



***PLANTS, STORMWATER,
EROSION & SLOPE STABILITY***
role & benefits of native vegetation

*& management tips for
folks living on the edge*

Elliott Menashe
Greenbelt Consulting
www.greenbeltconsulting.com



SHORELINES ARE TEMPORARY PLACES
**poor management practices
can make them even
MORE temporary**



or you can make
your property
less temporary
by improving
management
practices

**vegetation
management**
is a key aspect
of good
management

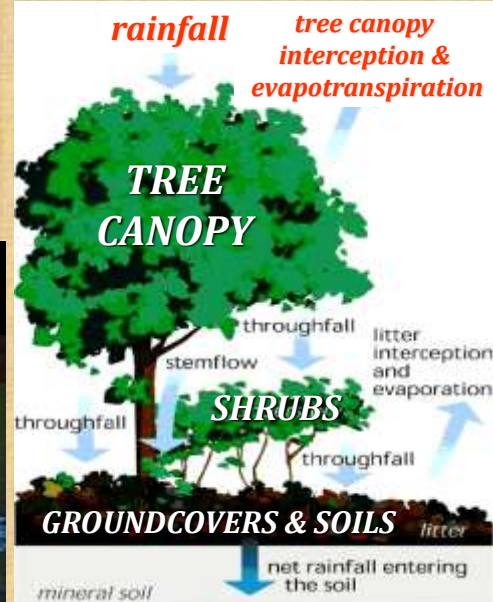


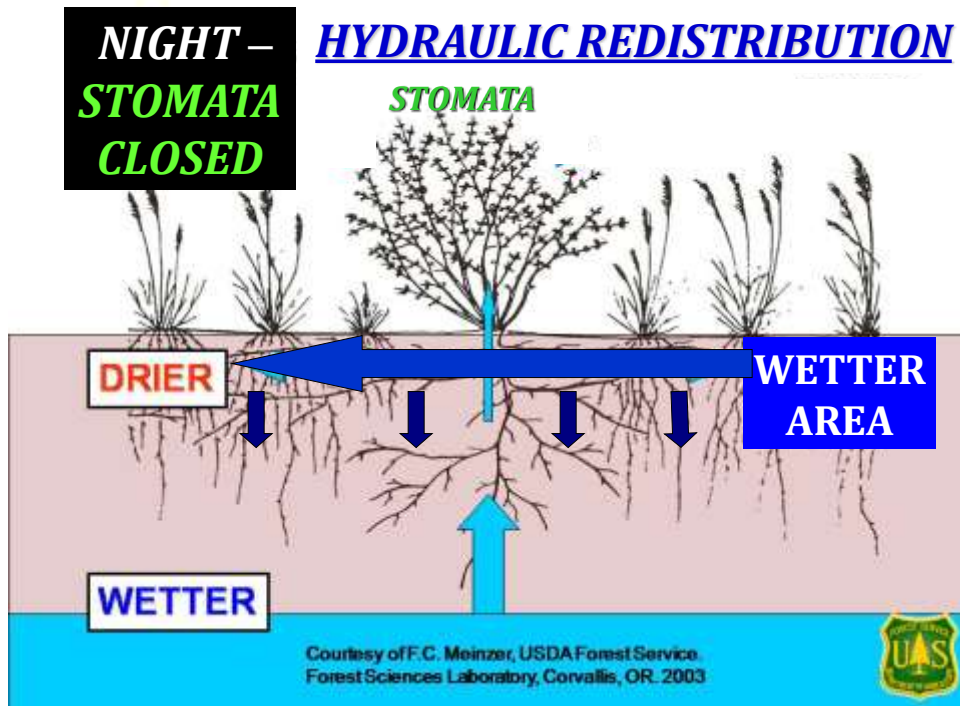
FORESTS PROTECT LAND FROM STORMWATER, EROSION & LANDSLIDES IN TWO BASIC WAYS

1. Hydrologic Benefits

- 'METERS' RAINFALL
- MINIMIZES STORMWATER
- REDUCES SURFACE WATER RUNOFF, SOIL SATURATION & FLOODING

*a more elegant solution
than stormwater retention*





2. Structural Soil Reinforcement

- **SHRUB & TREE ROOTS HOLD SOIL PARTICLES**
- **SHRUB & TREE ROOTS ANCHOR SOIL BLOCKS**
- **VEGETATION MAINTAINS SOIL STRUCTURE**
- **TREES ROOTS RESIST SHALLOW LANDSLIDES**



tree roots holding a large soil particle



GLACIAL ERRATIC, SKAGIT COUNTY

coarse tree roots permeate the soil, maintain soil structure & reinforce marginally stable slopes

