

# Stormwater Management

And what it means to the  
Bridgewater Citizen



## Chesapeake Bay Cleanup - Part II

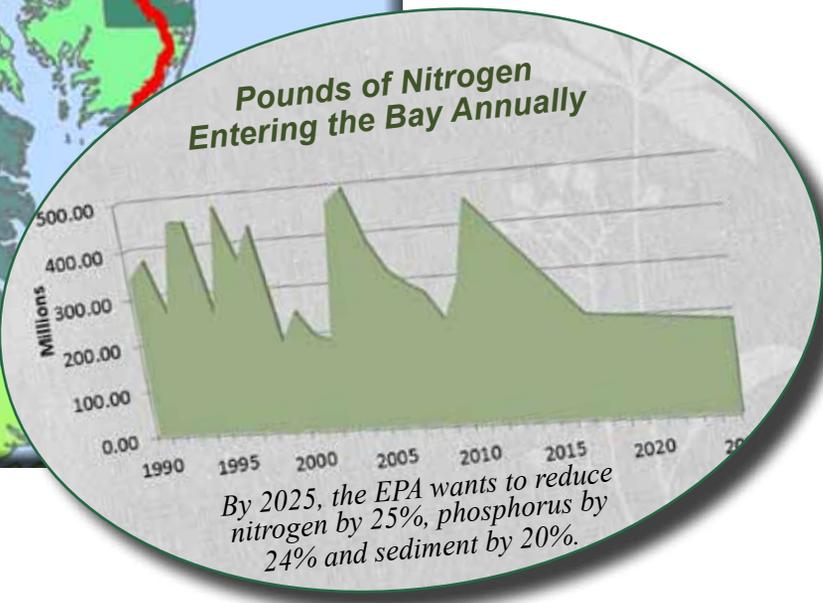


The map to the left shows the entire Chesapeake Bay watershed. As you can see, it takes in parts of six states as well as the District of Columbia.

Efforts to clean up the Bay have shown limited success. As a result the Commonwealth of Virginia has imposed strict stormwater management regulations that will govern development, construction, and many facets of your day-to-day living.

On the following pages we discuss the history of pollution, the impact of population growth and development, previous efforts to clean up the Bay, and stormwater management.

We hope this publication will help explain the new world we are entering as well as its direct effect on you in the form of a monthly fee.



# History of Pollution

## ***When were pollution problems first noted in the Chesapeake Bay?***

The first recorded mention of pollution in the Bay was around 1700. Jamestown was founded in 1607 followed by many other colonies up and down the east coast. In those days there was little knowledge or interest in preventing erosion or the runoff of waste materials into rivers and streams. In fact, they were considered appropriate places to discard all kinds of waste.



## ***Has the problem gotten worse over the years?***

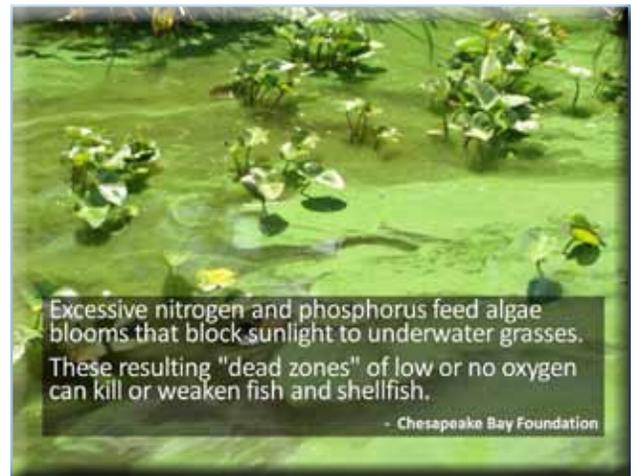
Of course. It took generations before we understood the impact pollution had on waterways and even longer to develop practices to mitigate the effect. At the same time, population grew rapidly, which compromised some of the improvements made over the last few decades. Along with this population growth came industrialization and technology

that allowed greater areas of land to be farmed. All of these contributed to the increase in nitrogen, phosphorous, and sediment in the Chesapeake Bay.



## ***Have we made any improvement to water quality in the Chesapeake Bay?***

Some claim that we are holding our own, but the raw data disputes that statement. In 2000 nitrogen levels in the Chesapeake Bay were 252.4 million pounds per year. By 2010, EPA reported 293.4 million. Phosphorus levels changed from 12 million pounds per year to 18 million.

