

Water Quality Friendly Gardening

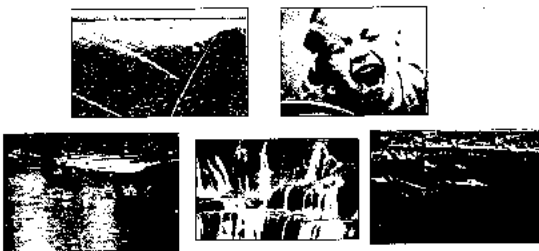
Jacqueline Farn
Natural Resource Specialist
Oregon Dept. of Environmental Quality



Topics

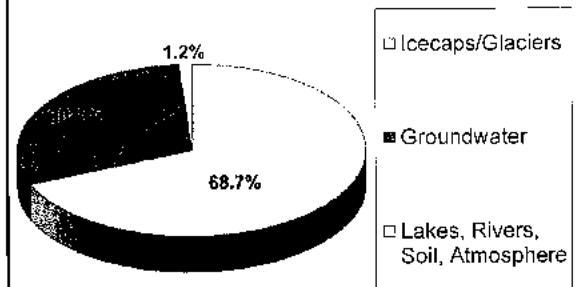
- Groundwater and Surface Water Concepts
- How Does Contamination Occur?
- How Can Gardeners Help?
 - Water management
 - Soil nutrient retention
 - Fertilizer and pesticide practices
 - Streamside practices
- Other topics (time allowing):
 - Wells and septic systems

Why is Protecting Water Quality So Important?

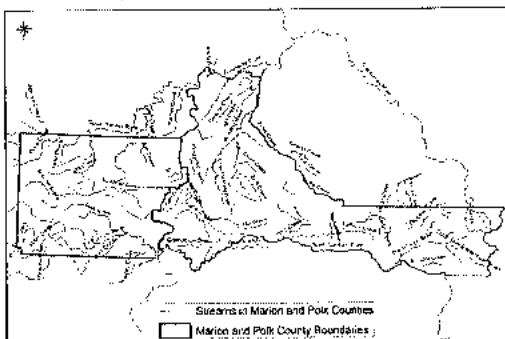


And clean-up can be costly and difficult

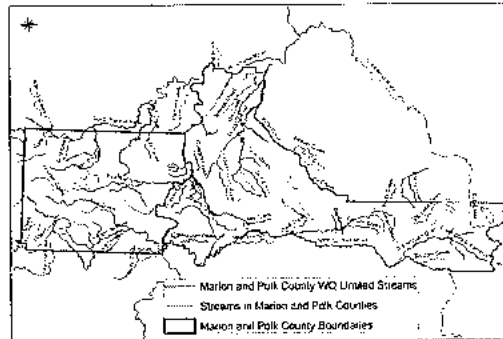
Global Freshwater Resources (< 3% of All Water on Planet!)



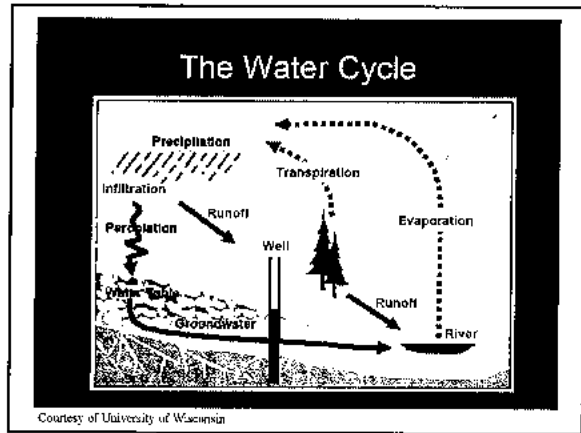
Waterways in Marion and Polk Counties and Vicinity



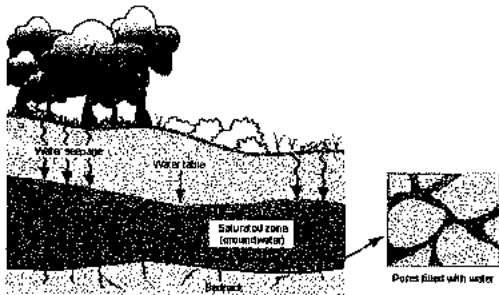
Impaired Waterways in Marion and Polk Counties and Vicinity



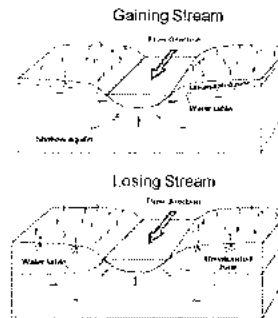
Water Quality – Key Concepts



What Exactly Is Groundwater?