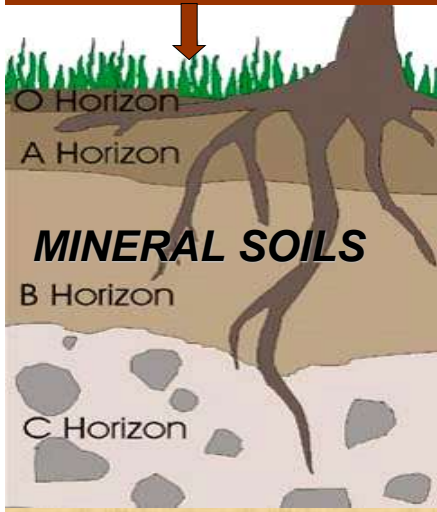


the structural engineering properties of roots are remarkable

26 yr-old Western Hemlock forest, Clallam Bay. Dr. Bob Edmonds, UW

TREE ROOTS ALONE MAY NOT DEFEND AGAINST SURFACE SOIL EROSION

**MOSS, DUFF, HUMUS &
ORGANIC-RICH SOILS**



**soil
erosion
under
tree
roots**

Benefits of Organic Forest Soils

leaf litter + duff + humus = NATURAL MULCH

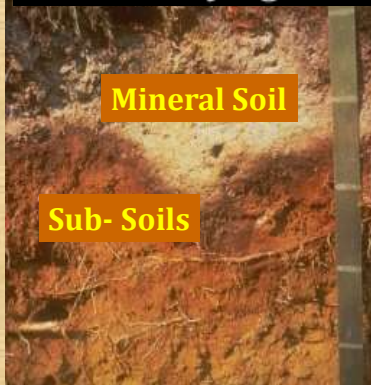


duff



leaf litter

**organic-rich soil holds water like a sponge & protects
underlying mineral soil from surface erosion**



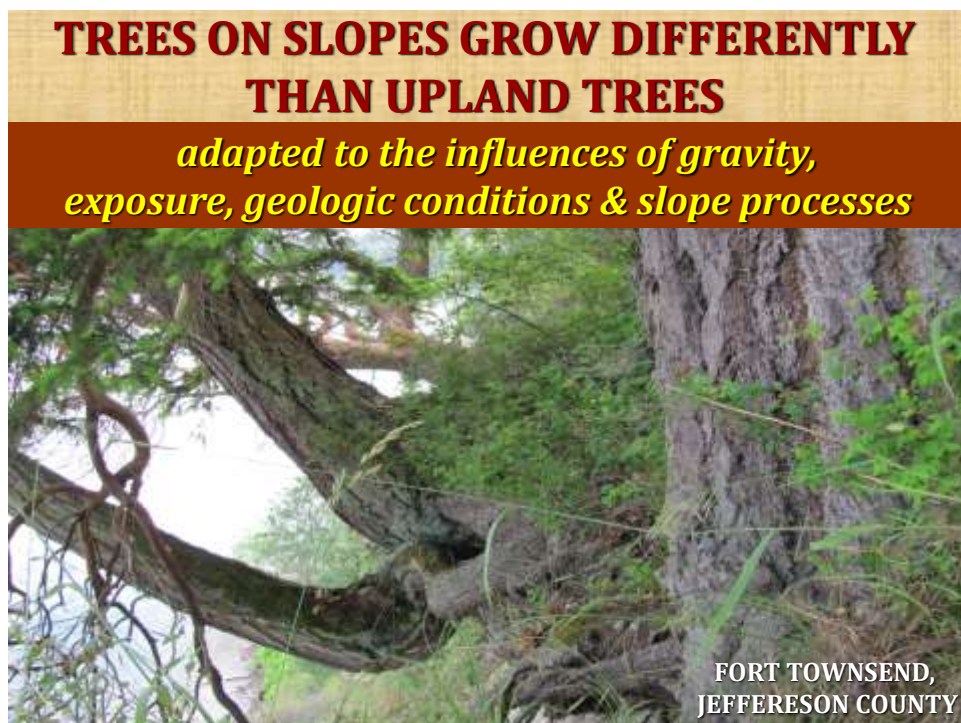
Mineral Soil

Sub- Soils



humus

duff







TREE ROOTS MAINTAIN SLOPE CREST



*lateral
roots*

*anchor
roots*

**TREE ROOTS
CAN SUPPORT
ENTIRE PLANT
COMMUNITIES**

**TREES ARREST LANDSLIDES &
HOLD SLIDE DEBRIS ON THE SLOPE**



LUMMI MARINE PARK, WHATCOM COUNTY

**LARGE DRIFTLOGS AND FALLEN TREES ON
THE BEACH BUTTRESS SLOPES**



natural bulkhead

SARATOGA PASSAGE, WHIDBEY ISLAND

TREES ADAPT TO CHANGING CONDITIONS



FOR THOUSANDS OF YEARS OLD-GROWTH SHORELINE FORESTS PROTECTED PUGET SOUND