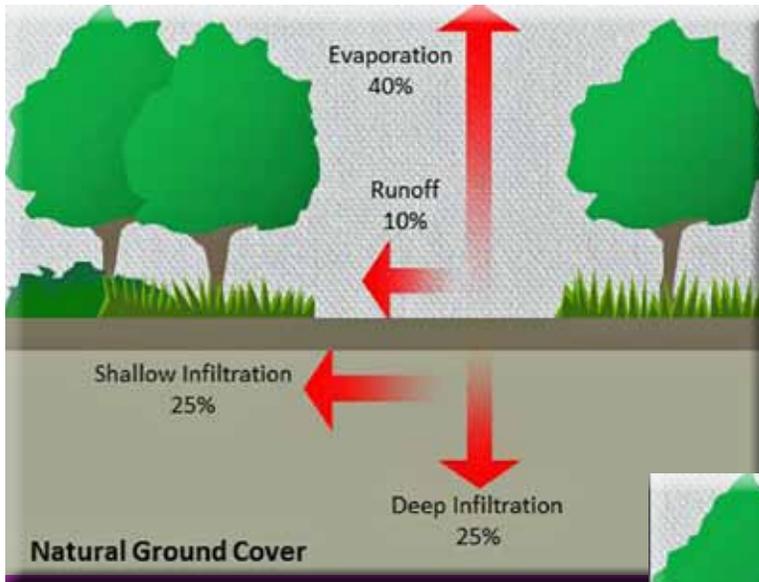


## ***How will the new stormwater regulations help?***

The simple answer is that we are attempting to divert 50% of all stormwater underground instead of allowing it to flow directly into our streams and rivers. The more complex answer involves an understanding of the impact development has had since the founding of Jamestown.

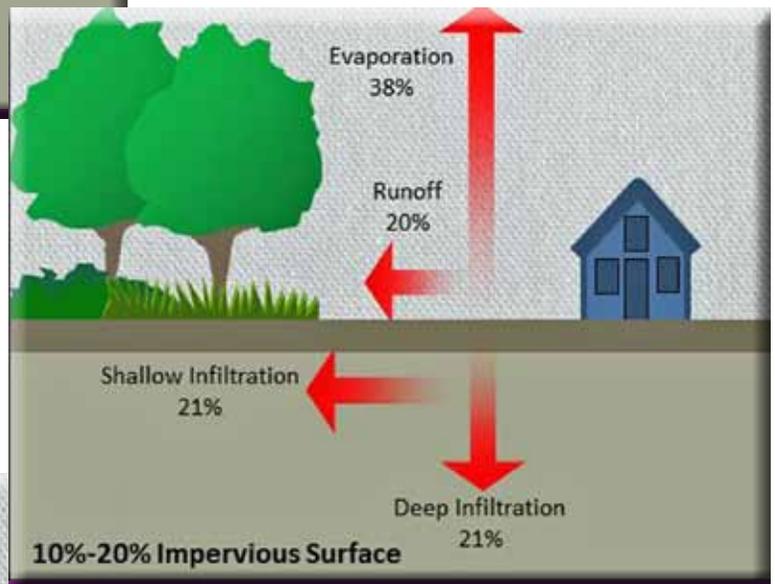


# The Impact of Population Growth and Development

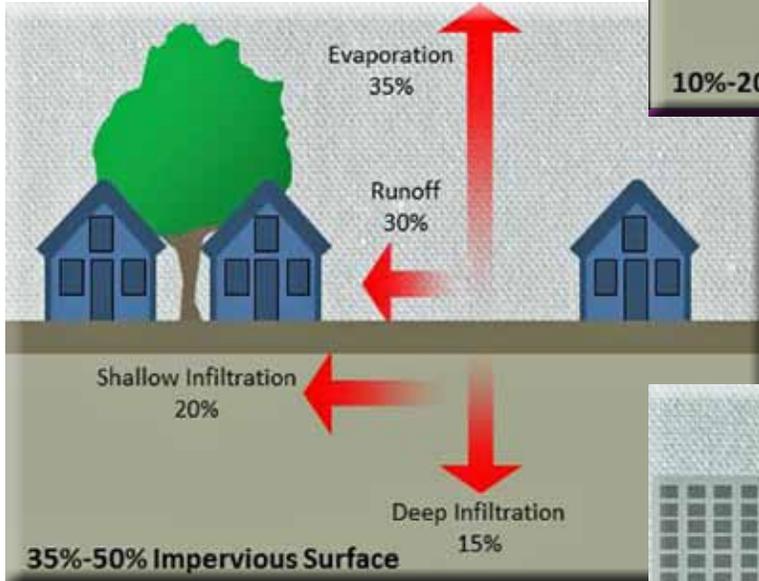


*(Left) When settlers first arrived to the new world the undeveloped watershed had very different runoff characteristics than it has today. On average, undeveloped land will allow 50% of all rain water to filter underground. 40% is lost to evaporation with another 10% running off into the streams.*

