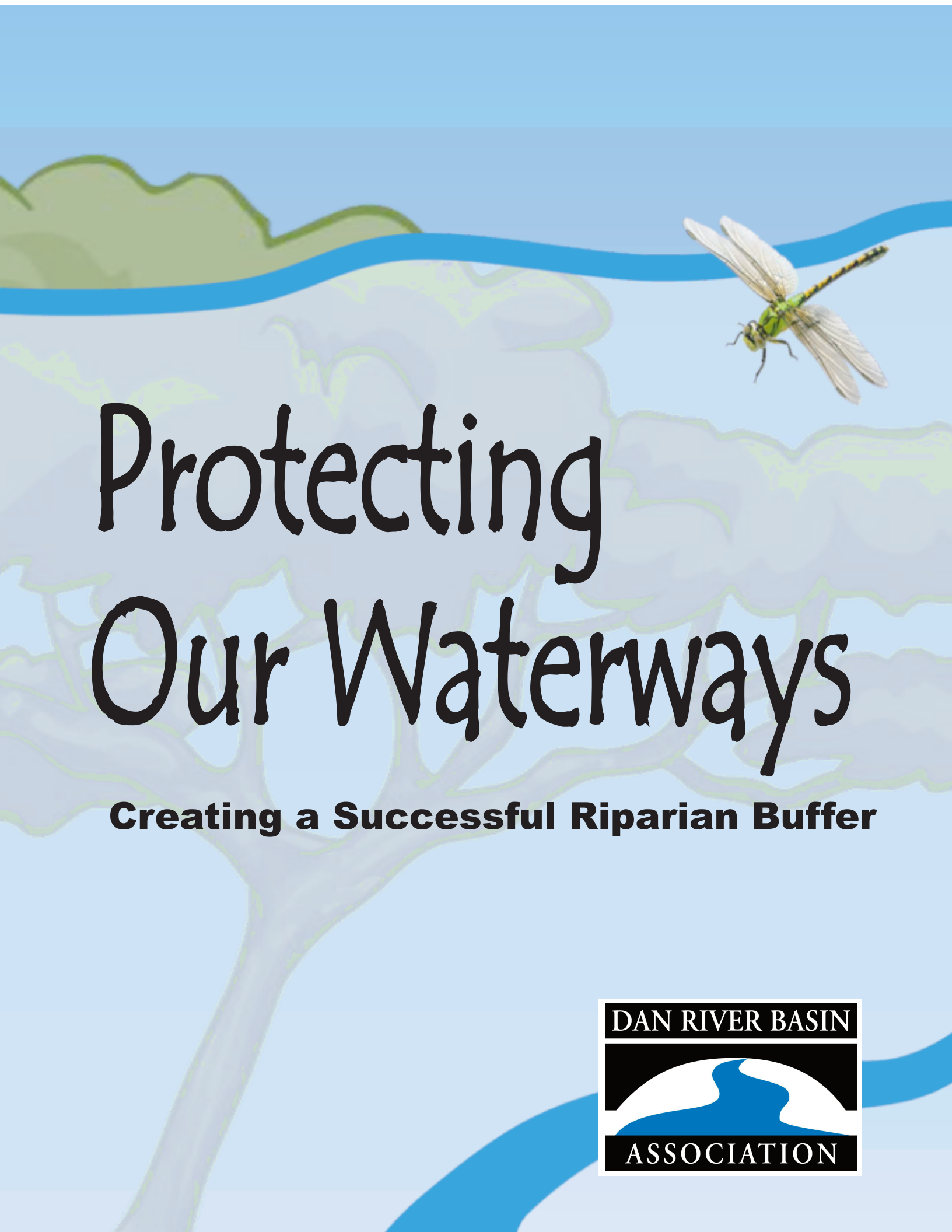


Protecting Our Waterways

Creating a Successful Riparian Buffer

DAN RIVER BASIN ASSOCIATION

Riparian Buffers: **Critical Protection for Rivers and Streams**

Riparian buffers are strips of forested land along rivers, streams and lakes that help keep pollution out of waterways. Riparian buffer protections are the most effective tool we have to improve the quality of our rivers and streams and public understanding of these areas are critical in development and preservation of these areas. These simple solutions to water quality protection are proving to be effective from a cost verses outcome perspective.