Connections Between Surface Water and Groundwater



- In our region, most streams receive a portion of their flow from groundwater
- Pollutants can travel between aquifers and streams—direction depends on water table

USGS Circular 1139

How Does Water Get Contaminated?

- Leaching
(*nitrate, some pesticides*)
 - Water soluble pollutants
 - Permeable soil and underlying geology
- Runoff and erosion
(*soil, nutrients, pesticides*)
 - Stormwater / flood events
 - Vegetation/root removal
 - Clay soils
 - Steep slopes



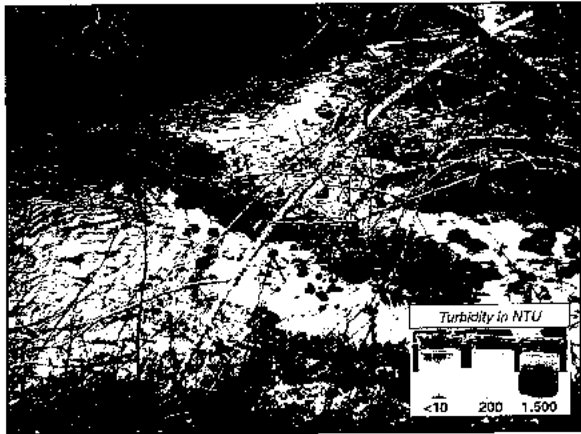
What Caused these Algae Blooms?



Green Algae Bloom
Hunter Creek Estuary, Curry
County

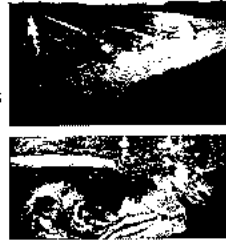


Toxic Algae Bloom
Siltcoos Lake, Lane County

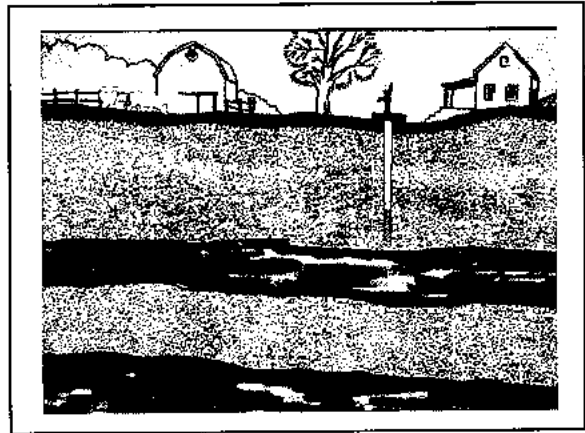
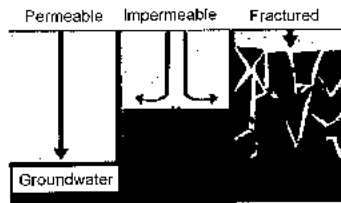


Factors that Affect Movement of Contaminants

- Soil type/texture (refer to soil surveys!)
- Permeability
- Porosity
- Topography
- Site-specific conditions
- Irrigation practices
- Precipitation
- Vegetation



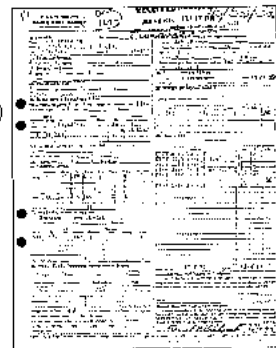
Subsurface Geology Affects Movement of Water and Contaminants to Aquifers



What's in a Well Log?