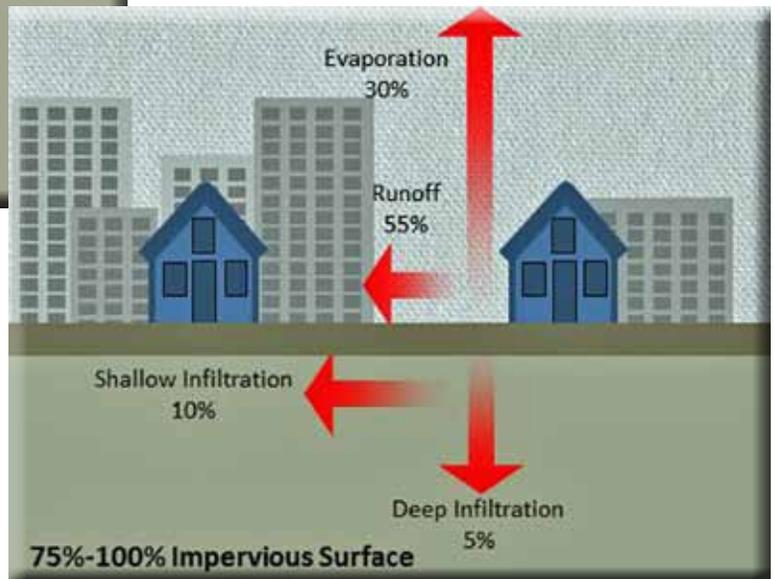
*(Right) For the first 250 years after Jamestown, we were an agricultural nation, especially in the South. The construction of housing to serve a small population changed the runoff characteristics in the manner depicted in this diagram.*



*With the arrival of the Industrial Revolution, the demand for labor increased. Along with this came factories, houses, stores, and the creation of impervious surfaces which, once again, increased the rate of stormwater runoff.*



*After World War II, a rapid growth in population took place and technology brought us the automobile, paved streets, parking lots, etc. While everyone knows the automobile existed at the turn of the 20th Century, it was not until the 1950s that a majority of families actually owned an automobile. Housing trends produced suburban development and the creation of high-density apartment complexes.*



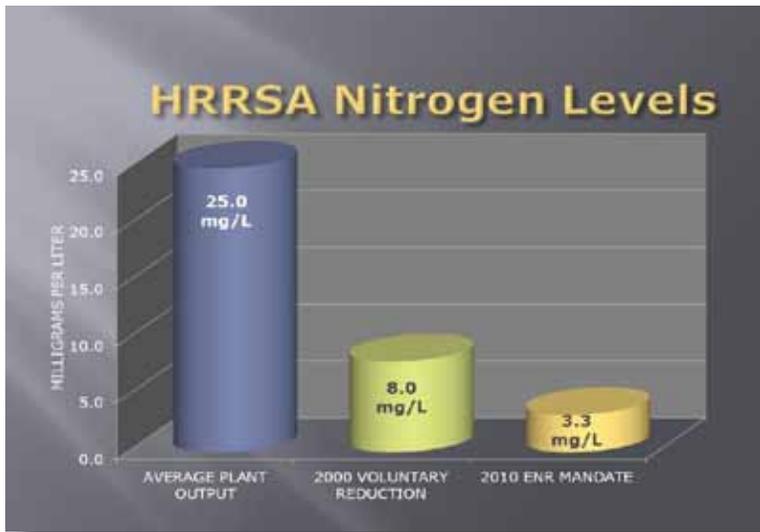
## Previous Efforts to Cleanup the Bay

### **Why are we implementing strict stormwater regulations and practices?**

The simple reason is that previous efforts to clean up the Chesapeake Bay either didn't work or didn't offer enough improvement to counteract the growing issues of pollution in the watershed.

### **Why do you say previous efforts didn't work?**

If you look at test results for various pollutants, you will see that pollutant levels in the Bay are much the same as they were before sewer plants were upgraded.



