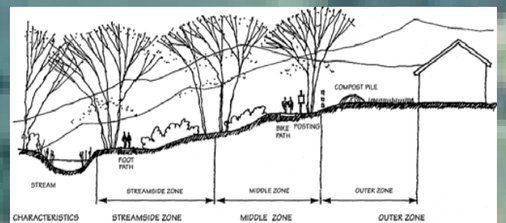
Landscape Conservation Principles



CHARACTERISTICS	STREAMSIDE ZONE	MIDDLE ZONE	OUTER ZONE
FUNCTION	Protect the physical integrity of the stream ecosystem	Provide distance between upland development and streamside zone	prevent encroachments and filter backyard runoff
WIDTH	Min. 8 m (25'), plus wetland and critical habitats	15 to 30 m (50'-100') depending on stream order, slope, and 100 year floodplain	8m (25') minimum setback to structures
VEGETATIVE TARGET	Undisturbed mature forest. Reforest if grass	Managed forest, some clearing allowable	Forest encouraged, but usually turfgrass
ALLOWABLE USES	VERY RESTRICTED (e.g., flood control, utility right of ways, footpaths, etc.)	RESTRICTED (e.g., some recreational uses, some stormwater BMPs, bike paths, tree removal by permit)	UNRESTRICTED (e.g., residential uses including lawn, garden, compost, yard wastes, most stormwater BMPs)

Figure 1. Three zone design. Randolph 2004


Photo by UW-Green Bay

•**Determine and clearly delineate critical areas for protection**
- •Review pertinent maps and sources
- •Field investigation
- •Protection is the best practice

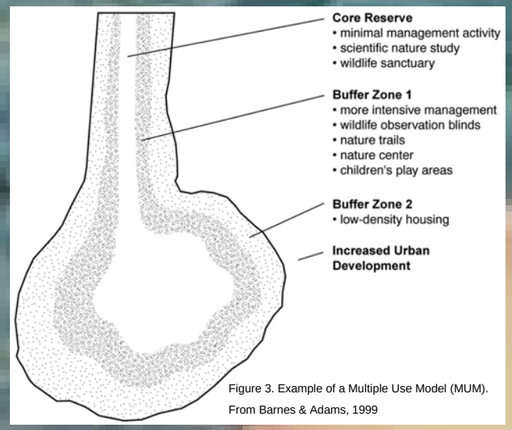


Figure 3. Example of a Multiple Use Model (MUM). From Barnes & Adams, 1999


Photo by Maryland Dept. of the Env.

•**Restore degraded habitats to improve connectivity**
- •Develop central goal
- •Monitor and Maintain

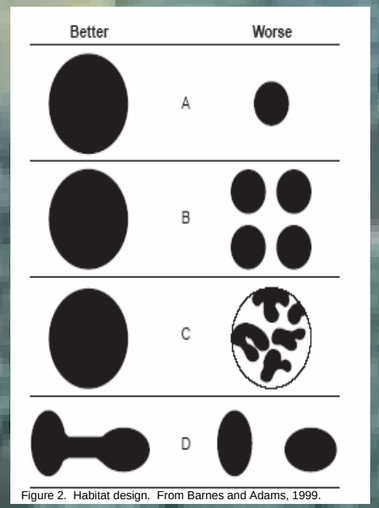


Figure 2. Habitat design. From Barnes and Adams, 1999.


Photo from Dr Missa

•**Minimize disturbances of critical habitats**
- •Minimize road crossings
- •Use three sided culverts at crossings

Table 1. General Guidelines for Designing Urban Stream Buffers (Schueler and Holland 2000a).

- Minimum total width of 100 feet, including floodplain.
- Zone-specific goals and restrictions for the outer, middle, and streamside zones.
- Adopt a vegetative target based on predevelopment plant community.
- Expand the width of the middle zone to pick up wetlands, slopes and larger streams.
- Use clear and measurable criteria to delineate the origin and boundaries of the buffer.
- The number and conditions for stream and buffer crossings should be limited.
- The use of buffer for stormwater runoff treatment should be carefully prescribed.
- Buffer boundaries should be visible before, during, and after construction.
- Buffer education and enforcement are needed to protect buffer integrity.
- Buffer administration should be flexible and fair to landowners.

•**Promote habitat connectivity through buffers and corridors**
- •Stream and riparian areas make good natural corridors
- •Use buffers to incorporate upland areas
- •Provide option for extending connectivity to off site conserva5tion areas

•**Use appropriate buffer widths based upon desired goals**
- •Create buffers for multiple purposes
- •Minimum perimeter buffer of 100 ft
- •Functions include filtration, habitat protection, travel, and aesthetics

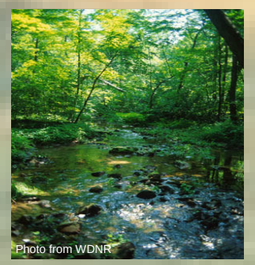


Photo from WDNR

Table 2 General Guidelines for Buffer Widths (Fischer and Fischenich 2000).

Function	Description	Width
Water Quality Protection	Buffers, especially dense grassy or herbaceous buffers on gradual slopes, intercept overland runoff, trap sediments, remove pollutants, and promote ground water recharge. For low to moderate slopes, most filtering occurs within the first 10 m, but greater widths are necessary for steeper slopes, buffers comprised of mainly shrubs and trees, where soils have low permeability, or where NPSP loads are particularly high.	5 to 30 m
Riparian Habitat	Buffers, particularly diverse stands of shrubs and trees, provide food and shelter for a wide variety of riparian and aquatic wildlife.	30 to 500 m +
Stream Stabilization	Riparian vegetation moderates soil moisture conditions in stream banks, and roots provide tensile strength to the soil matrix, enhancing bank stability. Good erosion control may only require that the width of the bank be protected, unless there is active bank erosion, which will require a wider buffer. Excessive bank erosion may require additional bioengineering techniques.	10 to 20 m
Flood Attenuation	Riparian buffers promote floodplain storage due to backwater effects, they intercept overland flow and increase travel time, resulting in reduced flood peaks.	20 to 150 m
Detrital Input	Leaves, twigs and branches that fall from riparian forest canopies into the stream are an important source of nutrients and habitat.	3 to 10 m

Photo from USDA