**OLD-GROWTH SHORELINE FORESTS LOGGED BY 1870
CAUSED PROFOUND CHANGES IN FOREST COVER**



2nd-GROWTH FORESTS STILL PROVIDED BENEFITS

*less than 1% surface water
run-off from forested land*

30% run-off

*logging impacts
can be temporary*

*development impacts
are permanent*





**POOR DEVELOPMENT PRACTICES CAUSE
STORMWATER RUN-OFF & LANDSLIDES**



***IF YOU
LIVE BELOW
A STEEP SLOPE
PAY SPECIAL
ATTENTION TO
UP-SLOPE
DEVELOPMENT
& MANAGEMENT***

***the impacts
can be
DISASTROUS***



**when we build & live near the *edge*
we must keep a sense of proportion**

WHAT IS IMPORTANT ? WHAT IS NOT ?



VIEWS ARE IMPORTANT TO PEOPLE



Gig Harbor, Pierce County

*the cost
of a view
may be
too high*



BEACH ACCESS IS IMPORTANT TO PEOPLE



*but beach stairs can
cause landslides*



LAWNS ARE IMPORTANT TO PEOPLE ***lawns can also cause serious problems***



*soil saturation
& high run-off*



*compacted soil &
lawns contribute
to soil saturation,
stormwater run-off,
erosion & landslides*

CHUCANUT BAY, BELLINGHAM, WA

Slope Stability Is Important To People

but that may not be apparent until it is too late



Langley, Whidbey Island

SO WHAT CAN WE DO NOW?

