

1 Water Quality for Virginia Master Gardeners

- ▲ *What you should know*
- ▲ *What you can do*
- ▲ *What you should be able to teach*

2 Francis J. Reilly, Jr.

- ▲ <http://advancedmastergardener.org/water.htm>
- ▲ Frank@TheReillyGroup.net
- ▲ Webmaster@VMGA.net

3 Shameless Commercial

- ▲ *Have you joined VMGA?*
 - ▲ *The Voice of VA Master Gardeners*
 - ▲ *Promote fellowship, training & communication*
 - ▲ *State Coordinator's Endowment.*

4 Outline

- ▲ *Factors that contribute to water quality and pollution*
- ▲ *Lawn and garden activities can impact water quality*
- ▲ *Information about pond water quality issues*
- ▲ *Role of MGs in protecting water quality*
- ▲ *VCE's role in homeowner water quality*

5 Why is Water Quality Important

- ▲ ?
- ▲ ?
- ▲ ?

6 Why is Water Quality Important

- ▲ *Life is water-based*
- ▲ *Federal Law*
 - ▲ *Clean Water Act*
 - ▲ *FIFRA*
 - ▲ *Rivers and Harbors*
 - ▲ *Clean Air Act*
- ▲ *State Law*
 - ▲ *VA Constitution (Article XI sec1)*

7 Hydrologic Cycle

- ▲ *Precipitation*
- ▲ *Runoff*
- ▲ *Infiltration*
- ▲ *Evaporation*

8 Factors that affect runoff

- ▲ ?

- 9 Factors that affect runoff
- ▲ *Slope*
 - ▲ *Vegetation*
 - ▲ *Previous moisture*
 - ▲ *Infiltration rate*
- 10 Infiltration
- 11 Groundwater
- 12 Watersheds
- ▲ *What is a watershed?*
 - ▲ *What is your watershed?*
 - ▲ *How can you find out?*
- 13 Chesapeake Bay Watershed
- 14 Loudoun County Watersheds
- ▲ http://www.loudounwatershedwatch.org/subitem2_2.html
- 15 Types of surface water
- ▲ *Ephemeral streams – vernal pools*
 - ▲ *Puddles*
 - ▲ *Streams*
 - ▲ *Ponds*
 - ▲ *Lakes*
 - ▲ *Rivers*
 - ▲ *Estuaries*
 - ▲ *Oceans*
- 16 Pollution Sources
- ▲ *Point Source*
 - ▲ *Name some sources*
 - ▲ *Non-Point Source*
 - ▲ *Name some sources*
- 17 Pollution Types
- ▲ *Sediment*
 - ▲ *Nutrients*
 - ▲ *Animal Waste*
 - ▲ *Pesticides*
 - ▲ *Salts*
 - ▲ *Toxicants*
 - ▲ *Thermal*

18 **Pollution Sources**

- ▲ *Sediment*
- ▲ *Nutrients*
- ▲ *Animal Waste*
- ▲ *Pesticides*
- ▲ *Salts*
- ▲ *Toxicants*
- ▲ *Thermal*

19 **Nutrients**

- ▲ *N-P-K*
- ▲ *Sources?*
- ▲ *Air is the major source!*
- ▲ *Sinks*

20 **Which are the Biggies for us?**

- ▲ *Sediment*
- ▲ *Nutrients*
- ▲ *Animal Waste*
- ▲ *Pesticides*
- ▲ *Salts*
- ▲ *Toxicants*
- ▲ *Thermal*

21 **Chesapeake Bay Pollutants**

22 **Chesapeake Bay Pollutants**

23 **Pollution Impacts**

- ▲ *Sediment*
- ▲ *Nutrients*
- ▲ *Animal Waste*
- ▲ *Pesticides*
- ▲ *Salts*
- ▲ *Toxicants*
- ▲ *Thermal*

24 **Types of Toxicity**

- ▲ *Acute*
- ▲ *Cancer*

- ▲ *Birth Defects*
- ▲ *Endocrine Disruptors*
- ▲ *Chronic*
- ▲ *Bioaccumulation*
- ▲ *Biomagnification*

25 **Measuring Pollution**

- ▲ *Chemistry/Laboratory/Bioassay*
- ▲ *Effects*
 - ▲ *Global effects*
 - ▲ *Less fish landings – global warming*
 - ▲ *Ecological assays*
 - ▲ *Macroinvertebrate assays - surveys*
 - ▲ *Secondary effects*
 - ▲ *Low DO – Cloudy water*