Riparian buffers help protect our drinking water supply by absorbing pollution from run-off, stemming erosion, controlling temperatures, preventing fish kills and blooms of toxic algae, and providing viewscapes to enhance our communities.

Trees and all the smaller plants under them provide never-ending miles of root systems that absorb pollutants before they reach valuable waterways. That means homeowners and businesses can help keep our rivers and streams healthy by putting in plantings that help restore those natural abilities and reducing the use of chemicals and fertilizers that can potentially wash into streams, lakes and storm drains that feed into bigger waters.

Nutrient pollution is runoff from farms and from urban and suburban roads, lawns, golf courses and other properties. Actions taken by property owners can help to restore some of the natural capacity of those areas. Excess nutrients that run into our local water bodies often contribute to water quality problems such as algae.

Riparian Buffer Design Principles

- **Create a vegetated buffer system along perennial streams**
- **Use native plants for the buffer system**
- **Limit forest clearing**
- **Enhance forests and other natural vegetated areas**
- **Avoid discharging untreated storm water into sensitive areas**

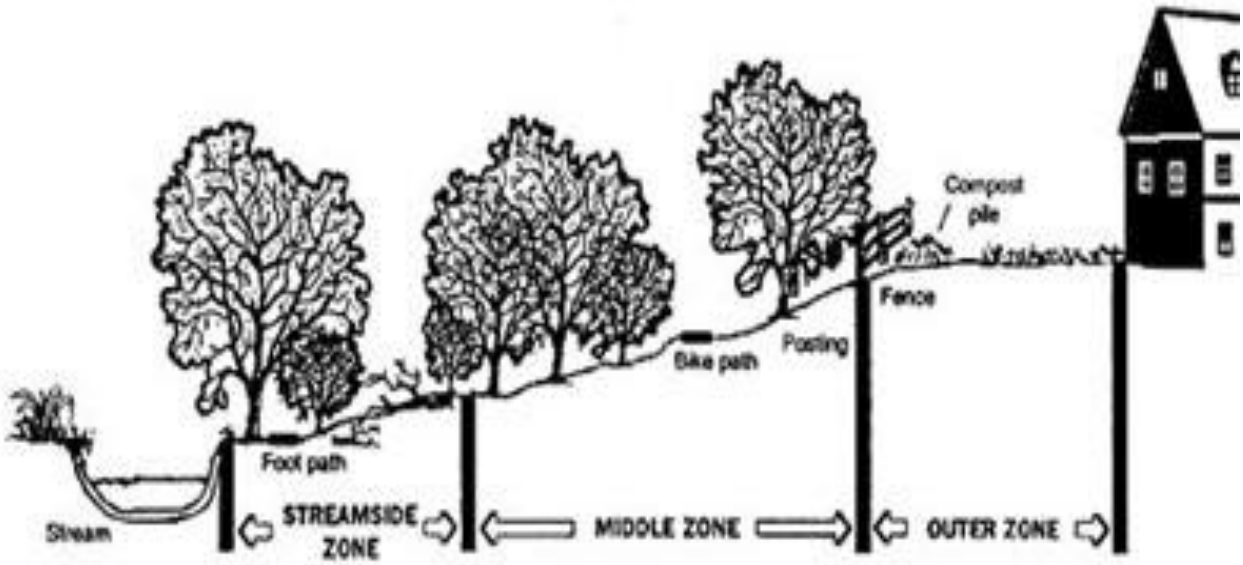
Create a vegetated buffer zone along perennial streams

A water quality buffer zone is a strip of undisturbed native vegetation, either original or reestablished, bordering a stream or river, pond, lake, wetland, or seep. It is very important to water quality, stream integrity, and wildlife habitat. It protects the physical and ecological integrity of water bodies from surrounding upland activities and can protect the stream bank from erosion. A buffer zone is most effective when storm water flows into and through it as a shallow sheet, rather than through concentrated channels or gullies.

Forest cover amplifies the benefits of buffered streams. Those benefits include:

- **Reduction of watershed imperviousness.** An average buffer width of 100 feet reduces watershed imperviousness by 5 percent. Buffers discourage excessive storm drain enclosures and channel hardening. They prevent increases in runoff from impervious cover and subsequent erosion and overflow of headwater streams.
- **More room for best practices.** Where topography, floodplain limits, and groundwater limits allow, buffers provide more room between developed areas and streams for the placement of best practice modifications, like storm-water ponds. They also improve septic system performance. Even a modest buffer provides space and access for future stream restoration, bank stabilization, or reforestation.

