Streamside Neighbor

This project is funded by a grant from the National Fish and Wildlife Foundation's Chesapeake Bay Small Watershed Grants Program sponsored by the Environmental Protection Agency's Chesapeake Bay Program and by Harford County Department of Public Works, Watershed Protection and Restoration.

Chesapeake Bay Program
Science. Restoration. Partnership.

NFWF

BARRY GLASSMAN
COUNTY EXECUTIVE

Acknowledgments

Many thanks to Mr. Stan Kollar with Harford Community College for preparing the text and providing most of the photographs for this project. In addition, we extend our appreciation to individuals from the following agencies that contributed to this project: Maryland Department of Natural Resources, Harford Soil Conservation District, and Harford County Department of Planning and Zoning

HARFORD COUNTY DEPARTMENT OF PUBLIC WORKS
WATERSHED PROTECTION AND RESTORATION
212 SOUTH BOND STREET, 1ST FLOOR
BEL AIR, MARYLAND 21014
(410) 638-3217 FAX (410) 893-3849

This document is available in an alternate format. Please contact Harford County Department of Public Works, Watershed Protection and Restoration at (410) 638-3217.

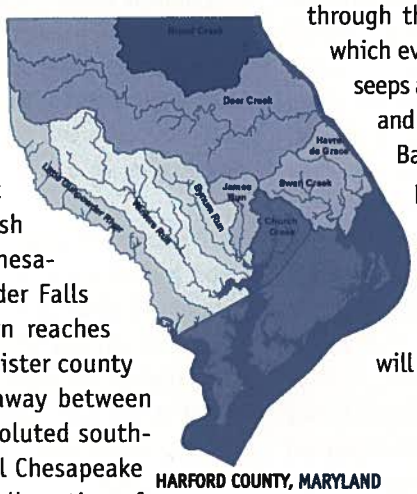
STREAMSIDE NEIGHBOR

Introduction

Introduction

- *Changes in land cover alter stream habitat*
- *Healthy backyard streams are key to a healthy Chesapeake Bay*

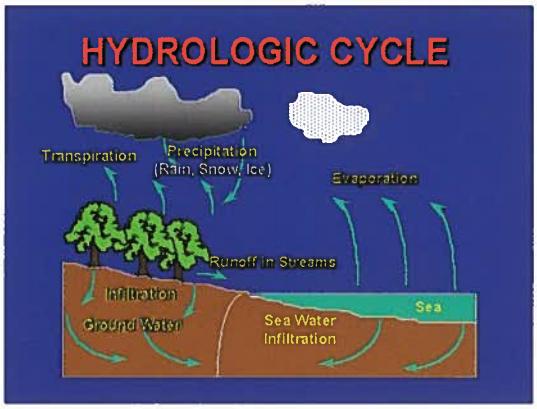
Harford County occupies a unique position in the geography of Maryland. Sitting at the headwaters of the Chesapeake Bay, the mighty Susquehanna River flows along our northeast border. With its source in southern New York State, its watershed is so vast that it carries one half of all the fresh water that flows into the Chesapeake. The Little Gunpowder Falls separates us in its southern reaches from Baltimore County, our sister county to the west. Sequestered away between these two rivers is our convoluted southwest border — the beautiful Chesapeake Bay shoreline. All but a small portion of this is located on Aberdeen Proving Ground, so public access to the Bay proper is limited to the Havre de Grace shoreline, and by boat, from the Bush and Gunpowder Rivers. To the north, the historic Mason-Dixon Line forms our border with Pennsylvania. Within our borders, four main watersheds drain the land. They are Bush River, Deer Creek, Broad Creek and Swan Creek. Many tributaries make up each of these watersheds. Winters Run, Bynum Run, James Run, Cranberry Run and Gray's Run, for example, are all part of the Bush River watershed. As a note of interest, Deer Creek is the only watercourse within the borders of our county that has its source outside of Maryland (It begins near Shrewsbury, PA.).



HARFORD COUNTY, MARYLAND

A watershed is any area drained by a system of rivers and/or streams. In a watershed that is totally forested or otherwise vegetated, the majority of the precipitation is filtered through leaves, organic matter, roots and soil. It then percolates through the ground to become groundwater which eventually finds its way to springheads, seeps and wetlands which flow into streams and rivers, and in our circumstance to the Bay and finally to the ocean. This component of the hydrologic cycle, as it is called, purifies water, and when water flowing out of the land is clean, then bodies of water downstream, such as the Chesapeake Bay will be unpolluted.

When development proceeds across the landscape, things begin to change. As trees and other veg



THE BUSH RIVER WATERSHED DRAINS MUCH OF HARFORD COUNTY.

CHESAPEAKE BAY WATERSHED DRAINS 64,000 SQUARE MILES OF LAND, INCLUDING SIX STATES

etation are removed, the land and streams heat up. Non-native, introduced and invasive plants creep across the land like a cancer. Improperly conducted agricultural activities can contribute heavy sediment, nutrient and pesticide loads to a watershed. Impervious surfaces such as parking lots, roadways and rooftops prevent precipitation from being filtered slowly through the soil and instead, runoff flows rapidly across the surface of the land, carrying any pollutants that may be present along with it. Streams swell and flow swiftly after storms, cutting away at banks, carrying sediment and other pollutants to the Bay. Flooding becomes more commonplace downstream. Because the flow of water through the soil is reduced, water tables drop, and wells and streams are more likely to dry up during hot summer months.

The degree of contamination that occurs in any watershed is dependent upon the activities conducted there. The amount of pollution that flows into a stream is a function of how people live in an area. The more products used that are toxic or polluting, the more polluted the adjacent waters will be. The more the land is disturbed or improperly cared for, the worse off will be the waters beside the land.

Downstream from all of us is the Chesapeake Bay. At one time, it was the crown jewel of estuaries, producing a bounty of shellfish and finfish without parallel. Today, oysters occupy only 1/100th of their former area. Finfish populations such as sturgeon, bluefish, shad, herring and yellow perch have plummeted. Watermen are finding it harder to make a living as they travel further from their home ports to get fewer and fewer crabs. Visibility in the Bush River that was reported to be 20 feet in the 1950's now hovers at 1-2 feet.