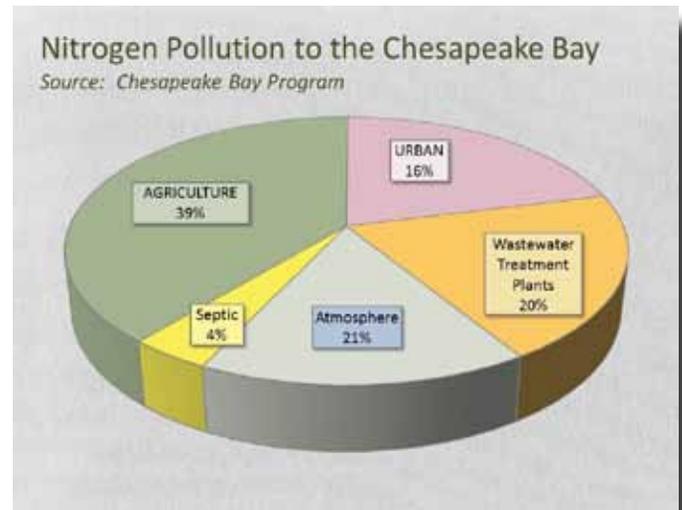
*The average sewer plant releases 25 milligrams per liter of nitrogen. In 2000 HRRSA made voluntary improvements that reduced nitrogen pollution significantly. The mandated improvements that were required in 2010 brought them to the cutting edge of technology of approximately 3 mg/L. Over the past 10 years HRRSA has reduced nitrogen pollution by 87%.*

### **So, does that mean the \$5.9 million we invested at the HRRSA was a waste of money?**

No, but it may not have been the best cost-effective use for counteracting pollutants in the Chesapeake Bay. Without a doubt, some of the treatment plants in this watershed were not in compliance and needed upgrading. HRRSA was already operating at a high level of nutrient removal. The improvements they've undertaken have raised their performance to the maximum that today's technology allows.

### **Will the new stormwater requirements solve the problems of the Chesapeake Bay?**

As you will see in the adjacent chart, urban areas contribute 16% of the pollutants to the Bay. If the new regulations actually reduce pollutants by 50%, as projected, then it is safe to say that improvement will be seen. However, when you consider that the combination of wastewater and urban pollution comprises less than half or only 36% of the total problem, it is possible that this isn't the complete solution.



### **Why is the cleanup of the Chesapeake Bay so difficult?**

You can come up with many different reasons for our failure to cleanup this valuable watershed. It is certainly true that the ever-increasing population places additional stress. However, the physical characteristics of the Bay make it a unique and difficult problem to address. It is an obvious but rarely mentioned fact that the Chesapeake Bay is the only watershed with a land to water ratio of 14:1. By that we mean that there are 14 acres of land for every one acre of water. No other watershed that we know of has such a disparity between land mass and water. It probably makes sense to you that rainwater falling on a watershed with a 14:1 ratio will cause more pollutant runoff than, say, a watershed with a 2:1 ratio.

If you look at the chart and text on page 8 of this report you'll see more information on this unusual characteristic of the Bay.



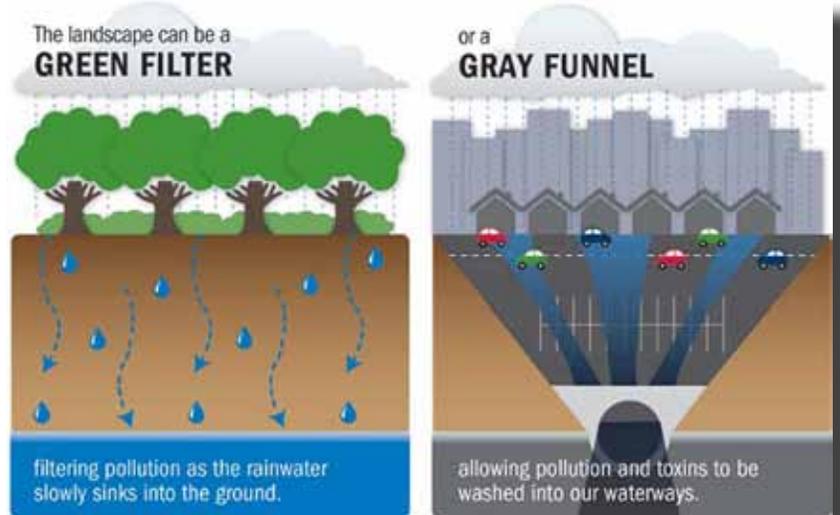
**Where does that leave us today?**

The modern world we live in is obviously different from colonial times. We've changed from days when half of all rainwater filtered underground to a time when up to 95% of it is channelled to surface waters. One of the goals of the new stormwater regulations is to convert the runoff coefficient to the level that existed when our nation was founded.