***we can replace some lost functions
through improved management practices***

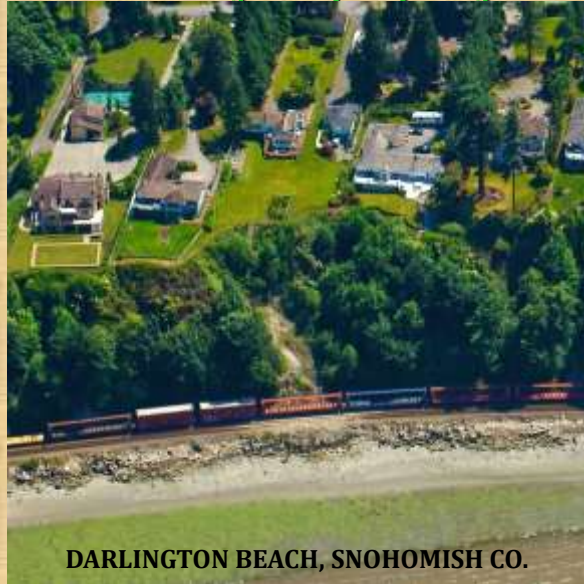


Freeland, Whidbey Island

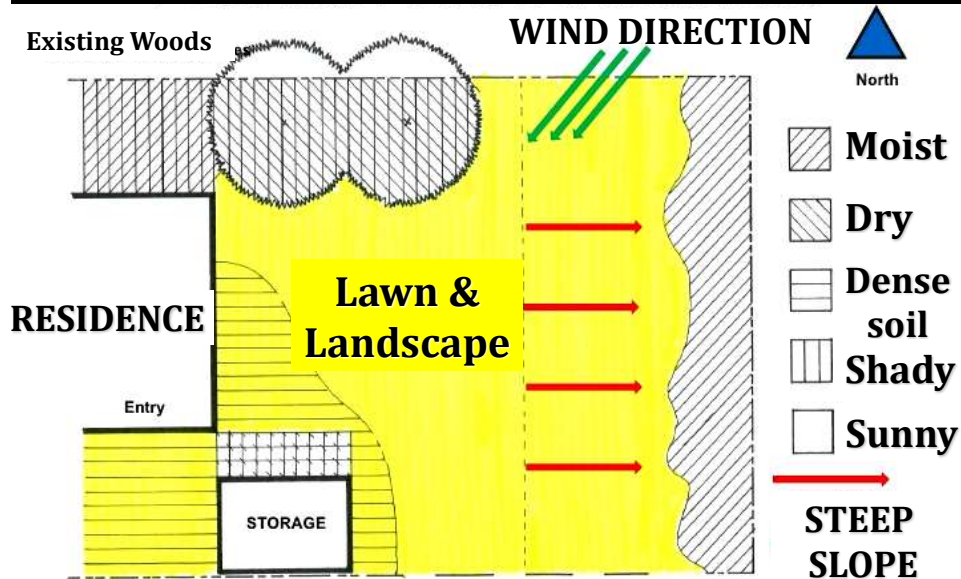
Unique Site Characteristics

- Topography
- Geology
- Soils
(unconsolidated fill?)
- Hydrology
- Drainage Patterns
- **Vegetation**
- Shore Processes
- Signs of Erosion or slope instability
- Off-Site Influences

1st thing – know your site!
evaluate your property



Map Your Property Landscape & Environmental Characteristics



CREDIT: Kathy Settevendemie and Madeline Mazursk

IDENTIFY & ASSESS POTENTIAL PROBLEMS

Upland - Slope - Shore

- stormwater?
- impervious surfaces?
- drainage control?
- soil erosion?
- hydrology?
- slope instability?
- landslides?
- wave attack?
- invasive plants?
- off-site influences?