What we do may seem to have little impact upon a problem so vast, but what we must remember is that there are nearly 13 million of us living in the Chesapeake Bay Watershed. Each one of us that impacts a stream has an effect upon the lifeblood of the Bay. We all live in a watershed. We all have an impact. It can be positive or it can be negative. The streamside neighbor program is about learning how to have a beneficial impact upon the land and waters around us, both for ourselves and for the waters downstream.

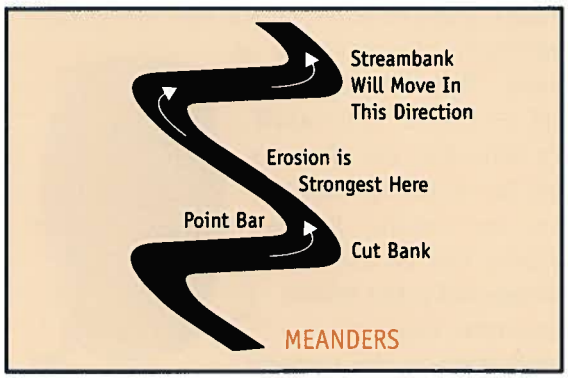
STREAMSIDE NEIGHBOR

Stream Evolution

Stream Evolution

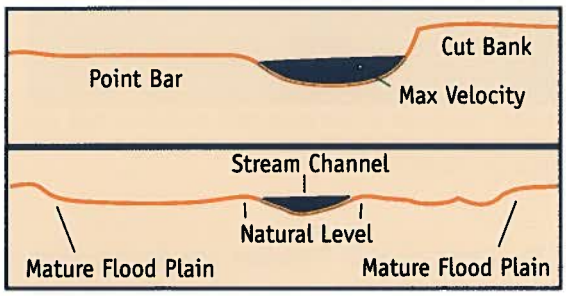
- *Channel erosion is a natural process*
- *Channel shape depends on soil type, slope, and bedrock*
- *Runoff from paved surfaces increases the rate of channel erosion*

Streams begin when water flows downhill. As it does, it takes the path of least resistance, flowing first down steeper slopes, and moving through softer soils. When the force of water is sufficient, it takes soil along with it, cutting downward through soil and eventually into bedrock. When harder rock is encountered, as it is at the Rocks State Park in Deer Creek, waterfalls and cascades are formed. Streams that flow over steeper land flow relatively straight, cutting a "V" shaped channel. As the slopes become more gentle, however, they cut their banks farther out during periods of flooding, developing a broad flood plain. The stream bottom becomes broader and shallower, and begins to meander, cutting outer, steeper banks (cut banks), and forming gentle slopes (point bars) on the inner radius of curves.



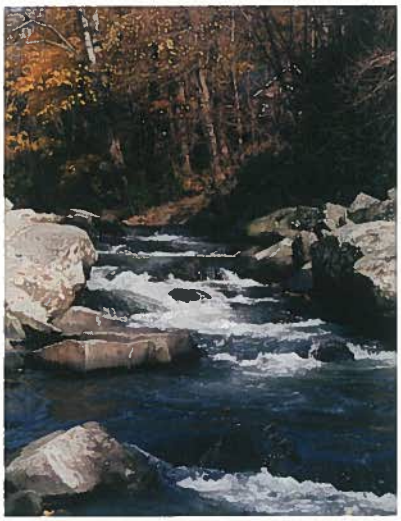
POINT BARS FORM ON THE INSIDE CURVE WHILE CUT BANKS ARE ERODED BY THE FASTER MOVING WATER ON THE OUTSIDE CURVE.

The shape of a stream channel is dependent upon the slope, soils and bedrock over which it flows. In Harford County there are two geologic provinces. The Coastal Plain is relatively flat with sandy and silty soils. It lies primarily to the east of Route 40. Many of the streams here are influenced by tides. The lower section of James Run is an example of a Coastal Plain stream, which has a wide flood plain, extensive meanders and a sandy bottom. The remainder of Harford County lies within the Piedmont Plateau, which consists of rolling hills, steeper slopes and rockier soils. A good example of a Piedmont stream is Deer Creek, which has a narrow floodplain and a rocky bottom.



NATURAL LEVEES FORM WHEN COARSER MATERIALS DROP OUT OF SUSPENSION CLOSE TO THE DEEPEST CHANNEL.

THE STEEP FLANKS OF THE SUSQUEHANNA RIVER REVEAL THAT THE RIVER IS CUTTING THROUGH RESISTANT ROCK.



DEER CREEK HAS ITS SMALLEST FLOODPLAIN AND IS MOST NARROW WHERE IT CUTS THROUGH THE HARD GNEISS AT ROCKS STATE PARK.

IN THIS SECTION OF JAMES RIVER JUST BELOW ROUTE 7, THE CUT BANK IS EASILY VISIBLE.

THIS BROAD FLOODPLAIN OF DEER CREEK ABOVE ROCKS STATE PARK WAS FORMED AS SILT WAS DEPOSITED OVER THE YEARS AND NO FURTHER DOWNCUTTING OCCURRED.

The banks of both Piedmont and Coastal Plain streams are subject to erosion in varying degrees, and native vegetation has an important role in stabilizing them.

Changes in the landscape can significantly alter the stream channel. As development occurs, the amount of land surface that is impervious to water increases (roads, driveways, parking lots, rooftops). When it rains, the water can no longer percolate through the soil. Instead, the rainwater is collected in gutters and downspouts and stormdrains, where it is delivered to the stream system more rapidly. Peak water flow in the channel becomes higher and the velocity of the water is greater. The end result is a rapidly eroding stream channel. Although channel erosion is a natural process, the effects of impervious land surfaces greatly increase the rate of erosion. This accelerated erosion can have numerous impacts. Trees along the stream are often undercut and fall. The sediment produced by eroding stream banks smothers aquatic plants and animals. Flooding often increases. Shifting stream channels can threaten roadways, water and sewer lines and other structures that have been built close to a stream.

