GREEN INFRASTRUCTURE

Approaches to Development

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Agricultural and forest lands are being converted to residential and commercial developments at an alarming rate. In the U.S. an estimated 1,920,000 acres of rural land is converted to residential and commercial uses each year. This is land that was formerly forest or farmland. In 2004, a study by the Brooking Institute estimated that one third of the residential units needed to house Americans in 2030 do not currently exist and will have to be built. This translates into about 38 million new housing units by 2030. In the South this increased need for housing is expected to reach 60 percent, while in Alabama it is projected that 900,000 more housing units will need to be built by 2030.

This housing development provided for a large greenspace behind the houses to convey stormwater runoff. However, the design still relies upon concrete-lined waterways for low-flow events.

The nation's population is increasing by about 3,000,000 annually; however, the amount of rural land converted is far greater than can be justified by population increases alone. This "urban sprawl" is propelled by the trend towards larger homes that occupy lots of one acre or more. Concerns over urbanization and the accelerated paving of fields and forests to build commercial and residential developments are widespread. These development patterns are consuming the habitat of both wildlife and people and, in some places, only small remnants of open or green space remain. When parkland is present, it is seldom connected to other vegetated areas in ways that would allow people or

A constructed waterway and wetland in a new housing development slows delivery of stormwater and provides some initial water quality treatment as the water interacts with plants and soil. This location also contains interpretive signs along the public walkway.

animals to traverse from one area to another. Ironically, in an effort to simplify the environment for humans, we often create a world that is too complex for most wildlife.

As buildings are constructed, sidewalks laid in, and streets paved, large quantities of rainwater can no longer soak into the soil. The parking lots of many of our stores are designed to accommodate the "100-year" shopping event, resulting in large volumes of stormwater runoff during rainstorms. Managing this runoff is a challenge not only for a community, but also for downstream residents of the watershed. As more and more surfaces are paved, the hydrology of the watershed is drastically altered.

The conventional solution is to use more concrete to divert untreated runoff into stormdrains, where it is concentrated and eventually discharged into dry detention ponds or directly into rivers and streams. These massive discharges, in turn, induce bank erosion and flooding downstream, while causing a general disruption in the ecological function and integrity of our waterways. In extreme cases, the stream channels themselves are lined with concrete. To complicate matters, communities are now legally required to treat stormwater discharges.

Wildlife impacts – A pair of ducks find a place to loaf along a walking/biking trail adjacent to an urbanized stream.

Cities, towns, and individual home sites all reside within a larger matrix of land uses which typically include privately held working lands, such as forests and farmlands. Urban areas should no longer be viewed as isolated islands on the landscape. Water and air flow in and out of communities, as do traffic, people, and wildlife. A community and the landowners in the surrounding rural area need to be more aware of each other's land use decisions and how they affect each other.

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The typical method for handling parking lot runoff is to directly convey it from parking lot to underground pipes without any water quality treatment.

Many of the goals that are important to rural communities – such as water quality and stormwater management, wildlife habitat, recreational and aesthetic opportunities, and economic viability – must be addressed at the landscape or regional scale to be successfully achieved. This often requires working in partnership across agencies and political jurisdictions.

The need has long been recognized by communities to invest in "grey infrastructure" such as roads, bridges, power lines, and sewers to provide the underlying foundation for continuance and growth. In a similar manner, communities have recently begun to acknowledge the need for "green infrastructure" – a strategically planned and managed interconnected network of green spaces. Green infrastructure is comprised of a system of "hubs" and "links." Hubs may include large protected areas such as reserves, parks, forests, rangelands, and farms. Links include conservation corridors, riparian zones along rivers, and greenbelts. They are the connections that enable the system to work. This network can help support native plant and animal species, maintain natural ecological processes and functions, sustain water and air resources, and contribute to the quality of life in a community.

The key to green infrastructure is managing the pattern of growth and development. Traditional conservation strategies have tended to focus on environmental restoration and preservation, while neglecting the pace, shape, and location of developments in relation to natural resources and amenities. Green infrastructure strategies blend economic and social goals with the ecological functions and benefits provided by natural systems. Development occurs in concert with ecosystem protection and is proactive, not reactive; systematic, not haphazard; holistic, not piecemeal; multi-purpose, not single-focused; and also multi-scale, not only site-based.

One promising approach is the increased use of agroforestry practices on agricultural lands, as well as modification of some of these practices for use within communities. For example, field windbreaks can control soil erosion and livestock odors while providing wildlife habitat and connecting fragmented patches of forests throughout the landscape. Riparian forest buffers can effectively protect surface waters in a watershed from fertilizers, pesticides, sediments, and animal wastes in agricultural runoff. In urban settings, modified riparian forest buffer designs can be installed to manage stormwater runoff, create wildlife habitat, provide recreation opportunities, and provide noise, odor, dust, and visual screening.

Parking lots can be designed differently to include porous paving materials, and runoff can be directed into areas arranged throughout the lot where trees and other plants are planted below grade level rather than in raised islands so that they can absorb water during rain events. Geographic information systems (GIS) can be used to enable landscape analysis of where best in a watershed to locate conservation efforts, providing a spatial context that allows for the consideration of landscape features, hydrology, and land use so that multiple benefits can be achieved.

The pace of urbanization in Alabama is accelerating, but fortunately there is still time for the state to actively choose the path along which it grows. With thoughtful planning and a commitment to green infrastructure approaches, we can sustain Alabama the Beautiful.

Photos courtesy of the USDA National Agroforestry Center

An urban stream that has been straightened and the banks armored in order to handle increased stormwater delivery. This method of handling stormwater increases the rate of delivery, the energy of the stream, and downstream bank erosion.