26 **Chesapeake Bay - How's It Doing**

- ▲ *Lets look at some systems indicative of condition:*
 - ▲ *SAV submerged aquatic vegetation*
 - ▲ *Striped Bass*
 - ▲ *Blue crabs*
 - ▲ *Oysters*

27 **Chesapeake Bay - How's It Doing**

- ▲ *SAVIS recovering*

28 **Chesapeake Bay - How's It Doing**

- ▲ *Striped Bass*

29 **Chesapeake Bay - How's It Doing**

- ▲ *Blue Crabs*

30 **Chesapeake Bay - How's It Doing**

- ▲ *Oysters*

31 **Impacts of Pollution**

- ▲ *Toxicity*
- ▲ *Food contamination*
- ▲ *Habitat destruction*
- ▲ *Habitat degradation*
- ▲ *Cascading Effects*

32 **Habitats at risk**

- ▲ *Clear water habitats*
- ▲ *SAV*
- ▲ *Wetlands*
- ▲ *Oyster reef*

33 Water Quality
Healthy vs. Unhealthy

34 **Virginia Master Gardener Association**
VMGA is the state association of VCE-MGs
VMGA's mission is to support the VCE-MG program
VMGA is the voice of VCE-MGs

35 **VMGA - The Voice of VCE-MGs**
VMGA represents all VCE-MGs
Officers meet with VT & VCE leadership
Local units have representation in VMGA
Officers welcome input

36 Virginia Master Gardener Association, Inc.
***The State Master Gardener
Coordinator Endowment***

***Ensuring the Future
of Master Gardening in Virginia***

37 **The Role of the State Coordinator**
The size of the administrative job...
▲ *51 units across the state*
▲ *4,000+ certified VCE-MGs*
▲ *800 – 1,000 trainees each year*
(Training MG leaders, ordering and mailing Handbooks, creating & mailing certificates, maintaining hours reporting system, creating & sending newsletters, maintaining the web site & list services, resolving conflicts, managing service awards...)

38 **Beyond Administration**
▲ *Develops new training materials, improves the current ones*
▲ *Collects and disseminates impacts*
▲ *Facilitates networking*
▲ *Liaison about our needs to VCE, the College of Ag and to other colleges*
▲ *Coordinates with state and federal agencies*
▲ *Conducts Master Gardener College and Leadership Training*

39 **When the Position is Vacant**
Connection is neglected and compromised
Lack of consistent directives
Collective results weakened

40 **State Coordinator Funding**
USDA Grant

Department of Horticulture

Funds are not in jeopardy...yet

41 **Funding through an Endowment**
Master Gardener originated idea

Support from the university

\$1,000,000 endowment partially funds

More likely that VT will fund the remainder than funding a program that has no such funding

Ensures Master Gardening in perpetuity

42 **Raising \$1,000,000**
Foundations, corporations
Units
Individuals

43 **Raising \$1,000,000**
"\$50 for 5"

$\$50 \times 5 \text{ years} = \250

$\$250 \times 4,000 = \$1,000,000!!$

Identify potential donors

Food Lion, Silent Auction

44 **Current Status**
\$50K challenge grant
Silent Auction and wine tasting
Unit donations
Individual donations & pledges

45 **Contact Us**
www.VMGA.net
Pat@TheReillyGroup.net
dclose@vt.edu
mbales@vt.edu

46 **No contribution is more important than yours**

Won't you make a pledge today?

VMGA Thanks You!

47 A Brief Break

48 Impaired Waters

- ▲ *Watershed approach – 10 major tributaries*
- ▲ *Tributary Strategy – crosses political boundaries*
- ▲ *The states (and counties) adopt the Chesapeake Bay Restoration Plan*
- ▲ *Find yours <http://gisweb.deq.virginia.gov/>*

49 How can we affect
water quality?

- ▲ *How much property do you have?*
- ▲ *What is on it?*
- ▲ *What do you do to it?*

50 Multiply that by all the neighbors in your watershed

- ▲ *Add in cheating*
 - ▲ *Gasoline in the ditch – on the ground*
 - ▲ *Pesticide disposal*
- ▲ *Add in yard waste*
 - ▲ *In the ditch, taking up landfill capacity*
- ▲ *Add in doing nothing and thinking THAT is better*
 - ▲ *Erosion thermal /pollution*

51 Impervious Surfaces

- ▲ *Loss of groundwater*
- ▲ *Erosion*
- ▲ *Flashiness of flooding*
- ▲ *Contaminant transfer*
- ▲ *This is why there are stormwater utility fees – that are going up!*