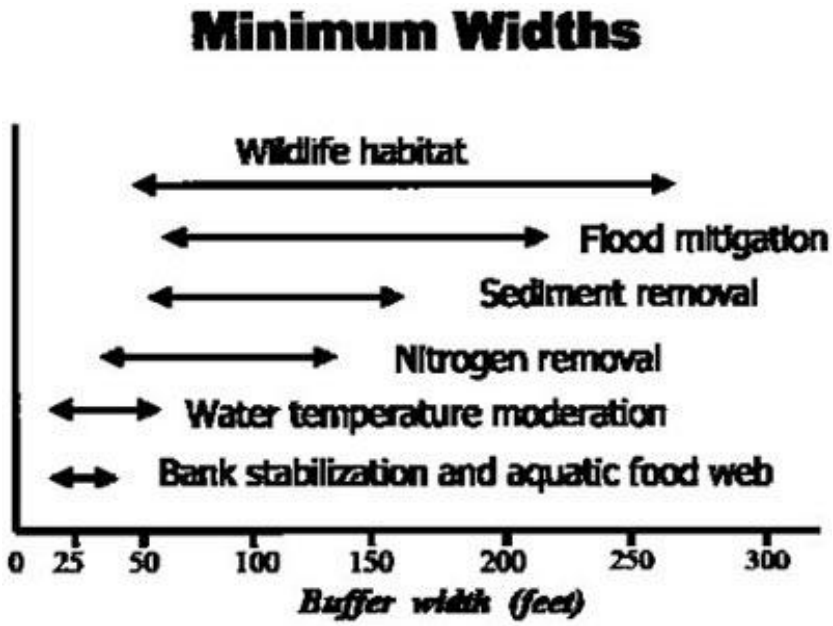
- **Flood control.** Property too close to a stream may experience flooding, standing water, and bank erosion. Other, more expensive flood controls are not necessary if a buffer includes the 100-year floodplain. Stream “right-of-way” allows for lateral movement, and most stream channels shift or widen over time. A buffer protects both the stream and nearby properties.
- **Protection from stream-bank erosion.** Tree roots consolidate floodplain and stream-bank soils, reducing the potential for severe soil erosion. Avoiding construction activity on steep slopes along a stream is the best way to prevent such erosion.
- **Community enhancement.** Buffers can be attractive amenities that add to property values. They provide the foundation for greenways, and such connected open space allows pedestrians and bikes to move efficiently through a community.
- **Removal of water pollutants.** When properly placed, buffers remove pollutants and control flows from developed areas. When properly designed, they can provide effective pollutant removal for development located within 150 feet of the buffer boundary. A forest canopy prevents further stream warming in developed watersheds.
- **Protection of wetlands.** Stream buffers can protect wetlands frequently found near streams.
- **Improved habitat.** Buffers provide food and habitat for wildlife. Leaf litter is the base food source for many stream ecosystems, and forests provide woody debris that creates cover and habitat structure for aquatic insects and fish. Riparian corridors preserve important terrestrial habitat, including forest cover. They are important transition zones, rich in species. A mile of stream buffer can provide 25 to 40 acres of habitat. Unbroken stream buffers provide “highways” for migrations of plant and animal populations. Buffers also provide essential habitat for amphibians, which require both aquatic and terrestrial habitats to complete their life cycle. Buffers maintain the base flow of streams.



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 encroachment and filter backyard runoff
WIDTH	Min. 25 feet, plus wetlands and critical habitats	50 to 100 feet, depending on stream order, slope, and 100 year floodplain	25 foot 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

Small headwater streams are very important to protect since they comprise 75 percent of many watersheds. Communities establish stream buffers to regulate development within the floodplain and to protect water quality.

A minimum buffer width to maintain water quality and habitat commonly ranges from 75 to 100 feet. Buffers narrower than 35 feet cannot sustain aquatic resources; widths of 35 to 100 feet are needed under most circumstances. Buffer widths toward the lower end of the range support some of the physical and biological needs of the stream ecosystem, especially on small streams. Those at the upper end of the range are most likely to protect the physical, chemical, and biological characteristics of the aquatic resource.



The optimal buffer width depends on its intended purpose.