- Age and depth of well
- Type of aquifer (confined or unconfined)
- Geology of subsurface

Database Maintained by Oregon Water Resources Department



http://apps.wrd.state.or.us/apps/gw/well_log/

Water Resources Department

menu

Well Log Query

Township: South
 Range: West

Well Log:
 Well Tag:
 Completed Date: to
 Received Date: to
 County:
 Bonded License #:
 Owner Last Name:
 Company Name:
 Computed Depth:
 Taxlot:
 Type of Log:

SCHEDULE									
6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25
26	27	28	29	30	31	32	33	34	35
36	37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54	55
56	57	58	59	60	61	62	63	64	65
66	67	68	69	70	71	72	73	74	75
76	77	78	79	80	81	82	83	84	85
86	87	88	89	90	91	92	93	94	95
96	97	98	99	100	101	102	103	104	105

Records per Page: 10
 Records to Display: 100

Management Practices to Improve Water Quality

Hydrology BEFORE Development

Evapotranspiration: 40 – 50%
 Surface Runoff: < 1%
 Interflow: 20 – 30%
 Infiltration: 10 – 40%

LID Technical Guidance Manual for Puget Sound 2005

Hydrology AFTER Development

Evapotranspiration: approx. 25%
 Surface Runoff: approx. 30%
 Interflow: 0 – 30%
 Infiltration: approx. 15%

LID Technical Guidance Manual for Puget Sound 2005

Creative Treatments to Increase Recharge and Filtration

Photos from City of Portland Stormwater Management Manual

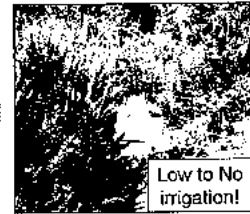
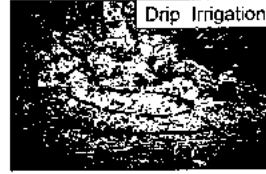
Rain Gardens and Bioswales

- Filtration/purification of water
- Recharging aquifers
- Flood prevention
- Beneficial insect habitat
- Attractive native plants to select from!
- Easy to maintain if installed properly

Bioswale at BRING Recycling



Irrigation Practices Make a Difference!



Rainwater Catchment

- 1" of rain on a 1,000 square foot roof = 620 gallons!
- Reduces runoff, erosion, and pressure on water supplies
- Beneficial uses include irrigation, in-home use, livestock, fire protection



Photo credit: Jackson SWCD

Small Group Exercise

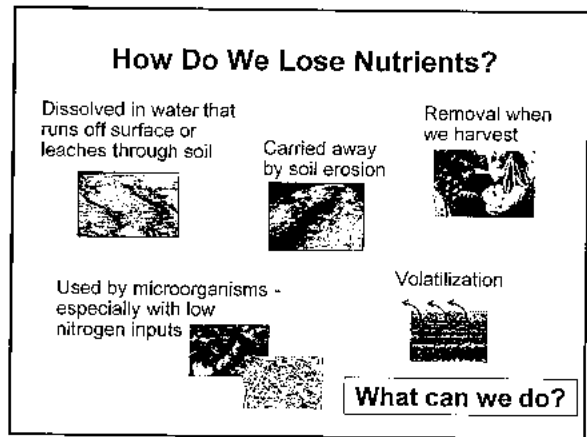
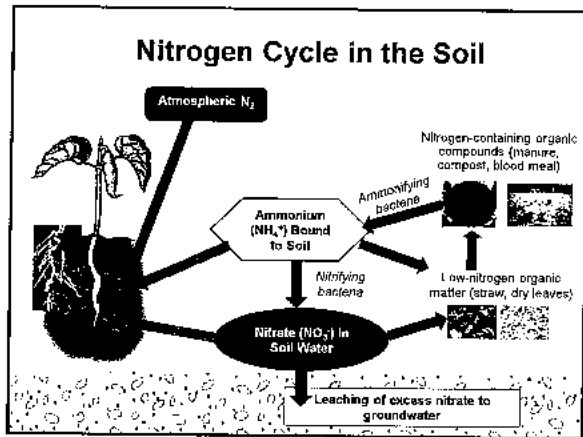
Take 10" to conduct a water quality assessment of your team's photo !!

- 1) What water related problem(s) do you see?
- 2) What do you recommend?

Nutrient Management and Water Quality

Important Plant Nutrients Found in Soil Water

- Iron
- Manganese
- Copper
- Sulfur
- Nitrate
- Phosphorus
- Potassium
- Calcium
- Magnesium
- Molybdenum
- and others!



Add Decomposed Organic Matter!