In 1984, Harford County adopted regulations that require stormwater management for all new development projects. The purpose of stormwater management is to collect storm runoff from impervious surfaces into a facility, such as a pond or an underground storage tank, which temporarily holds the water and releases it into the stream at a slower rate. The use of stormwater management facilities has reduced, but not eliminated the erosion problems in streams throughout the County. In addition, there are many streams that receive uncontrolled runoff from developments that were constructed prior to 1984.

THIS STREAM IN THE SWAN CREEK WATERSHED RECEIVES UNCONTROLLED RUNOFF FROM AN URBANIZED AREA.

Homeowners can reduce the amount and velocity of runoff produced by their properties. Downspouts should be directed to flow through grass or other vegetation, rather than directly to the driveway or street. Rainbarrels can be used to collect roof runoff. This rainwater can then be used for watering flowers, trees and shrubs. Porous masonry can be used for walkways and patios instead of concrete. In general, any modification to the property that can slow runoff will help the stream channel.

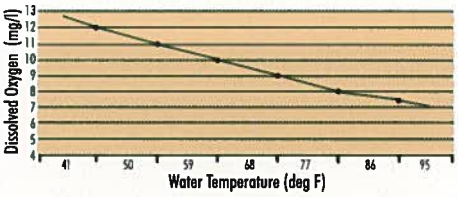
RAINBARRELS COLLECT WATER FROM DOWNSPOUTS.

STREAMSIDE NEIGHBOR

Stream Ecology

Stream Ecology

- *Trees and shrubs shade the stream and help keep the water cooler.*
- *Excess nutrients inputs from fertilizers and yard waste have a negative impact on water quality.*



AS WATER TEMPERATURE INCREASES, IT LOSES ITS CAPACITY TO HOLD OXYGEN. WARM WATER LIMITS THE TYPE AND NUMBER OF FISH THAT CAN SURVIVE.

Ecology is defined as the study of the interaction between living things and their environment. The ecology of a stream is dependent upon many factors, such as temperature, water velocity, bottom substrate (rock or mud), nutrient load and turbidity. Streams that are considered healthy are generally clear-running with high oxygen levels, all year. This generally means that water temperatures are also fairly cool during the summer (below 75 °F, because the cooler that water is, the more oxygen it can hold. As oxygen levels drop (below 6 milligrams per liter), desirable stream dwellers die out and are replaced by organisms that are more tolerant of poor conditions. These more tolerant organisms are of lower food value to fish. Cool, highly oxygenated water supports fish like trout (the State standard for a native trout stream is a maximum of 68 °F. If streambanks are kept well vegetated, especially by trees and tall shrubs, the water will be cooler, with more abundant, healthier fish and invertebrate (aquatic insect and crustacean) populations. Tree and shrub roots also help to stabilize streambanks, thus slowing bank erosion, keeping sediment out of the water.

TROUT NEED COOLER WATER IN WHICH TO LIVE. IN DEER CREEK, TEMPERATURES ARE COOL ENOUGH TO SUPPORT NATIVE TROUT ONLY ABOVE EDEN MILL.

Oxygen levels are also affected by factors such as water turbulence, organic matter and nutrient concentrations. These interactions can be very complex. However, the more pollutants like yard waste, manure, fertilizers or sewage that contaminate a stream, the more "food" there is on which bacteria thrive. The more bacteria there are, the more oxygen they use up, and the more fouled a stream becomes. As streamside neighbors, it is incumbent upon all of us to keep our sections of the streams free of pollutants. The attitude, " I'm only one person, it won't matter" breaks down when even a few people use streams as dumping grounds, because bacteria levels very quickly build up and cause oxygen levels to plummet, thus killing much, if not all of the life in the stream. The leaves that fall into a stream in the fall don't act as pollutants because they are of low nutrient value and they must be acted upon by a series of beneficial organisms that use them for food before bacteria can utilize them.

Additionally, the cooler stream temperatures of autumn provide more oxygen than in the summer, and slow bacterial growth rates. The higher the stream velocity, the more that oxygen is entrained in the water. Slack water areas are thus, more prone to oxygen deprivation due to higher pollution.

DUMPING OF YARD WASTE INTO STREAMS CAUSES INCREASED BACTERIA LEVELS AND CAN KILL FISH AND OTHER BENEFICIAL STREAM DWELLERS. IF THIS MATERIAL WERE TO BE COMPOSTED IN THE BACK YARD, IT WOULD BECOME A VALUABLE PRODUCT TO BE USED AS A BENEFICIAL SOIL AMENDMENT.

Pesticides and other toxic materials can contaminate streams and kill sensitive organisms. Exposure to chemicals need not be intentional. For example, overapplication of a lawn chemical or application just before heavy rains can result in the compound washing into nearby streams. Any products that end up on sidewalks, driveways, parking lots or roadways will wash off into storm sewers, which also empty into nearby streams. Hazardous products of any type should never be disposed of on the ground, in streams or down storm drains. Proper disposal of unused or out-of-date chemicals is paramount. With over 225,000 people now residing in the county, the cumulative effect of improper chemical disposal could be devastating. Preferably, hazard household products such as solvent and pesticides should be used up according the their directions. If it is necessary to dispose of these products, hazardous household waste should be disposed of in the regular trash.

A COMPOST PILE CAN BE AS SIMPLE AS 4 POSTS SURROUNDED ON 3 SIDES WITH MESH FENCING.

Since Harford County incinerates the majority of its trash, the chemicals will not pose a threat to the environment. Harford County does provide collection sites for oil, gasoline, mixed oil and gasoline, antifreeze, yard waste, latex paint, Christmas trees and lead acid batteries at various locations and times. For more information, contact Harford County Recycling Office at (410)638-3417 or Harford County Office of Environmental Affairs, Bureau of Solid Waste Management at (410) 638-3636 or visit the County's web site at www.co.ha.md.us/dpw/envaffairs.