**How is this even possible?**

The theory behind the new concept is that drainage structures can be created that will slowly release water underground. Of course it is going to take a long, long time to create a network of stormwater ponds that will detain and filter water, but that is the direction we are heading.

Up to now, local governments have required developers to build stormwater detention ponds which reduced the impact downstream of major storms and allowed for the filtration of some of the rain into the soil. The new system will focus on holding or retaining the stormwater instead of slowing it down.



**What has Bridgewater done so far to mitigate stormwater pollution?**

While more could be listed, here are three methods the Town is currently utilizing to reduce pollutants entering our river and streams.



Many people do not realize that the field where children play soccer or residents sit to enjoy the summer concerts is really a detention pond designed to slow the release of rainwater downstream.



Bridgewater began sweeping streets over two decades ago. This practice has been proven to reduce street waste and toxins that would otherwise wash into our storm sewer system and eventually North River.



As money permits, the Town has pursued the purchase of land in the floodplain to develop into parks. This reduces the costly devastation flooding can bring to residential areas and eliminates the potential of fuel leaks or other contaminants entering our river at these times.

# Stormwater Management

## What Does This Mean for the Bridgewater Resident?

### *What is this going to cost the homeowner?*

We are imposing a \$1 per month fee that will be dedicated to stormwater management. As we said in the budget newsletter, this is about 1/3 of the amount other communities are assessing, but for our needs we think it will be adequate.

### *How much will this generate annually?*

We believe this will produce approximately \$65,000 in revenue each year.



Stormwater Utility	
Bridgewater	\$1.00/month
Waynesboro	\$3.00/month
Staunton	\$3.00/month
Charlottesville	\$3.00/month
Virginia Beach	\$3.00/month

### *Will everyone pay the stormwater management fee?*

Yes, every property owner pays the fee. That means that tax-exempt organizations will be on equal footing with businesses and homeowners in this regard. The fact that churches, schools, and other nonprofit organizations pay the fee has proven controversial in cities such as Waynesboro and Charlottesville, but you cannot run a program of this nature unless the charges are applied fairly and across the board. Ironically, it is often the case that these organizations have the highest percentages of impervious surfaces. Therefore, to exempt them seems to be a self-defeating effort.



### *Does everyone pay \$1 per month?*

No. The \$1 fee is applied to a single-family residence. Other properties are based on the number of residences or the amount of impervious surface on the property.

### *How will the bill be received?*

Stormwater management fee will become a part of your monthly utility bill which also includes water, sewer, and trash collection services. In the case of apartment complexes and other high-density developments, a bill will be sent to the property owner.



### *Why do you make this distinction?*

Apartments are occasionally vacant, but the impervious surface remains the same. If water service were turned off, thereby negating the monthly charge, there would be no stormwater fee collected but the expense of the stormwater management program would continue.



# Stormwater Management

## What Does This Mean for the Town of Bridgewater?

### What will we do with the funds collected?

We wish we could say that all proceeds will go directly into projects that will improve water quality in North River and therefore the Chesapeake Bay. However, if you've ever dealt with federal or state government you understand that paperwork and red tape are a part of every program. This one won't be any different as we are already devoting considerable time to filling out forms and documentation.

That doesn't mean that projects won't be built—they will. Unfortunately, a lot of our time and your money will end up being paperwork. Any balance beyond those administrative costs will go into projects designed to divert stormwater underground.

### What types of projects might this include?

Where possible we'll focus on converting existing ponds into ones that meet the new criteria. You'll probably see our Public Works staff excavating in and around stormwater structures to change the soil characteristics and add plants that readily absorb water.



*In the past, developing subdivisions meant creating individual lots wholly owned by the homeowner. In the future, developers will be required to dedicate a certain percentage of acreage to "green space" that will require maintenance either by homeowner covenants or the local government.*



### What other effects will stormwater regulations have on the Town of Bridgewater?

The answer to this is more far reaching than a \$1 per month fee. The most obvious change is in the development of real estate. These drawings show how a traditional subdivision has been developed and what is likely to be seen in the years ahead. Traditional development maximized the use of the land in terms of housing, leaving little property undeveloped. Meeting the new criteria will require fewer lots and a significant amount of area left undeveloped. While this type of subdivision will prove very popular aesthetically, it will also come with a very high price tag.