- Enhances moisture-holding capacity, percolation and infiltration
- Holds & releases important nutrients
- Makes soil easier to cultivate
- Provides habitat for beneficial organisms

The diagram shows a central circle labeled **HUMUS AND CLAY (many negatively charged sites)**. Surrounding it are various ions: K^+ , Ca^{2+} , Mg^{2+} , Al^{3+} , NH_4^+ , and H^+ . The text "and..." is also present.

More Tips to Prevent Nutrient Loss

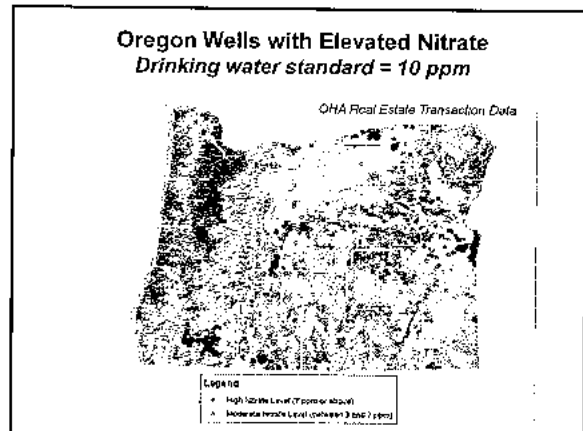
- Intercrop with legumes
- Use slower release fertilizer
- Avoid applications in fall/winter
- Consider seasonal needs—plan ahead (e.g. cover crops, leaves)
- Water deeply with drip irrigation
- Minimize paved and compacted surfaces

Area in Southern Willamette Valley with High Nitrate in Drinking Water Wells

Contributing Sources:

- Fertilizer
- Animal waste
- Septic systems

The map shows the **Groundwater Management Area** in the Southern Willamette Valley, including cities like Junction City, Madras, and Clatskanie. A legend indicates high nitrate levels.



Testing Well Water for Nitrate

- **Divide into groups of 3 or 4**
- **Each group should have:**
 - 1 nitrate test kit
 - 1 or 2 well water samples
 - Instructions for conducting the test
 - If needed: cup with tap water to clean syringe and cup for wastewater

Interpreting Nitrate Screening Results

- Nitrate in groundwater above 3 parts per million (ppm) is likely human-caused.
- Drinking water standard = 10 ppm to reduce risk of "blue-baby" syndrome (low oxygen condition)
- Some other illnesses may be correlated with nitrate levels below the current standard.
- Nitrate in groundwater may indicate presence of other contaminants.

Pesticide Use and Water Quality

Before Using Pesticides...

Identify problem...



Photos courtesy of University of Nebraska



Is it REALLY a pest?



Field Scouting can provide valuable insights!



Pesticides in U.S. Waterways

More than half of streams sampled by USGS contained pesticides at concentrations above levels that support aquatic life.



Low concentrations detected in groundwater, but little is known about synergistic effects.

Pesticides Commonly Found in U.S. Streams and Groundwater (summarized from USGS Circular 1291)

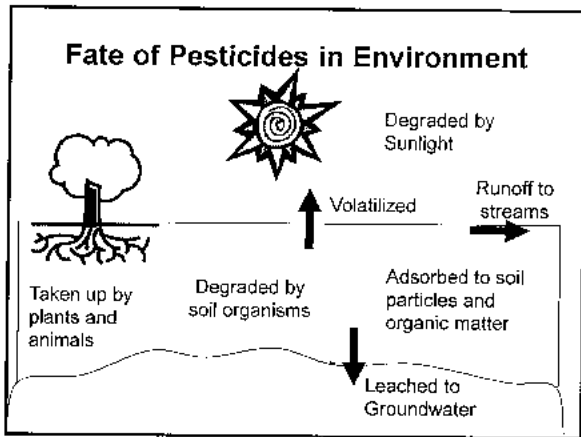
Streams

- Atrazine
- Deethylatrazine
- Metolachlor
- Simazine
- Prometon
- Diazinon*
- Carbaryl*

Groundwater

- Atrazine
- Deethylatrazine
- Simazine
- Prometon
- Metolachlor
- Tebuthiuron

* Insecticides



Water Quality Considerations for Pesticide Products

- Is it water soluble?
- How easily will it adsorb to soil particles?
- On what type of soil and terrain will it be applied?
- How toxic is it to humans and wildlife?
- How persistent is it? (half-life)

FIPRONIL
GENERAL FACT SHEET

What is fipronil?
Fipronil is a broad spectrum insecticide that disrupts the central nervous system of insects. It is effective against a wide range of insects, including beet beetles, caterpillars, and other pests. Fipronil is available in various formulations, including granules, wettable powders, and emulsions.