**WHICH ISSUES
ARE THE
MOST IMPORTANT?**

SOME MANAGEMENT TIPS TO MAKE YOUR PROPERTY LESS TEMPORARY



***RETAIN TREES &
OTHER NATIVE
VEGETATION ON
UPLANDS & SLOPES***



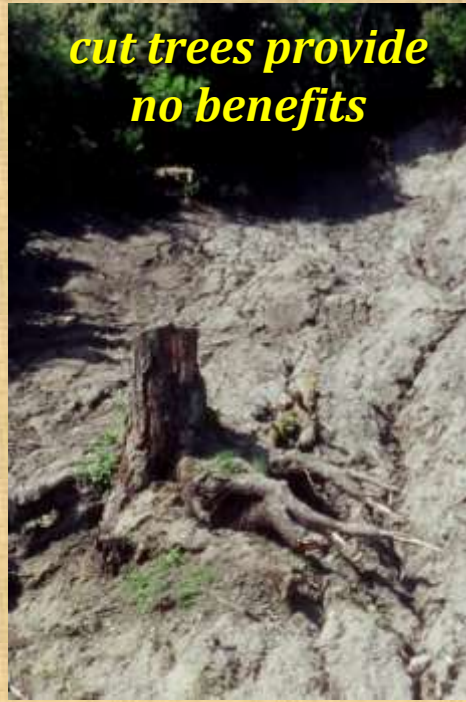
***PRESERVE & ENCOURAGE NATIVE
VEGETATION AT BASE OF MARINE SLOPES***

overhanging trees

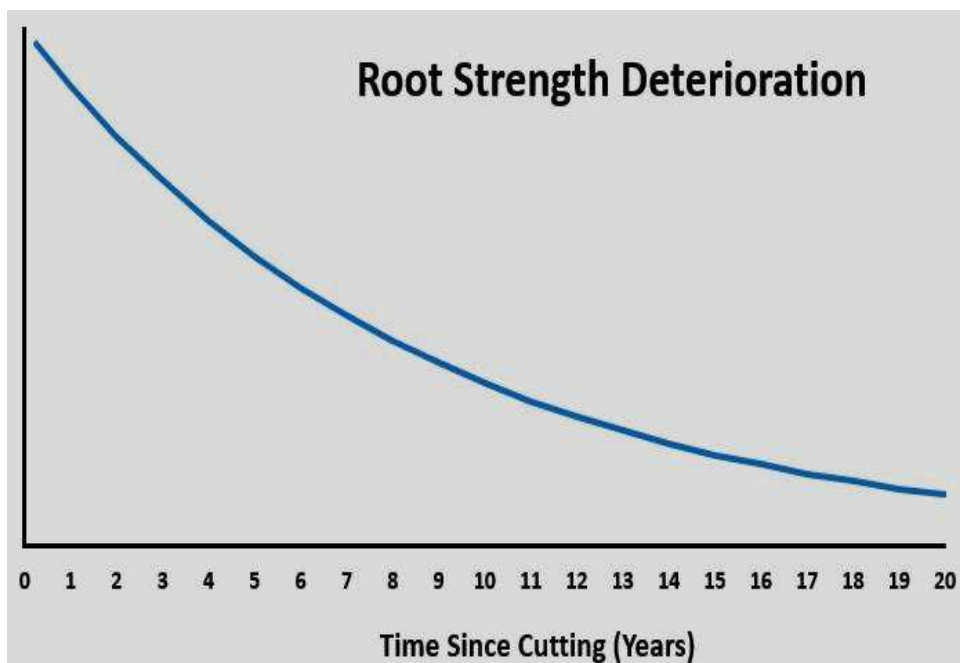


*backshore vegetation
& drift logs*

UNNECESSARY TREE CUTTING CAN CONTRIBUTE TO LANDSLIDES



*cut trees provide
no benefits*



adapted from: *Hillslope Stability and Land Use*, R. Sidle, et al, 1985

DON'T TOP TREES FOR VIEW ON STEEP SLOPES



DECIDUOUS TREES



CONIFER TREES



DECIDUOUS TREES



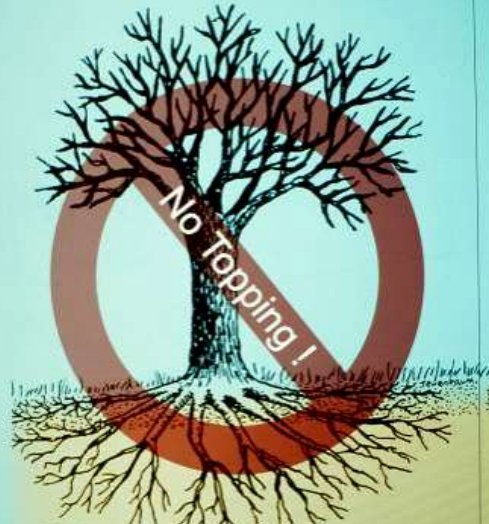
CONIFER TREES

TOPPING TREES IMPAIRS ROOTING



**TOPPING TREES
ON SLOPES
REDUCES
STABILITY**