### What else is down the road?

To us, there's a lot of uncertainty about the impact these regulations will have on the individual. Our staff has had numerous conversations with state and federal officials and knows that changes are coming, but no one yet understands the full impact they will have.

It is possible that we'll one day see prohibitions against many practices that are now commonplace. One of these could be the simple act of washing your car in the driveway. Another will be regulations governing how contractors build houses or the addition of rules limiting many day-to-day activities. In reality we really don't know where this is going at this point. As information is received from state and federal agencies, we'll get it to you through articles in the Bridgewater Current.

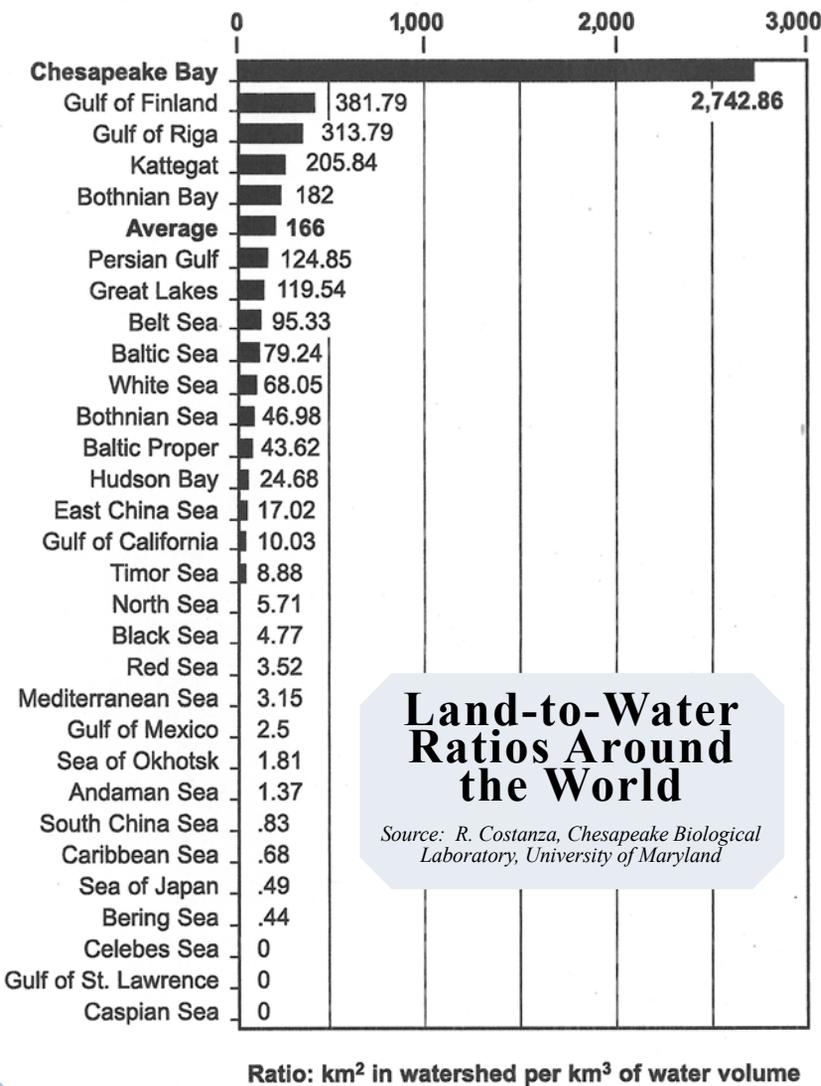


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# The Shallow, Vulnerable Bay

The Chesapeake Bay, compared to other coastal and inland bodies of water, has a huge drainage basin for the amount of water it contains, a ratio of 2,742.86 square kilometers of land for every cubic kilometer of water. The principal reason is the Chesapeake's extreme shallowness - its average depth is less than 22 feet.

We've pointed out elsewhere in this report that the ratio of land to water is 14:1. That's an accurate statement but only a reflection of surface area. When you consider the volume of water in the Bay, the ratio is even more extreme. Bodies of water with greater depth or a lower land to water ratio are less stressed by pollution than the Chesapeake Bay.