STREAMSIDE NEIGHBOR

Introduced & Invasive Plants in the Stream Buffer

Introduced & Invasive Plants

- *Invasive plants choke out native plants*
- *Habitat and food value of invasive plants is lower than native plants*
- *Eradication of invasive plants requires perseverance*

Introduced plants and animals are those that were not native to this area when the first explorers and colonists arrived. They were brought here either intentionally, for example as food, pets or ornamentals, or accidentally in people's belongings. When these alien species find their way into our existing habitats, they are said to have escaped. When they find open niches, expand into them and overwhelm native plant or animal populations they are said to be invasive.

We are all familiar with some of these invasive species. Dandelions were introduced as greens for early spring salads. They were a good source of vitamins after a winter devoid of fresh fruits and vegetables. Today, they prefer the open, sunny expanses of our lawns, along with our gardens. Gypsy moths were brought to this country in 1866 to test the feasibility of using them as a replacement for silkworms. Unfortunately, they escaped from the laboratory in the early 1900's. For a few years they stayed around Boston, then gradually expanded their distribution to New England. When their population reached a threshold level, they surged down the East Coast, leaving millions of acres of forest in ruin. Today, their populations fluctuate depending upon weather and other factors.

Others that are less well known are no less serious in the problems that they create. A nurseryman in Stewartstown, Pennsylvania inadvertently brought Asiatic tearthumb to this country. The sapphire-berried,

MULTIFLORA ROSE

PHRAGMITES

JAPANESE HONEYSUCKLE ▼

barbed vine was in the soil of azaleas imported from Japan. Thinking it somewhat attractive, he failed to realize it's incredible reproductive and invasive potential, and did not destroy it. It didn't take long for the plant to reach the fertile flood plain of Deer Creek, and today, the species smothers a significant portion of nearly every stream valley in Harford and Baltimore Counties. An annual, it peaks during late summer when billions of sky blue berries are produced, eaten by birds and mammals to be spread for germination the following year. Phragmites is a tall reedlike grass that was intentionally introduced as an ornamental. Today, it covers vast areas close to water where the soil was disturbed, or just ideal for its colonization. This extremely invasive plant has covered many marshlands throughout the country. The wildlife value of the native species that used to exist there has vanished, and therein lies the problem. When invasives take over, they outcompete what should be there, because they have no indigenous enemies, predators or diseases that keeps them under control. When the native plants disappear, the animals that depend upon them for food, habitat and shelter will also vanish. Kudzu, carp, grackles, English sparrows, starlings, fire ants, killer bees, hydrilla, walking catfish, honeysuckle; the list of introduced species that has wreaked havoc across the landscape is seemingly endless. To a naturalist, trained to see the natural world as a system of interacting species, invasives are like a cancer in a body. They are noxious aliens that occupy space reserved for something of greater value. They can severely weaken or cripple an ecosystem and if left uncontrolled, they can bring about its demise.

Along most of our streambanks, native vegetation struggles to compete with such invasive plants as multiflora rose, Asiatic tearthumb (also known as devils tail or mile-a-minute), Phragmites, Japanese and Tartarian honeysuckle, autumn olive, and gill-over-the-ground. There are others, but these are the worst. Species such as multiflora rose and tearthumb make hiking almost impossible. The only way to reestablish the native plant populations is to systematically remove the invading populations to give the indigenous species a competitive advantage. Removing invasives requires diligence and perseverance, because like the cancer they emulate, these plants are usually not totally eradicated after the first attempt. Multiple treatments are often required, beginning with mechanical removal followed by selective herbicide treatment or further mechanical extraction. If the seed bank within the soil is extensive, as it so often is, the total process can take several years. As long as the introduced plants are capable of producing seeds, they are capable of producing offspring that are will migrate up and down stream corridors.

It may be desirable to bring several groups of people together to achieve success, if the task seems particularly

PORCLEINBERRY

GILL-OVER-THE GROUND

HYDRILLA

daunting. Community groups, scouts, the youth conservation corps, high school students that need community service credits, and conservation organizations are all possible sources of "people power" that might be contacted to help rejuvenate streambanks. Even if the riparian zones are on such privately held land as community open space, the greater good can be served by eradicating introduced plants, and reestablishing indigenous communities.

Centuries of disturbance due to clearing, plowing, grazing, and development have taken their toll on the normal distribution of native plants, and thus, the seeds that they produce. Replanting with native species can help to reintroduce what was likely there to begin with.

STREAMSIDE NEIGHBOR

Native Plants in the Buffer

Native Plants

- *Native plants tolerate Maryland's extreme weather conditions better than ornamental plants*
- *Native plants provide appropriate food and shelter for Maryland's wildlife*
- *Native plants should always be used in the stream buffer*

Plants that are native to a particular area have spent thousands of years in competition with each other. They have been subjected to climatic fluctuations, geologic changes, and human and animal impacts. They have come into equilibrium with the conditions of that region, and with each other. The animals of the area depend upon them for food, shelter and other habitat benefits. Many of our native species have been lost or have declined in the region due to continuous disturbance, and competition with non-native invasives. By removing the alien species and replacing them with native trees, shrubs, vines and herbaceous (nonwoody) plants, we can help to reestablish native plant populations.

While plants have become adapted to many physical influences such as soil type, shade or sun, temperature and rainfall, there are generally three categories that we use in designating where plants should be planted along streams. They are well drained (as in upland areas or sandy floodplains), moist, and wet (as in marshy or swampy). Knowing which of these categories a plant is most well adapted to will go a long way towards providing for the plants ultimate survival. The following lists will help you to decide which plants will do best along your stream.