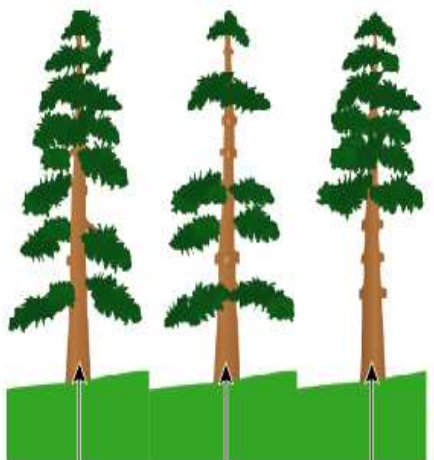
TREE TOPPING



ROOT DIE-BACK

EXPLORE ALTERNATIVES TO TOPPING

FOR IMPROVING VIEWS



WINDOWING

INTERLIMBING

SKIRTING UP

***alternative pruning
for conifers***

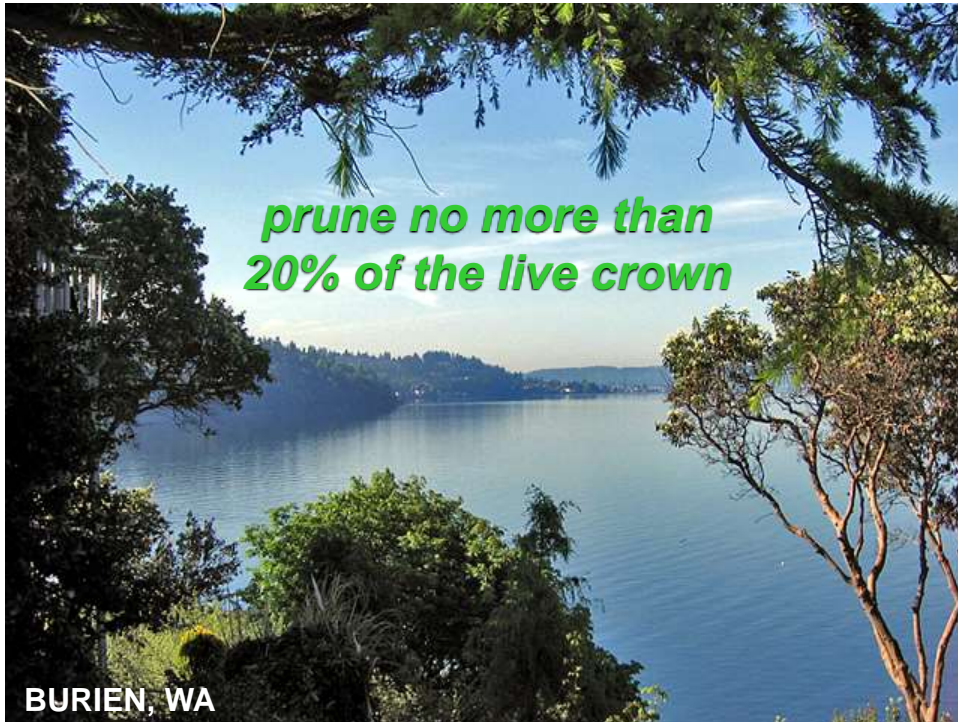


CORRECT

INCORRECT

***pruning broad-leaved
trees***





***A WELL-PRUNED TREE CAN PROVIDE
BOTH VIEWS & STABILIZE SLOPES***



BAD NEWS FOR SLOPES!

Scot's Broom

Himalayan Blackberry

English Ivy

Thistle

Butterfly Bush

CONTROL INVASIVE PLANTS

INVASIVE PLANTS PROVIDE INFERIOR STORMWATER & EROSION CONTROL

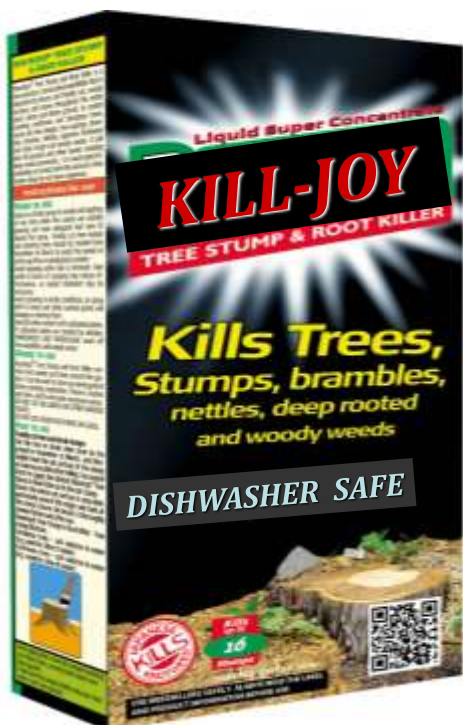
BAMBOO: A GROWING CONCERN

300 species sold in the Pacific NW
 'Running' varieties are fast spreading
 Roots 18-24 inches deep
can create severe problems for shoreline landowners

