DELAWARE
RIVERKEEPER®

Natural Open Space

Turfed areas, such as those developed for active recreation, generate significantly more stormwater runoff than meadow, scrub vegetation or forests, and can approach the imperviousness of asphalt if soil has been severely compacted. Clearing and grading can result in significant soil compaction, which reduces infiltration capacity and increases overland flow and runoff.

Parking lots, even gravel lots, are highly impervious and cause increased stormwater runoff. A crushed rock parking lot, for instance, has a surface bulk density of 1.5 to 1.9, urban lawns are the same, while sandy soils are 1.1 to 1.3 and concrete are 2.2. The higher the bulk density, the less pervious the surface. And a decrease in infiltration capacity results in increased runoff volumes. By way of illustration, the runoff volume from a one-inch storm from a parking lot is 3,450 cubic feet, whereas the runoff volume from a meadow for the same storm is 218 cubic feet. Also, Schueler has found in reviewing 44 sites nationwide that runoff coefficients were found to be strongly correlated with impervious cover.

Maintaining the vegetation on the land is the best method of protecting soils from compaction and promoting infiltration and reduced runoff. The vegetation allows the creation of topsoil and humus (which is the most absorbent layer on the ground) providing pathways for the water to enter the ground. This maintains the natural absorbency of the soil sponge. As the humus layer builds in a succession forest, the soils change, becoming better able to support more mature vegetation and more able to infiltrate rain. "A mature forest can absorb as much as 14 times more water than an equivalent area of grass."

Under natural conditions, most sites have depressions that serve to capture and store rainfall, allowing time for evaporation and/or infiltration. These natural depressions make up the lay of the land and allow for more precipitation to be absorbed and runoff slowed down, as the time of concentration is increased.

Preservation of tree cover directly translates into reduced stormwater runoff and reduced flooding for downstream neighborhoods. Examples of how vegetation reduces stormwater runoff include:

- It has been "calculated that tree loss in [an] urban corridor resulted in a 19% increase in runoff from major storms, an estimated 540 million cubic feet of water. Replacing the lost stormwater retention capacity would cost $1.08 billion."
- In the Baltimore-Washington corridor the stormwater retention capacity of forest cover in 1973 was calculated to be worth $5.7 billion.

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- In Atlanta , Georgia a 20% loss in tree cover in the metropolitan region produced a 4.4 billion cubic foot increase in stormwater runoff; and official estimates are that it would cost at least $2 billion to build containment facilities capable of storing this excess water.
- In Milwaukee , an existing tree canopy of 16% has been found to reduce stormwater flows by up to 22%, saving the City $15.4 billion in "not having to build additional stormwater retention capacity."
- In Texas , a tree canopy of 30% reduces stormwater runoff by 28% and saves Austin , TX $122 million in stormwater control.
- It has been determined that a 40% canopy tree cover in a metropolitan area with a population of around 2 million, could result in reduced stormwater management costs of more than $2 billion a year.

It is important to protect existing native plant communities along stream corridors and ponds. Riparian vegetative communities provide a number of benefits to both aquatic and terrestrial ecosystems -- they filter out and/or utilize nonpoint sources of pollution such as excess nutrients, sediments, metals and some pesticides; their root systems anchor soils, thereby preventing erosion; in-stream waters are cooled as a result of plant shading; and overland flow is slowed down as it passes over and around the vegetation, thus increasing soil absorption and groundwater recharge, and decreasing flood damage.

Riparian buffers increase infiltration, groundwater recharge and surface water recharge; attenuate the rate of runoff to streams; reduce flood peaks; reduce streambank erosion; improve and increase aquatic and forested habitat; reduce sedimentation caused by overland flow; remove nonpoint sources of pollution such as nitrogen, phosphates and some pesticides from runoff from agricultural, suburban or urban land uses.

Requiring open space to be preserved in its naturally vegetated state helps ensure these water quality, water quantity, and flood damage reduction benefits but the economic benefits of keeping natural open space natural are also significant.

- It costs about $75 per acre per year to manage natural open space.
- It costs up to up to $200 per acre per year to manage for passive recreation such as established trails.
- It costs up to $240 to $270 per acre per year to manage open space as turf.
- Management and maintenance costs increase up to $1000/acre as artificiality of parks and open space increases.

Native plant communities and natural forested areas reduce air, water and noise pollution as well. This benefits the quality of life for the surrounding community. And the value of a stroll through woods, the stress relieving properties of quietly sitting under a tree, and the incalculable benefits of clean streams that can be waded in or fished in or enjoyed in any number of ways by everyone from children to seniors may not be accurately measured in dollars (though there are efforts to calculate such multiple benefits) but inarguably contribute great worth.

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