Buffers should incorporate sensitive landscape features such as floodplains and wetlands. Including the entire floodplain width is desirable, but often difficult. Storm-water ponds and buffer infiltration areas can be incorporated in buffer areas, but take care not to locate such practices too close to a stream. Flooding may increase the maintenance required to remove sediment. High or seasonally high groundwater may exclude several practices, as may local floodplain regulations.

Use native plants for the buffer system

The type of vegetation in a buffer is important to its function. Both grass and forest buffers can reduce nutrients and sediments from surface runoff and nitrates from subsurface flows. Forested buffers have high rates of nitrogen removal. Soil and hydrological conditions also affect the performance of buffer zones.

For a listing of native plants in your region, visit www.danriver.org.

Limit forest clearing

Site fingerprinting, or footprinting, carefully limits the clearing of vegetation and disturbance of soil to a set distance around proposed structures and improvements. It restricts clearing to the minimum area required for building footprints, construction access, and safety setbacks. Through onsite preconstruction meetings, contractors can be informed of what to preserve and mark with fences or flags. The preserved natural areas of vegetation retain all of their hydrologic functions and can be integrated into a storm-water management system. This approach reduces the construction costs associated with clearing, and because the runoff volume is lower, storm-water management costs are also reduced.

Enhance forests and other natural vegetated areas

Natural vegetation can become an important part of a storm-water management system. Trees and other types of vegetation evapo-transpire at least 40 percent of rainfall. The forest duff layer absorbs large amounts of runoff, releasing it slowly to the streams through shallow groundwater flow. Mature vegetation is also an efficient water quality buffer. Identify and preserve the highest-quality forest stands prior to development. Where possible leave mature trees.

Planting additional vegetation, clustering trees, and promoting the use of native species can enhance forests and other vegetated areas.

Native plants are beneficial because they

- Require less water and have deeper root systems
- Create a more stable landscape and require less fertilizer
- Are drought tolerant
- Emit carbon dioxide and control ozone
- Control temperature
- Reduce storm-water flows
- Reduce erosion
- Have lower maintenance costs
- Are better adapted to climate changes and pests.

Avoid discharging unmanaged storm water into sensitive areas

Site design is key to solving storm-water treatment problems. New outfalls should not discharge untreated storm water into jurisdictional wetlands, sole-source aquifers, or other sensitive areas. Aquifers are a key underground source of drinking-water supply in many communities. Develop a pollution prevention plan for all sites during the design phase.

Even if you don't live near a waterway, you can help improve water quality!

- If you have no trees … plant trees, especially native ones. Shrubs, perennials, ground covers and grasses also help restore natural areas. You'll also benefit honeybees by planting native flowering plants and shrubs that provide both nectar and habitat.
- If your property is suitable, build a rain garden. A rain garden is a natural or strategically placed manmade depression in the ground; it collects and stores water runoff that is slowly filtered and absorbed into the soil. Plants in a rain garden should be capable of thriving in alternating wet and dry conditions.
- Consider using rain barrels to capture roof runoff; you can prevent the water from going into storm drains and, at the same time, reduce your irrigation needs when you use the water for plants.
- Only apply nutrients that are needed. If your soil has not been tested in the past three years, get a soil test done and use it to address your soil's needs for nutrition and pH (acidity) adjustments for the lawn — and landscape/garden. Avoid additional phosphorus applications if it's not needed (and only way to know is to soil test); phosphorus-free fertilizers are now available. It takes only very small quantities of phosphorus in waterways to cause serious problems — algae bloom is a big one. Phosphorus is essential for plant growth and development, including turf, but too much increases the possibility of problems. Many lawns fertilized with 10-10-10 for years have so much phosphorus in the soil, they could be mined for fertilizer.
- Use nitrogen in moderation. Up to 1 pound nitrogen per 1,000 square feet over the next four to six weeks is all a cool-season lawn needs for spring. Apply nitrogen with a slow-release fertilizer (indicated on the bag) so you get efficient, long-lasting results. Make sure the fertilizer lands in the turf, not on the driveways or sidewalk where rain can wash it into storm drains that lead to waterways where pollution can occur.
- Mow properly. Start the mowing season off right with a sharp, properly balanced mower blade. Tall fescue can be mowed at two to three inches during spring's favorable weather conditions; by mid- to late spring, raise the mower to higher levels so the grass can adapt to the hotter, drier summer months.

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