Vashon Island, King County, WA

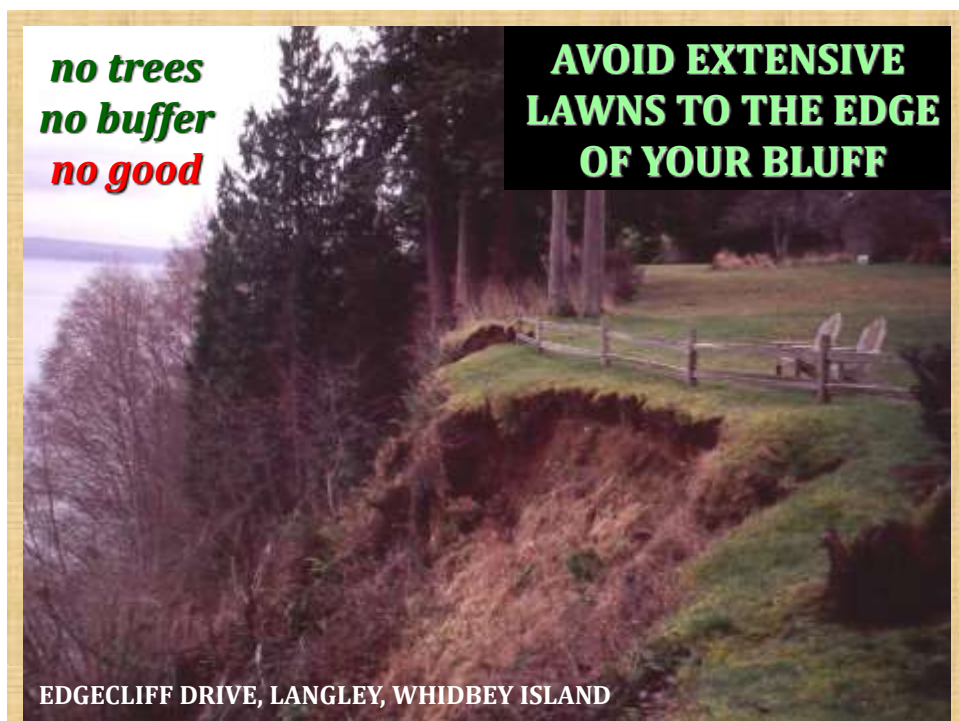
DON'T PLANT BAMBOO WITHIN 150 MILES OF A STEEP SLOPE

*eradicating English ivy & other invasive plants
can be difficult, complicated, & expensive*



**AVOID USE OF
HERBICIDES
NEAR SHORELINES**
*protect
water quality, wildlife
& slope stability*





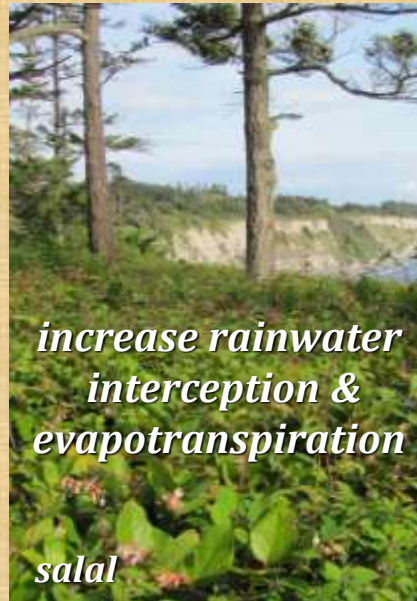
ESTABLISH VEGETATED BUFFERS



***reduce
storm
water
run-off***

***swordfern &
Oregon grape***

DINES POINT, WHIDBEY ISLAND



***increase rainwater
interception &
evapotranspiration***

salal

OAK HARBOR, WHIDBEY ISLAND

PLANTING ISLANDS TO REDUCE EXTENT OF LAWN AND MANAGE STORMWATER RUNOFF



LANGLEY, WHIDBEY ISLAND

USE NATIVE PLANTS in YOUR LANDSCAPING WHENEVER & WHEREVER POSSIBLE

ADJUST YOUR AESTHETIC



LANGLEY, WHIDBEY ISLAND

- Better stormwater & erosion control
- More drought-hardy than ornamentals
 - Resistant to climate change
- Requires less water & pesticides than lawns or ornamentals

create a regionally distinctive landscape style

keep in mind that replacing the lost functions of vegetation takes time to become effective



Groundcovers: 3 to 5 years

Shrubs: 4 to 10 years

Trees: 7 to 15 years

vegetation becomes more effective over time, unlike conventional engineered structures



so plan ahead, BEFORE problems occur!

