline is moving and changing. Sandy beaches especially are not static and are in constant motion. There is a source of sand and an accumulation along the shoreline. The sand moves around and out, usually to the depths or by littoral drift down the shoreline. The beach sand came from rock and shell ground up by natural forces. The finer the particles the more easily it is moved. Wind direction, rain run-off, waves, tide, current and sea level rise are all factors in the accumulation of sand on waterfronts. Simply a change in wind direction and intensity -- a storm surge with waves building across a broad fetch of open water, can dramatically change a beachfront in a single day. Man-made boat wakes can accelerate beach destruction over a few summers. Observing the same stretch of beach year-round can show dramatic sand movement through the seasons.

The Chesapeake Bay estuary features a soft geology. Unlike the rocky coastlines found in New England, the Chesapeake has been constantly widening. Most of the shoreline soils are alluvial clay and sand deposited by glaciers thousands of years ago.

Maps of the region over the last 300 years show how dramatic the loss of land can be, in some areas hundreds of feet in a century.

The problem today is we would like to maintain what we have in real estate, beaches and islands. Simply replenishing beaches with sand either trucked in or dredged is a Sisyphean effort. There is no perfect engineering solution that is immune to destruction under the wrong circumstances. Up and down the Chesapeake there have been many studies and attempts to curb Mother Nature's rule and make idyllic beaches permanent. With all the permits needed to perform any alteration of our shorelines, an entire industry directs the process. Studies of the problem area by a licensed marine engineering firm comes first. Plans are then submitted for approval by county, state and federal entities. Bids from certified marine contractors and securing funding for these expensive projects takes time and commitment. The fear factor is the substantial failure rate of projects installed with good intent. Many projects in the Chesapeake region have been reworked in just a few decades as some essential variable in the process of beach erosion was misunderstood.

Hard structures include jetties, bulkheads, groins and breakwaters. Vertical flat surfaces such as wooden jetties and bulkheads are not just out of favor but usually banned. They create wave reflection or bounce so the disruptive energy from the wave will continue to cause damage. Traditional jetty placement was perpendicular to the shore with regular beach nourishment. The sand will accumulate on the up current side and scallop away on the down current side as the barriers attempt to slow littoral drift. These do not stop the direct erosion assault from man-made boat wakes or heavy rains.

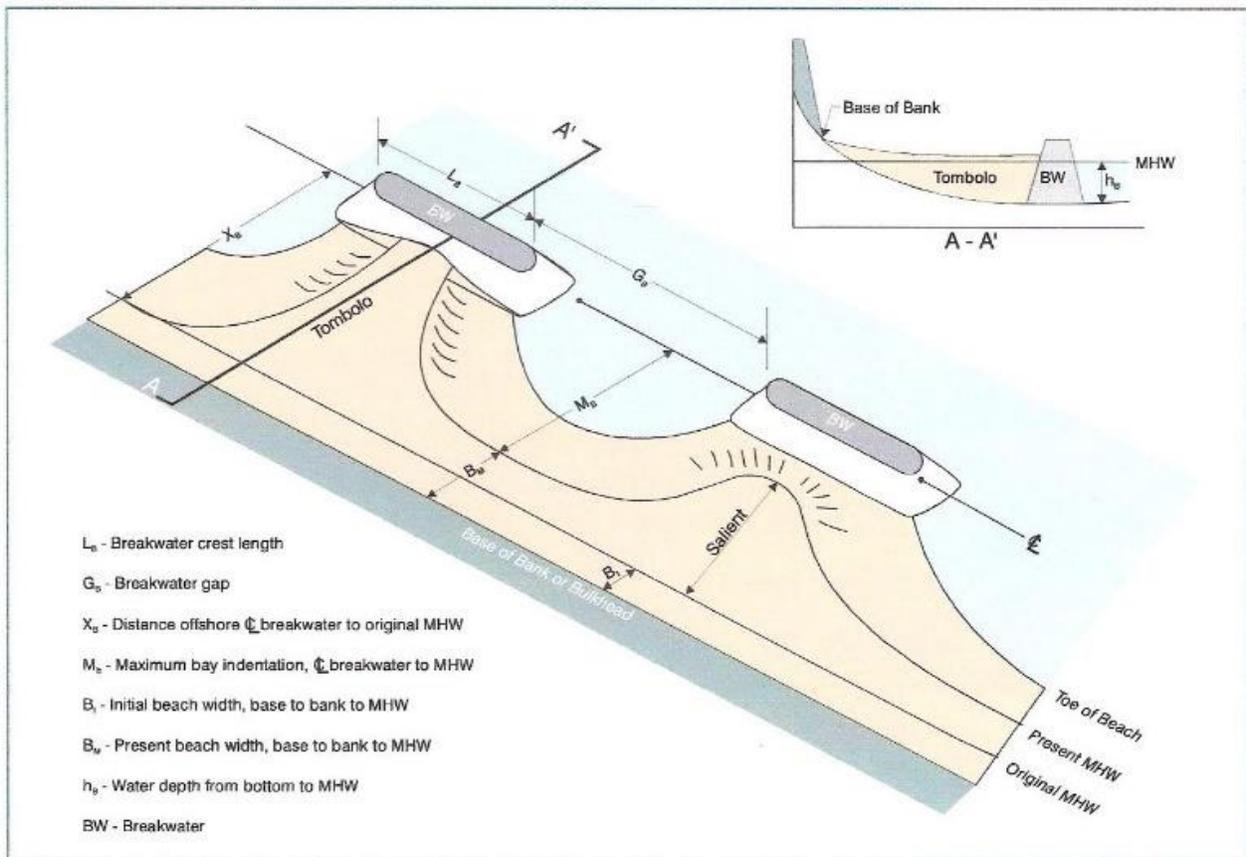
The best structures for permanence are rock breakwaters or sills and rip-rap. The uneven jagged surfaces and gaps between