52 How much impervious surface do you have?

- ▲ *1/3rd Acre ~ 14,000 sq feet*
- ▲ *House ~ 20 X 80 = 1600 square feet*
- ▲ *Drive ~ 10 X 20 = 200 Square feet*
- ▲ *Detached garage ?*
- ▲ *Husband house ?*
- ▲ *Lawn mower shed ?*
- ▲ *Pool ?*

▲ *At least 1800/14000 or almost 13%!*

53 **Impervious Surface Solutions**

- ▲ *Storm Water Structures*
- ▲ *Retain water on-site*
- ▲ *Rain gardens*
- ▲ *Slow down flow at gutters*
- ▲ *Decrease impervious surfaces percentage*

54 **Hydrograph**

55 **Use Gardening**

- ▲ *Ensure complete cover*
 - ▲ *Reduces runoff*
 - ▲ *Reduces erosion*
 - ▲ *Increases infiltration*
- ▲ *Make it healthy*
 - ▲ *Less fertilizer need*
 - ▲ *Less pesticides use*
 - ▲ *Less yard waste*
- ▲ *Use Mulch*
 - ▲ *Retains water*
 - ▲ *Keeps soil temperature more moderate*

56 **Run Off**

- ▲ *Flooding*
- ▲ *Erosion*
- ▲ *Potential pollutants*

57 **Home Damage**

58 **Puddles**

- ▲ *Mosquitoes*
- ▲ *Mud*
- ▲ *Further damage*

59 **Eroded topsoil, rills, gullies**

60

61 **How can we make residential developments
function hydrologically like natural systems?**

62 **Pervious Pavement**

- ▲ *Here is how well some of this works*
- ▲ *Here is how good some of this looks*

63 **Rain Gardens**

64 

65  **Amended Soils**

Benefits:

- ▲ *Increases soil permeability, enabling greater storage capacity and infiltration, reducing overall runoff from development site.*
- ▲ *Can effectively filter and treat pollutants.*
- ▲ *Reduces the need for extensive use of irrigation and fertilizers.*

66  **Green Roofs**

Benefits:

- ▲ *Improves a building's energy performance (both heating and cooling) by adding a thermal layer.*
- ▲ *Provides significant stormwater storage and evapotranspiration – reducing need for other SW practices on site.*
- ▲ *Improves air quality (filters large percentage of particulates in the air).*
- ▲ *Provides wildlife habitat.*
- ▲ *Increases lifespan of conventional roof (can double lifespan of roof).*

67  **Roof Top Rainwater Harvesting**

68  **Disconnect**

Benefits:

- ▲ *Retains water on site*
- ▲ *Available systems for almost any density*
- ▲ *Can be retrofitted*
- ▲ *Can help attain stormwater goals at lower cost*

69  **Splash Blocks by Myersculpture**

70  **Flow-through Planter**

71  **Moderate Cost Alternatives**

72  **Retrofitable on a neighborhood or personal scale**

73  **Comparison of Conventional and LID Site Conditions**

74  **An Be Aesthetically done – even in suburban NOVA**

- ▲ *Tree conservation*
- ▲ *Rain gardens*
- ▲ *Narrower streets*
- ▲ *Open drainage*
- ▲ *On-lot detention storage and infiltration*

75  **Water Quantity**

- ▲ *Right plant right place – resist irrigation*
- ▲ *Place plants with similar irrigation needs*
- ▲ *Time your irrigation*
 - ▲ *Summer dormancy*
 - ▲ *High winds and temperatures waste water*
- ▲ *Design gardens/lawns to save water*
 - ▲ *Odd shapes*
 - ▲ *The devil strip*

76 Pesticides

- ▲ *Only if you need them*
- ▲ *IPM*
 - ▲ *Scouting*
 - ▲ *Timing – effective control strategies*
 - ▲ *Natural controls/patience*
 - ▲ *Least intrusive approach*
 - ▲ *Safety for you and the environment*
 - ▲ *Rain – wind – sun - temperature*
- ▲ *More isn't better – or even legal*

77 Pesticides continued

- ▲ *Read the label*
- ▲ *Dispose of carefully*
- ▲ *Mix accurately*
- ▲ *Prevent spills*
- ▲ *Watch out for siphon effect!*
- ▲ *Remember you are a MG –*
 - ▲ *call Adria & use the PMG*

