

1 Water Quality for Virginia Master Gardeners

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

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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 Types of surface water

- ▲ *Ephemeral streams – vernal pools*
- ▲ *Puddles*
- ▲ *Streams*
- ▲ *Ponds*
- ▲ *Lakes*
- ▲ *Rivers*
- ▲ *Estuaries*
- ▲ *Oceans*

15 Pollution Sources

- ▲ *Point Source*
 - ▲ *Name some sources*
- ▲ *Non-Point Source*
 - ▲ *Name some sources*

16 Pollution Types

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

17 Pollution Sources

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- ▲ *Toxicants*
- ▲ *Thermal*

18 Nutrients

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

19 Which are the Biggies for us?

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

20 Chesapeake Bay Pollutants

21 Chesapeake Bay Pollutants

22 Pollution Impacts

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

23 Types of Toxicity

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

24 **Measuring Pollution**

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

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

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

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

- ▲ *SAV IS recovering*

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

- ▲ *Striped Bass*

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

- ▲ *Blue Crabs*

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

- ▲ *Oysters*

30 **Impacts of Pollution**

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

- 31 **Habitats at risk**
- ▲ *Clear water habitats*
 - ▲ *SAV*
 - ▲ *Wetlands*
 - ▲ *Oyster reef*
- 32 **Chesapeake Bay Program**
- ▲ *Handout*
 - ▲ *Healthy System*
 - ▲ *Unhealthy System*
- 33 **A Brief Break**
- 34 **Impaired Waters**
- ▲ *Watershed approach – 10 major tributaries*
 - ▲ *Tributary Strategy – crosses political boundaries*
 - ▲ *The states (and counties) adopt the Chesapeake Bay Restoration Plan*
- 35 **How can we affect water quality?**
- ▲ *How much property do you have?*
 - ▲ *What is on it?*
 - ▲ *What do you do to it?*
- 36 **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*
- 37 **Impervious Surfaces**
- ▲ *Loss of groundwater*
 - ▲ *Erosion*
 - ▲ *Flashiness of flooding*
 - ▲ *Contaminant transfer*
 - ▲ *This is why there are stormwater utility fees – that are going up!*
- 38 **Impervious Surface Solutions**
- ▲ *Storm Water Structures*
 - ▲ *Retain water on-site*

- ▲ *Rain gardens*
- ▲ *Slow down flow at gutters*
- ▲ *Decrease impervious surfaces percentage*

39 **Master Gardener Opportunity!**

- ▲ *Storm Water Education Program*
- ▲ *Master Gardeners and staff are prepared to educate through two methods:*
 - ▲ *Site visits & Presentations – all free*
- ▲ *If you know of a potential client, please contact Paige Thacker at 703.792.4671*

40 **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*

41 **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*

42 **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*

43 **Pesticides continued**

- ▲ *Read the label*
- ▲ *Dispose of carefully*
- ▲ *Mix accurately*

- ▲ *Prevent spills*
- ▲ *Watch out for siphon effect!*
- ▲ *Remember you are a MG –*
 - ▲ *call Paige & use the PMG*

44 **Pesticide Problems**

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

45 **Fertilizer Basics**

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

46 **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*

47 **Yard Waste**

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

48 **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.*

49 **Turf continued**

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

50 **The Pond Part**

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

51 **How does a Pond Work**

- ▲ *Water*
- ▲ *Sediment*
- ▲ *Air*

52 **Water Quality**

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

53 **Algae Growth**

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

54 **Algae Control**

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

55 **Aquatic Weeds**

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

- 56 **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*
- 57 **The Spring Pond**
- ▲ *Water warms*
 - ▲ *Nutrients released*
 - ▲ *Spring algae or diatom blooms*
 - ▲ *Most pond calls*
- 58 **The Summer Pond**
- ▲ *Warm water*
 - ▲ *Stratification*
 - ▲ *Nitrogen flux*
 - ▲ *Pea soup and clouds don't mix*
- 59 **The Fall Pond**
- ▲ *Cooling water*
 - ▲ *De-stratification*
 - ▲ *Turn-over*
- 60 **The Winter pond**
- ▲ *Cold water*
 - ▲ *Watch out for external plumbing/or drainage problems*
 - ▲ *Never skate in Virginia*
- 61 **Questions**
- ▲ *Turtles/snakes and birds Oh My!*
 - ▲ *Green water*
 - ▲ *Cloudy water*
 - ▲ *Leaks*
 - ▲ *Skeeters*
- 62 **Animals**
- ▲ *Visitors*
 - ▲ *Design changes – elevation*
 - ▲ *Netting*
 - ▲ *Reality check*
 - ▲ *snails*
 - ▲ *examine your plant material*

- ▲ *Fish*
 - ▲ *goldfish koi others*
 - ▲ *be careful with exotic species*

63 **Green Water**

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

64 **Cloudy Water**

- ▲ *Emergency*
 - ▲ *Filters*
 - ▲ *Flocculation*
- ▲ *Patience*
- ▲ *Planting*

65 **chores**

- ▲ *Spring*
 - ▲ *Dredging*
 - ▲ *Replanting*
 - ▲ *Pest Control*
 - ▲ *Population Control*

66 **chores**

- ▲ *Summer*
 - ▲ *Algae Control*
 - ▲ *Mosquito Control*
 - ▲ *Filter Maintenance*
 - ▲ *Fertilization*
 - ▲ *Population Control*
 - ▲ *Plant Clean-up*

67 **chores**

- ▲ *Fall*
 - ▲ *Leaf Control/removal*
 - ▲ *Filter Maintenance*
 - ▲ *Population Control*
 - ▲ *Stop Feeding*

68 **chores**

- ▲ *Winter*
 - ▲ *Draw down*

- ▲ *Noxious weed removal*
- ▲ *Dredging*
 - ▲ *Careful with spoils placement*
 - ▲ *Don't poke any holes*
- ▲ *Fore Bay cleanup & Dredging for Storm Water structures*

69 **Garden Pond Water Quality**

- ▲ *Aging and/or treatment*
 - ▲ *chlorine in tap water*
 - ▲ *water temperature of well water*
- ▲ *Filters*
- ▲ *Selection of plants – include:*
 - ▲ *floating – submerged – emergent*
- ▲ *Animal overpopulation*

70 **Skeeters**

- ▲ *Moving water*
- ▲ *Fish*
- ▲ *Dunks*

71 **Chemical Recommendations**

- ▲ *Don't make any!*
- ▲ *Most all aquatic formulations require applicators permit*
- ▲ *Recommend that they ask to see the permit – Category 5A*

72 **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*