rocks aid in the dispersion of wave energy. The rock must be placed on filter cloth or it will sink over time into the soft sediments near shore. The size of the stone is selected based on the conditions at the site, the fetch, average size and direction of waves. Typically, large stones (500-2,000 lbs. each) when loosely piled are quite resistant to displacement by storm waves.

Breakwaters parallel to shore and with gaps have gained popularity as being the most durable. They will cause a natural beach arc to form behind each gap with a critical ratio of 1: 1.65 for depth of arc toward shore relative to a wider opening toward open water. These beach arcs are self-correcting and produce much lower loss of beach sand to littoral drift. However, a storm surge from a major hurricane event can still overtop the breakwater and rearrange the sand behind it dramatically. Rain erosion will always occur so if there is a high bank rising behind a beach expect more damage in such events.

The physics of beach sand movement is a three-dimensional problem so all aspects of the design count toward success. The grade along the bottom should be an 8:1 incline from deep water to mean high water and above. This is for proper wave formation approaching the shoreline throughout the tidal cycle. Sand particle size and shape makes a difference with construction grade sand the best. It has irregular polygonal forms which tend to hold together better than very smooth fine sand found on a natural beach.

Shore plantings as found in living shorelines will help stabilize sand when added. Even if the beach is for swimming, there should be places to stabilize it with plantings. If there is an area with heavy storm run-off, a rain garden style depression with plantings will hold water for absorption into the beach rather than cutting a channel. The old-style sand fence can help to form dunes and ridges behind a beach but are unsightly.





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We enjoy our beaches and wish to preserve them forever. We must then be willing to pay the price to keep our shoreline cartography stable. Blending recreational areas with living shorelines is the best possible outcome for a natural look and ecology.

References:

- 1, Beach Nourishment and Protection, National Research Council, 1995
- 2, Shoreline Management in Chesapeake Bay, Virginia Institute of Marine Science, 1999
- 3, Bray Hill LLC, (marine design engineering), Colin MacLachlin, personal communication, 2019

**PROFILE OF A TRUSTEE
SCOTT KNOCHE**



CEPA welcomes Dr. Scott Knoche to the Board of Directors. He is the Director of the Morgan State University Patuxent Environmental and Aquatic Research Laboratory (PEARL). Much of his applied economics research focuses on estimating the economic benefits of outdoor recreation and habitat restoration. As the Director of PEARL, Dr. Knoche oversees a vibrant K-12 education program, a shellfish aquaculture and genetics program, and researchers with expertise in fisheries biology and Chesapeake Bay ecology.

Prior to being named Director, Dr. Knoche was a Research Economist at PEARL. This position followed a post-doctoral research appointment joint with the University of Maryland Department of Agricultural and Resource Economics and the Maryland Department of Natural Resources Fishing and Boating Services. Dr. Knoche also has been employed by the U.S. Coast Guard, leading the adjudication of multi-million-dollar natural resource damage claims under the Oil Pollution Act of 1990.

Dr. Knoche was born and raised in Michigan, receiving his B.S., M.S., and Ph.D. from Michigan State University. An avid outdoorsman with a love of fishing and hunting, he currently lives in Calvert County with his wife and daughter.



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