What are some products that contain fipronil?
Fipronil is used in a variety of agricultural products, including corn rootworm, soybean beet beetles, and other pests. It is also used in residential and commercial settings for pest control.

How does fipronil work?
Fipronil works by blocking the GABA-gated chloride channels in the central nervous system of insects, which causes paralysis and death.

How is fipronil applied to crops?
Fipronil is applied to crops as a granular or emulsified formulation. It is typically applied to the soil or directly to the plants.

National Pesticide Information Center

- Science-based info about pesticides
- Partnership between OSU and EPA
- E-mail: npic@ace.orst.edu
- Phone: (800) 858-7378

Pesticide Reduction Case Study Lower Neal Creek (Hood River Basin)

Hood River Grower-Shipper Association
OSU Extension
Department of Environmental Quality

Unsprayed Vegetated Buffers

- Reduces water pollution by filtering
- Reduces potential for drift
- Provides habitat for beneficial insects

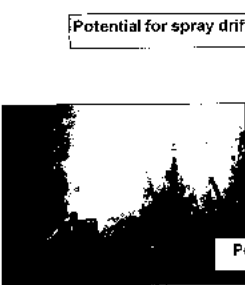
Hood River Grower-Shipper Association – Best Management Practices Project

Planting and Maintaining Cover Crops

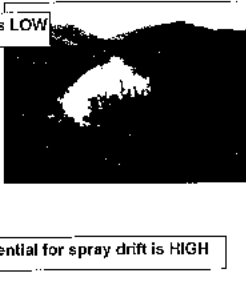
- Increases water infiltration / decreases runoff
- Slows water movement

Hood River Grower-Shipper Association – Best Management Practices Project

Avoiding Spray Drift

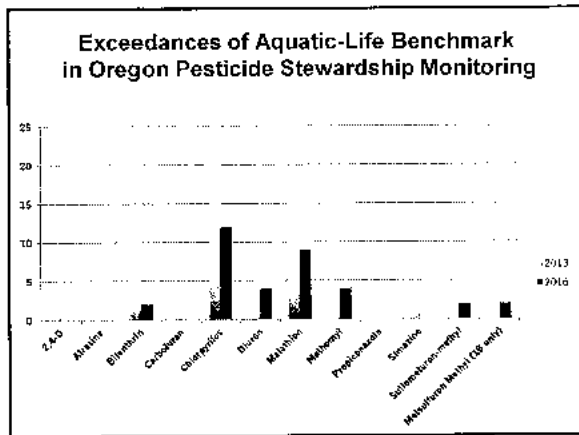
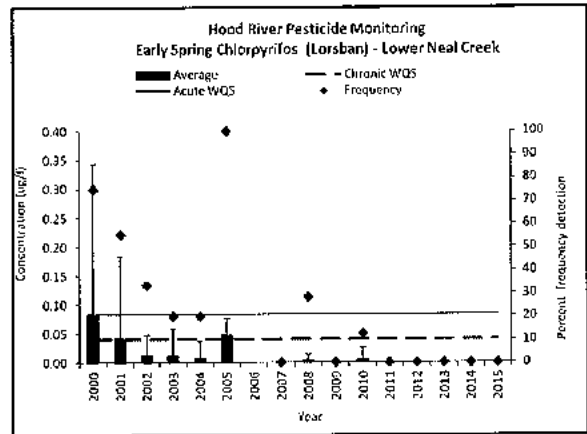


Potential for spray drift is LOW

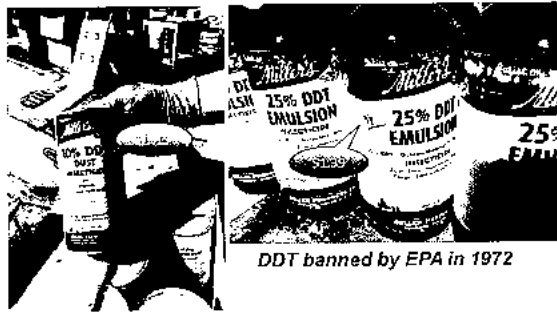


Potential for spray drift is HIGH

Recommendations from:
Hood River Grower-Shipper Association – Best Management Practices Project