Plants for Wet Sites

(waterlogged soils that are wet or flooded for at least 5 successive days during the growing season)

TREES

- red maple
- sweet bay magnolia
- black willow
- Atlantic white cedar
- silver maple
- tupelo gum
- green ash
- swamp chestnut oak
- swamp white oak
- bald cypress
- willow oak
- swamp cottonwood

SILVER MAPLE IS LOCALLY REFERRED TO AS SWAMP MAPLE BECAUSE OF ITS TOLERANCE FOR WET SOILS.

SHRUBS

- smooth alder
- rough alder
- button bush
- swamp rose
- swamp white azalea
- winterberry holly
- elderberry
- silky dogwood
- highbush blueberry
- spicebush
- red-osier dogwood
- sweet pepperbush

WINTERBERRY HOLLY IS NOT ONLY STUNNING BUT GOOD FOOD FOR BIRDS LATER IN THE WINTER.

ELDERBERRY IS A SOFT SHRUB WITH FLAT-TOPPED FLOWER CLUSTERS. ITS BERRIES MAKE EXCELLENT JAM.

HERBACEOUS PLANTS

- boneset
- arrowhead
- pickerel weed
- swamp milkweed
- New York ironweed
- New England aster
- cardinal flower
- blue flag
- sedges and rushes
- cinnamon fern
- royal fern
- skunk cabbage
- turtlehead
- New York aster
- redtop grass
- lizards tail
- arrowhead
- arrow arum

TURTLEHEADS OFTEN GROW AROUND SPRINGHEADS.

BOTH NEW ENGLAND AND NEW YORK ASTERS ENJOY WET ROOTS AND FULL SUN.

Plants for Moist Sites

(Soils that retain good levels of moisture throughout the growing season)

TREES

- red maple
- sugar maple
- river birch
- sweet gum
- black gum
- sycamore
- northern red oak
- southern red oak
- pin oak
- redbud
- slippery elm
- American hornbeam
- American holly
- hackberry
- American elm
- musclewood
- mockernut hickory
- eastern cottonwood
- tulip poplar
- willow oak
- southern red oak

RIVER BIRCH DEVELOPS STRIKING BARK AS IT AGES.

MUSCLEWOOD IS A SMALL TREE WITH BRANCHES THAT HAVE A SINEWY TEXTURE.

SHRUBS

- spicebush
- arrowwood
- red pannicled dogwood
- red chokeberry
- black chokeberry
- nannyberry
- blackhaw viburnum
- eastern bayberry
- sweet pepperbush
- elderberry
- silky dogwood
- witch hazel
- fringe tree
- winged sumac
- American filbert

THE FRAGRANT FLOWERS OF THE FRINGE TREE PERMEATE THE AIR IN MAY.

THE FATTY BERRIES OF SPICEBUSH MAKE IT PRIME EARLY-SEASON FOOD FOR OVER-WINTERING BIRDS.

HERBACEOUS PLANTS

- Virginia bluebells
- turks cap lily
- great blue lobelia
- common milkweed
- white beardtongue
- Joe-Pie-weed
- cardinal flower
- Christmas fern
- black cohosh
- maidenhair fern
- purple coneflower
- blue cohosh
- skullcap
- violets
- hepatica
- wild ginger
- blue bugbane
- wild geranium
- foamflower
- false dragonhead
- Jack-In-The-Pulpit

FOAMFLOWER MAKES AN EXCELLENT ADDITION TO THE MOIST WOODLAND.

VIRGINIA BLUEBELLS IS AN UNCOMMON PLANT IN HARFORD COUNTY WOODLANDS.

Plants for Drier Sites

(Sandy or well-drained soils that usually become dry during hot weather)

TREES

- black locust
- chestnut oak
- white ash
- red cedar
- scrub or Virginia pine
- American beech
- black oak
- bigtooth aspen
- scarlet oak
- black gum
- black walnut
- post oak
- black cherry
- sugar maple
- most hickories
- northern red oak
- sassafras
- common persimmon

AMERICAN BEECH CAN BECOME A LARGE TREE WITH SIGNIFICANT CHARACTER.

PERSIMMON IS AN UNCOMMON TREE, THE FRUITS OF WHICH ARE EATEN BY MANY ANIMALS.

SHRUBS

- deerberry
- pinxter
- maple-leaved viburnum
- serviceberry
- mountain laurel
- American hazelnut
- coralberry
- snowberry
- hawthorns
- strawberry bush
- staghorn sumac
- mountain laurel
- native hydrangea
- winged sumac
- Rhododendron maximum

THE NATIVE AZALEA OR PINXTER IS ONE OF THE FIRST NECTAR PRODUCERS USED BY THE HUMMINGBIRD EACH SPRING.

SERVICEBERRY IS LOCALLY REFERRED TO AS SHADBUSH OR SHADBLOW BECAUSE IT FLOWERS WHEN THE SHAD ARE RUNNING IN THE SUSQUEHANNA RIVER.

HERBACEOUS PLANTS

- black-eyed susan
- purple coneflower
- common milkweed
- blazing star
- bracken fern
- butterfly weed
- wood lily
- goldenrods
- sneezeweeds
- Solomons seal
- birdsfoot violet
- beardtongue

THE MIKWEEDS PROVIDE FOOD FOR THE INCREASINGLY UNCOMMON MONARCH BUTTERFLY.

TRUMPET CREEPER VINE IS A FLAMBOYANT SPECIES WHICH ENJOYS FULL SUN AND A FENCE OR OTHER ANCHOR.