78 Pesticide Problems

- ▲ *Spray drift*
- ▲ *Groundwater pollution*
- ▲ *Surface water pollution*
- ▲ *Sediment transport*
 - ▲ *Adsorption*
 - ▲ *Absorption*
 - ▲ *Solution*
 - ▲ *Breakdown*

79 Fertilizer Basics

- ▲ *Use it*
- ▲ *If you need it*
- ▲ *Check to make sure*
 - ▲ *VCE soil test – sample –paperwork*
 - ▲ *Remember to pay attention in class*

80 Fertilizer Basics continued

- ▲ *Calibrate*
- ▲ *Avoid putting it on the driveway and walks*
- ▲ *Use it when time is right*
 - ▲ *Growing season for most*
 - ▲ *SON for turf*

81 Yard Waste

- ▲ *Right plant reduces trimming*
- ▲ *Right plant reduces disease*
- ▲ *Avoid planting near power lines*
- ▲ *Walks, drives, etc.*
- ▲ *Over septic and drainfields*

82 **Turf**

- ▲ *Manage pests*
 - ▲ *Crabgrass or Poa annua*
 - ▲ *Or other weeds*
- ▲ *Ensure health*
- ▲ *Mow high and mulch*
 - ▲ *>2.5inches – less than 1/3rd of height – free fertilizer.*
- ▲ *Pick the right grass*
 - ▲ *Turf-type tall fescue, bluegrass, rye – mix.*

83 **Turf continued**

- ▲ *Aerify*
 - ▲ *Core aerator*
 - ▲ *Not spike*
- ▲ *Overseed*
 - ▲ *Every year is best*
 - ▲ *Every lawn needs it*
- ▲ *Water properly or not at all.*

84 **The Pond Part**

- ▲ *Farm ponds*
- ▲ *Natural ponds*
- ▲ *Storm Water features*
- ▲ *Ornamental Water Features*

85 **How does a Pond Work**

- ▲ *Water*
- ▲ *Sediment*
- ▲ *Air*

86 **Water Quality**

- ▲ *Nutrients the most important issue*
- ▲ *The source of most problems you hear*

87 **Algae Growth**

- ▲ *Water*
- ▲ *Nutrients*
- ▲ *Light*
- ▲ *The right temperature*

88 **Algae Control**

- ▲ *Remove one of:*
 - ▲ *Water*
 - ▲ *Nutrients*
 - ▲ *Light*
 - ▲ *The right temperature*

89 **Aquatic Weeds**

- ▲ *Navigational problem*
- ▲ *Unightly*
- ▲ *Odors*

90 **Aquatic Weed Control**

- ▲ *Advise nutrient reduction*
- ▲ *Carp – permit required*
- ▲ *Winter dredging – permit probably required*
- ▲ *Chemical control – requires a license (category 5a) – don't make Recommendations*

91 **Questions**

- ▲ *Turtles/snakes and birds Oh My!*
- ▲ *Green water*
- ▲ *Cloudy water*
- ▲ *Leaks*
- ▲ *Skeeters*

92 **Animals**

- ▲ *Visitors*
 - ▲ *Design changes – elevation*
 - ▲ *Netting*
 - ▲ *Reality check*
- ▲ *snails*
 - ▲ *examine your plant material*
- ▲ *Fish*
 - ▲ *goldfish koi others*
 - ▲ *be careful with exotic species*

93 **Green Water**

- ▲ *Emergency*
 - ▲ *Chemical flocculation*
 - ▲ *Dyes*
 - ▲ *Poisons*
- ▲ *Patience*
- ▲ *Long Term*
 - ▲ *Better practices*
- ▲ *Resignation-Adaptation*
 - ▲ *Give up or change the design*
 - ▲ *Planting*

94 **Cloudy Water**

- ▲ *Emergency*
 - ▲ *Filters*
 - ▲ *Flocculation*

▲ *Patience*

▲ *Planting*

95 **Skeeters**

▲ *Moving water*

▲ *Fish*

▲ *Dunks*

96 **Chemical Recommendations**

▲ *Don't make any!*

▲ *Most all aquatic formulations require applicators permit*

▲ *Recommend that they ask to see the permit – Category 5A*

97 **VCE's role in homeowner water quality**

▲ *Liaison with DCR*

▲ *Soil & Water Conservation District*

▲ *Many farm programs – CREP etc.*

▲ *MG programs like*

▲ *Lawn Knowers*

▲ *Great Scapes*

▲ *Water Stewards*

▲ *You – the front line*