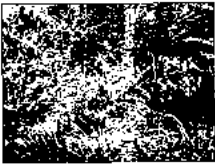



Recent Pesticide Collection Event **10,585 lbs. Collected!**



DDT banned by EPA in 1972

Pesticide Free Landscapes

Photos Courtesy of
Washington Toxics Coalition

Tips for Streamside Gardeners



Photo Courtesy: OSU Extension

Healthy Riparian Areas



Riparian restoration in progress, Amazon Creek

- Shade cools water
- Vegetation slows water; allows time for infiltration, breakdown of pollutants
- Habitat for beneficial insects and wildlife

- Streambank roots control erosion and reduce sediment, benefiting aquatic life



Restoration of streambank
Photo Credit: Gwy Bethrup

Why all the Talk about Native Plants?

- Typically require less care and fewer chemicals
- Encourage beneficial insects (natural pest control!)
- Supply food for wildlife for longer periods
- Promote biodiversity
- Reduce habitat loss and waterway degradation



Riparian Invasives & Exotics: Some (but not all) of the Culprits!



Himalayan
Blackberry
EPA



Reed Canarygrass
EPA



Japanese
Knotweed
Glenn Miller, ODA



Yellow Flag Iris
J.S. Peterson, NRCS

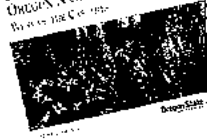


Butterfly Bush
Glenn Miller, ODA

Dive into the Resources to find Hearty Riparian Natives!