STREAMSIDE NEIGHBOR

Fertilizers & Pesticides & Natural Pest Control

Fertilizers and Pesticides

- *Overuse of fertilizer is a significant source of pollution in Maryland's streams and rivers*
- *Improper use of pesticides can harm beneficial insects*
- *Consider using "natural" pest control methods*
- *Use commercial deicers on sidewalks and driveways instead of fertilizer*

Most people take pride in their property, and to many, that means a verdant expanse of luxurious grass. This is often achieved with high inputs of fertilizer and chemicals such as weed killers, insecticides and fungicides. While the use of limited amounts of these chemicals may be necessary from time to time, the conservative application of lawn chemicals will often yield better results at a lower cost, and is less polluting to adjacent streams. Problems arise when chemicals are applied when they are not needed, or in quantities that can not be used or be effective. A common misconception is that "If one tablespoon per gallon is called for, three tablespoons will be better". If this rationale is being applied to fertilizer, it does not work, because the grass can only absorb so much over a given period of time. The rest will be washed off the land into streams during periods of heavy rainfall, or slowly leach downward into the groundwater. There, it will remain, until it moves out into the local stream or into the Chesapeake Bay. The plant nutrients then induce the growth of algae, which cloud the water, and eventually die, causing the proliferation of bacteria, which use up all of the oxygen in the water. The result is often a fish kill.

A similar scenario occurs when pesticides are applied too frequently, in quantities that are too great, or at the wrong time of year. The chemicals are not used and are washed into streams or leach downward into groundwater. There, they can affect both human health and the vitality of streams and the Bay.

The solution is to apply these chemicals (all fertilizers, both commercial and "organic" are chemical in nature) only when and in the quantity that they are required for the health of the plants, grass or otherwise. Grass, for example, should be fertilized only in the fall. The cool temperatures of autumn and winter allow the slow absorption of the plant nutrients by the roots, which then grow through the moist soil and become robust. When spring arrives, these very strong roots have extended wide and deep. They can very nicely fulfill their task of absorbing water and the remaining soil nutrients to produce a lush, green, healthy lawn. A soil test can tell you the amounts of each nutrient needed by your lawn, and can be obtained by contacting the Maryland Cooperative Extension Service in Forest Hill at (410)638-3255 or (800)342-2507. More information can be obtained from their web site at www.agnr.umd.edu/ces/.

By aerating the lawn once a year using a plug extractor that you can rent, the effects of soil compaction are ameliorated, and more oxygen can get to the roots. A mulching lawn mower is beneficial in that it chops up the grass clippings into small pieces, allowing them to break down quickly, returning nutrients to the soil for uptake and recycling within the plant. Grass should not be mowed to less than 3 inches. Using these pointers, a fine lawn can be created with minimal care or fertilizer input. Fertilizing during the summer simply causes grass to grow more quickly. This excessive growth puts stress upon the roots during summer months when soil moisture is at its lowest. The result is a weakened lawn that will become unhealthy at the slightest provocation.

Pesticides are chemicals that are used against pests. Insecticides are used against grubs, beetles, caterpillars, grasshoppers and other insects, and herbicides are commonly referred to as weed killers. Fungicides are less commonly needed on the lawn, but are used to combat such afflictions as powdery mildew on roses and lilacs, and anthracnose on dogwoods. A key point to remember is this: All pesticides are poisons. They can kill or injure unintended victims when used inappropriately, and even

when used according to label instructions. Birds, for example, often fall prey to diazinon pellets, which are often spread on lawns to kill root-eating grubs. After pesticides are applied to lawns, the rainfall that follows can wash the chemicals into the stream at the bottom of the hill. Imagine the effect of many square miles of treated lawn from numerous developments and a golf course or two washing into Bynum or Winters Run. In some cases, toxic levels of pesticides may be present immediately after a rain, and be diluted downstream. In other cases compounds have been known to concentrate in the tissues of aquatic creatures, in higher amounts as they move up the food chain. This phenomenon is known as bioaccumulation, or biomagnification, and the danger is that when the compounds reach levels that are toxic, the organism, or those that eat them (us, for example) will be harmed. In many lakes in the Midwest, including the Great Lakes, there are now advisories against eating fish, due to this phenomenon. While not all bioaccumulation is due to residential pesticide use, it is one factor that can help to reduce the overall contaminate load to our local waters and the Chesapeake Bay.

The solution is to use no pesticides at all on our lawns, or to use them very judiciously. It is an old maxim in plant science that states, " healthy plants are less susceptible to diseases than those that are weak". If your soil is kept well aerated and healthy, and fertilizers are applied only in the fall (if necessary), and if the right type of grass is planted for your site, you just might find that it is never necessary to treat your lawn with pesticides. This would be healthier for you and your families, as well as the well being of the finfish and shellfish in the waters that surround us.

Ensure that when granular fertilizers or pesticides are utilized, that they do not end up on the driveway or other pavement. They will do no good for the lawn, there, and will eventually be washed off into local streams.

PESTICIDES ARE POISONS WHICH MUST BE HANDLED WITH GREAT CAUTION.

One other issue that arises during the winter is the use of fertilizers as deicers on sidewalks and driveways. While a small amount of fertilizer running off of a sidewalk onto a lawn will cause little or no harm, large amounts of fertilizers running off driveways and sidewalks into storm sewers can be very detrimental to both streams and the Bay. Should you happen to run out of the proper deicer, consider using sand, kitty litter, or wood ashes to improve traction on icy surfaces, rather than fertilizer.

Alternatives to Insecticides

In nature, pest populations are kept in check by predators, diseases, and conditions that are beyond their tolerance (cold winters, etc). When we use insecticides we are using poisons to eliminate a particular problem insect. However, some of the bugs always survive the chemical onslaught. They are more resistant to the insecticide and they will go on to produce offspring that, like themselves are much less affected by the poison. In this way, insect populations gradually (or in some cases quickly) become immune to a particular insecticide. As an alternative to insecticide use, predatory insects are now commercially available both locally and by mail order. These predators will eat insect pests and bring them under control. Some of those that are available are as follows:

- ***Lady Bugs or Beetles*** - larvae consume aphids, scale, leaf hoppers, and eggs of Colorado potato beetle. Purchase the adults which then lay eggs, which hatch and produce larvae.
- ***Praying Mantids*** - voracious feeders of caterpillars, grasshoppers, beetles, grubs and aphids.
- ***Lacewings*** - eat aphids, mealy bugs, immature thrips and whiteflies, and the eggs of thrips and spider mites.
- ***Trichogramma Wasps*** - these tiny wasps are harmless to people, but lay their eggs on the larvae and eggs of over 200 garden pests, especially those that form caterpillar larvae.
- ***Beneficial Nematodes*** - these microscopic animals prey on and destroy hundreds of pests, including weevils, borers, grubs, fleas, cutworms, wireworms, armyworms and iris borers. They are, again, harmless to people or pets.

There are many others available for specific pests. Remember that these predators will bring about acceptable levels of control of pest insects. They will usually not eliminate them, but neither will insecticides. The predators are safer for you, your family and the surrounding environment.

Specific diseases are those bacteria that only affect certain insect larvae such as Japanese Beetle grubs or cabbage looper larvae. For Japanese Beetle control, use milky spore disease. Most other grubs and caterpillars can be controlled using Bacillus thuringensis, marketed under the names, Bt, Thuricide, and Biotrol.

Pheromones are natural chemicals that attract members of the opposite sex, which can then be trapped. The most commonly seen are the yellow-vaned traps that are used collect Japanese Beetles. They contain a sex lure for the males, a floral scent to attract females and the yellow vane is appealing to both. They are most affective when many are used in a neighborhood, so that most of the adults in an area are captured and prevented from reproducing. Within several years of use, most of the beetle population in an area can be reduced to barely noticeable levels.

Horticultural, or dormant oils are used to suffocate insects, such as wooly adelgid aphids and fruit tree pests. To be affective they must be applied to completely cover the tree and insect pests. These oils are very inexpensive, safe to use and effective when applied properly. Controlling insect pests need not involve the use of potent chemical insecticides when so many other alternatives are available that are safer.

STREAMSIDE NEIGHBOR

Activities in Streams and Buffers

Activities in Streams and Buffers

- *Buffers provide filters for pollutants and protection from flooding*
- *Buffers are a great place to observe wildlife*
- *Altering the watercourse or building retaining walls along streams is prohibited by law*
- *Children should be encouraged to play in their backyard stream but taught to respect the habitat of the plants and animals that live there*

Streams are wonderful places in which to play. Many of us have fond memories of slogging through a creek as children, catching salamanders, fishing, or making small dams with the rocks that were present. Such activities are enjoyable, because they get us out into nature, away from the living room and television to experience what's in our own backyard, living just around the corner, just beneath the rocks. And, for the most part they are harmless. Moving a couple of rocks around in a streambed may cause a few insects to relocate, and after the next storm will probably be rearranged, anyway.

Stream buffers, the land immediately adjacent to streams, are extremely important to the health of the stream. Wide, undisturbed buffers filter pollutants from runoff, provide protection from flooding, and provide shade to the stream. Stream buffers are areas that can and should be used by people, even though construction is not permitted there. Passive use activities such as hiking, fishing, bird watching, and camping are all permitted and encouraged (one should be cautious with camping during periods when flooding can occur). Stream valleys are great places to observe wildlife because they act as migration corridors for animals, and habitat for many species. Of course, respect for private property rights should always be observed. Landowners' permission must always be obtained before engaging in any passive use activity on someone else's land.

Federal, State and local statutes carefully regulate activities that may occur within the stream and buffer. Construction activities such as road, driveway and utility crossings, altering the course of streams, using heavy equipment in and around streams, digging and filling are all regulated activities that require permits. These permits are carefully reviewed by Federal, State and local agencies. The reasons for this are numerous. Careful consideration must be given to whether or not a project will cause increased flooding downstream, or whether fish populations will be impacted, or if the migration of fish during spawning will be affected. Building is restricted within the federally regulated floodplain, which may be greater than either the State or local buffers.

Within the Federally regulated flood plain, new structures will not be eligible for federally subsidized flood insurance because billions of dollars have been paid by taxpayers to pay for structure replacement in high-risk areas. Debris carried by floods is dangerous to people downstream, and impedes navigation. State and local agencies are concerned about safety issues, im

THIS RETAINING WALL IN A TRIBUTARY TO SWAN CREEK IS NOT ONLY ILLEGAL TO CONSTRUCT, IT ALSO DISPLACES THE NATURAL VEGETATION AND ROOT SYSTEMS THAT PROVIDE FOOD AND HABITAT FOR AQUATIC ORGANISMS.

THIS ILLEGAL RETAINING WALL IN A TRIBUTARY TO BYNUM RUN EXACERBATED THE EROSION ON THE OPPOSITE BANK.

REMOVING NATURAL VEGETATION ALONG THE STREAM RESULTS IN BANK EROSION.

pacts upon wildlife and the health of the Chesapeake Bay. The State of Maryland has a 25 foot buffer requirement to either side of the stream, within which no construction activities can take place. Harford County has more restrictive buffer protection requirements. Within the Critical Area (defined as 1000 feet landward of tidal waters) there is a 100 foot minimum buffer to streams. Outside the Critical Area, the buffer is referred to as the Natural Resources District, or NRD. The NRD ranges from 75 to 150 feet, with special consideration given to wetlands, steep slopes and floodplains.

If you feel that you need to conduct an activity in or near a stream that might need a permit, please contact Harford County Department of Planning and Zoning at (410)638-3103 or Department of Public Works at (410)638- 3545 and explain your situation. Someone will be glad to assist you. You can also contact the Maryland Department of the Environment, Water Resources Administration at (410)631-3510 or visit their website at www.mde.state.md.us.

The health of streams with regard to water contact is another concern. Streams vary in quality depending upon influences that occur both adjacent and upstream. If there are leaking septic systems, sewers, or manure sources close to creeks, they may become contaminated with waste or bacteria. The State of Maryland maintains a water contact standard of no more than 100 coliform bacteria per 100 milliliters of water and although streams in Harford County are generally of good to fair quality, they seldom meet this standard during summer months. This may be due to bird droppings, pet waste, runoff from streets or any of the aforementioned sources. While most local streams are probably safe to walk and play in, swimming is probably not a good idea. If you have questions about the health of a stream with regard to bacteria levels or other sources of contamination, please contact the Harford County Health Department at (410)638-8400.