GARDENING WITH
OREGON NATIVE PLANTS
By GUY HILL, 1992



A Field Guide to
Native Plants

Partnerships to Help Landowners with Restoration

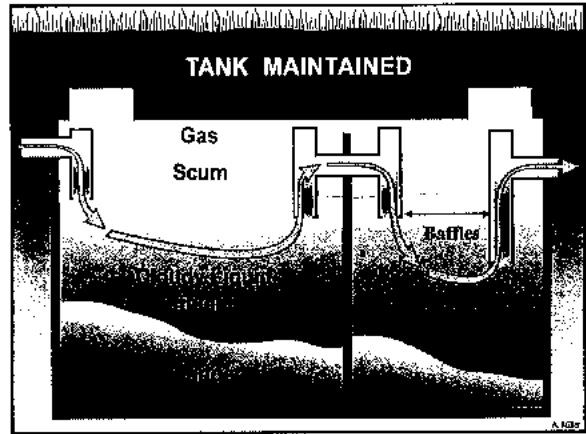
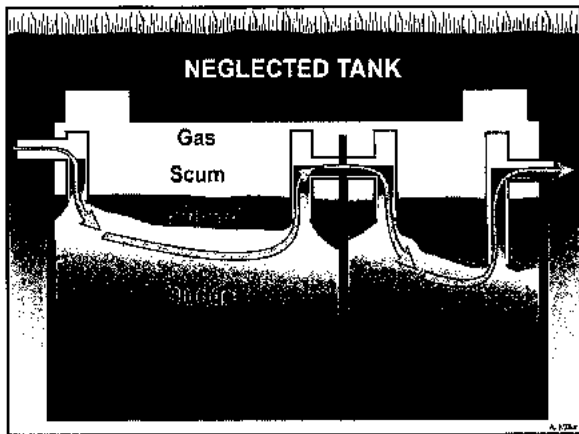
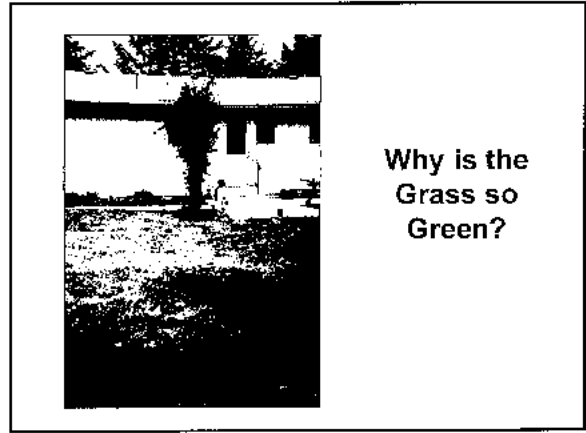
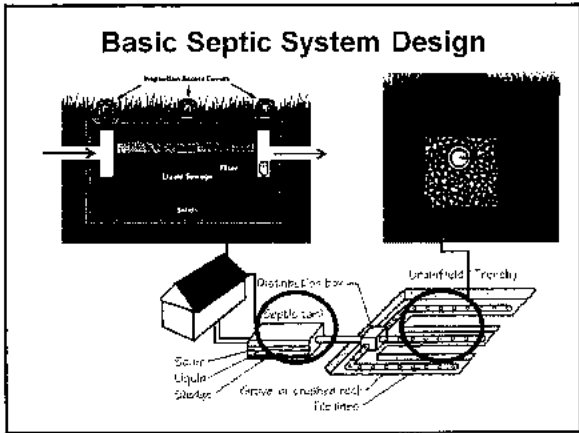
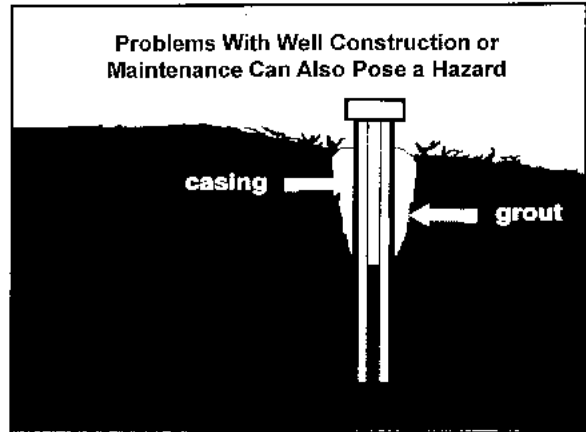
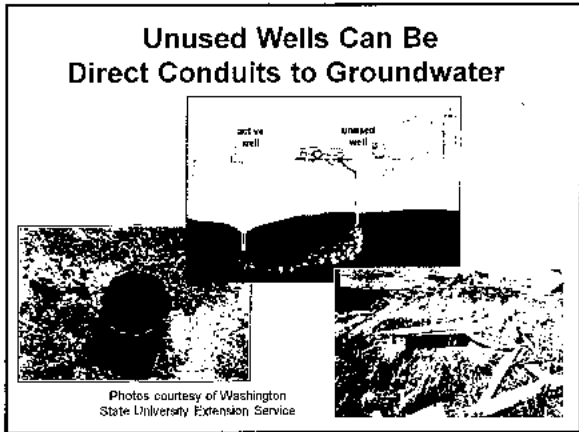
- Watershed Councils
- OSU Extension
- County Soil and Water Conservation District
- Public drinking water providers



Courtesy OSU Yamhill Extension

Special Topics

- Well Water Quality and Abandoned Wells
- Landscaping With Septic Systems



Are Trees OK Near Septic System Drainfields?

- Not recommended, especially:
 - Willow
 - Cottonwood
 - Cedar



- *How far away?*
 - Depends if it is a water seeking tree or not
 - Consider size and root spread of mature tree
 - Consider value of tree vs. value of drainfield

Septic System Management for Gardeners

- Avoid planting trees within 25' of drainfield
- Grass is preferred vegetation above drainfield
- Avoid irrigating, compacting, or disturbing soil above drainfield
- Soggy, marshy conditions? Don't buy wetland plants!!
- Dark green or brown lines? Sounds normal!
- Avoid toxic chemicals (leaching potential)



Key Points for Water Quality Protection

- Choose pest and disease-resistant cultivars
- Use plants to help manage water on site
- Fertilize and irrigate wisely
- Encourage infiltration while employing good practices to retain nutrients
- Avoid toxic and persistent chemicals...especially ones that run off or leach easily
- Enhance riparian buffers wherever possible
- Share ideas and successes!

For more information....

- DEQ – Regional Environmental Solutions
Jacqueline Fern – 686-7898
fern.jacqueline@deq.state.or.us
- GardenSmart: A Guide to Non-Invasive Plants (OSU)
- The Oregon Rain Garden Guide
<http://seagrant.oregonstate.edu/sgpubs/onlinepubs/h10001.pdf>
- OSU Integrated Plant Protection Center
(541) 737-3541 <http://ipmnet.org>