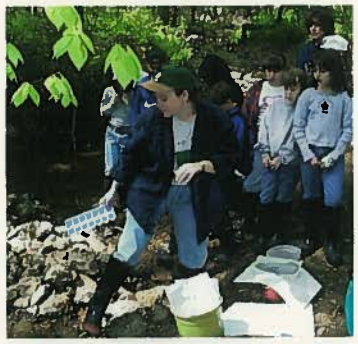
A HEALTHY BUFFER HAS AN ABUNDANCEOF NATIVE VEGETATION.

STREAMSIDE NEIGHBOR

Aquatic Insects

INDICATORS OF STREAM HEALTH

You may be wondering how to determine the health of the stream in your neighborhood. The types of fish found in the stream could be used, as many species are sensitive to pollution. Some, like trout, are sensitive to warm temperatures. The problem with fish is that different species are sensitive to different factors, so determining why they are present or not can be a trying activity. Also, they are often hard to catch, and netting them requires a permit. Chemical monitoring can be complex and expensive. The trick is to find something in the stream that is easy to locate. We need something that will tell us how healthy or how degraded the stream is, that will be easy to interpret. As it turns out, aquatic insects and other invertebrates fit the bill quite nicely. They spend all or most of their lives in the water, and are therefore very much affected by that which constantly surrounds them. Many of the larval insects (like mayflies) leave the water and become adults for only few days, when they reproduce. They then return to the water to lay their eggs. These organisms can be found living on and amongst the rocks in any stream. You can locate them by vigorously disturbing the bed of a stream with your feet, while somebody downstream holds a kick-seine (a small-meshed net) to capture any of the "bugs" that are dislodged from the rocks. Additionally, the tops and bottoms of rocks should be inspected. The types of invertebrates on the following lists will provide an indication of the health of the stream.



STUDENTS AT ABINGDON ELEMENTARY LEARN TO COLLECT AND IDENTIFY INSECTS IN A STREAM.

Indicators of Good Water Quality:

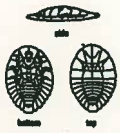
STONEFLY LARVAE - 6 legs, with hooked ends, 2 hairlike tails, no gills on abdomen, 1/2" -11/2" in length.

MAYFLY LARVAE - 6 legs, hooked at ends, 2 or 3 hairlike tails, fine gills along sides of abdomen, 1/4" - 1" in length.

DOBSONFLY LARVAE (hellgrammites) - 6 legs and pinching jaws. Dark colored with gill tufts along the sides of the abdomen, 3/4" - 4". A fairly stout animal that is a favorite bait of the trout fisherman.

CADDISFLY LARVAE - these live in cases on rocks that they make out of leaves, sand or other debris. Their thorax and head look small in comparison to their large abdomens, which are protected by the cases. Up to 1" in length, often with gill tufts on end of abdomen.

WATER PENNIES - these beetle larvae look like flattened saucers and have their appendages covered by a carapace that protects them.



GILLED SNAILS - spiral shaped snails that have a thin, hard cover (the operculum) over the opening in the shell. Bottom of shell opens to the right.

Organisms that Inhabit Water of Fair Quality (these are somewhat pollution tolerant)

CRAYFISH - resemble small lobsters, often dig holes in bank and pile mud up around the sides.

SCUDS - many legs, higher than wide, look like small shrimp, white to grey color, 1/4" long.

DRAGON FLY LARVAE - these are bizarre little creatures when viewed up close. They have a hinged jaw that unfolds like an arm with pincer on the ends to capture prey. They have large eyes and can be long or squat, 1/2" to 2".

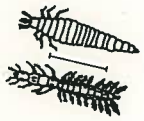
Organisms that Inhabit Water of Fair Quality continued

DAMSELFLY LARVAE - look like smaller version of dragonfly larvae, but with three oarlike tails at the end of the abdomen, 1/2' - 1".

ALDERFLY LARVAE - this looks like a smaller, thinner version of a hellgrammite, but with no gill tufts, and a terminal tail with many branches, body up to 1" long.

CRANE FLY LARVAE - plump, smooth, caterpillar-like body, with 4 fingerlike lobes on the end of the abdomen, 1/3" - 2 ".

BEETLE LARVAE - these can be variable, some with lateral gills and some smooth, but all have 6 legs and antennae, 1/4" - 1".



WATERSNIPE FLY LARVAE - light green, with a conical head, flaring to a wider body, with many caterpillar-like legs. Two pronounced, feathery gills at end of abdomen, 1/4" - 1".

CLAMS - mostly smaller than saltwater clams, with thinner shells.

Polluted Water Dwellers (when a preponderance of these organisms are found with an absence of the others, the water is degraded)

BLOODWORMS (TUBIFEX) - very thin, red worms that wave around in the water, often found in masses. Sometimes called sewage worms.

2) OTHER AQUATIC WORMS - variable, but usually thin and easily agitated.

BLACKFLY LARVAE - tail end of body is wider than head, which is black. Suction cup at tail end. Up to 1/4".

MIDGE FLY LARVAE - worm-like, segmented body, with two small legs on each side. Dark head, up to 1/4" length.

LEECH - mottled or brown, slippery body, with sucker at head end. Suck blood from both warm and cold blooded animals.

POUCH AND POND SNAILS - these have no operculum (covering) over the opening, and the shell opens to the bottom left.

OTHER SNAILS - these have no operculum, and the shells coil in one plane.

The above methods and descriptions were adapted from information provided by Save Our Streams (SOS), a volunteer group committed to improving stream quality across the state of Maryland. To learn more about the exact method of determining the health of Maryland streams, training class and publications are available from Save Our Streams. Their telephone numbers are (410)969-0084 or (800)448-5826, or visit their web site at www.saveourstreams.org and if you like you can become a stream monitor to see if the water quality is being maintained.

Aquatic Insects

- *The kinds of insects that live in a stream can tell us a lot about the health of the stream*
- *Some insects are more sensitive to pollution than others*