

## Integrating Sustainability & New Urbanism at the Regional Scale

Watershed ecological systems contain the urban entities and provide natural resources and assimilative capacity for the pollution and the consumption accompanying human settlements and built environment. The ecosystems existing within the watershed are water-controlled structures, dependent on the equilibrium between climate, soil and vegetation. Climate and soil conditions control vegetation dynamics. On the other hand, the vegetation affects the distribution of the water balance. The fluctuation of the soil moisture content is a key factor that dictates the ecohydrology of the natural systems and more specifically the vegetation structure and organization.

Manmade infrastructure and buildings may significantly change and distress the ecosystems equilibrium by modifying the distribution of the water balance and contaminating the water and soil resources. Impervious surfaces intercept precipitation and affect the natural hydrological cycle by a) reducing recharge of the aquifer by redirecting significant portion of the precipitation to stormwater management facilities, b) increasing evaporation from impervious surfaces and c) by polluting the fraction of the water that infiltrates the soil. Increased quantities of lawn nutrients, urban pesticides, rooftop runoff, first flush of stormwater,

contamination by heavy metals, suspended and deposited sediments, and biocontamination are additional factors that are attributed to urbanization. The resulting impact is demonstrated by deterioration of the ecosystem and declining biodiversity.

The impact of the built environment is in direct relation to the transect zones. The degree of impairment on a local scale (block and building) is proportional to the urbanization intensity and the extent of built infrastructure, i.e., type of human habitat/urban zones. In general, rural areas may have less impact on watersheds compared to urban core areas. However, on neighborhood and regional scale, the impact on the entire watershed depends on the integral effect of the urban zones within the watershed boundaries comprising a human settlement. Thus, the effect will be cumulative and while highly urbanized areas will have a greater impact on local scale, on regional scale the impact will be less severe compared to sprawl development patterns.

Watersheds contain the human habitat and preservation of the services provided by the watersheds, including water quality and quantity; biodiversity and assimilative capacity is essential for sustainability. The continuous expansion of the infrastructure of human society increases the stress and impacts the natural, sustainable conditions of the watersheds. Minimization of the impact of built environment is critical for maintaining the ecological balance and biodiversity of

ecosystems within a watershed. The principles of New Urbanism offer a better planning philosophy for minimization of the overall impact of the built environment. LI integrates urban and engineering practices to offer a sustainable framework for development on regional, neighborhood and block scales to ensure sustained growth while preserving natural resources; protect biodiversity; reduce pollution and reduce consumption of two resources: energy and land. The described methodology offers superior planning practices based on traditional neighborhood patterns favoring high density, mixed use, and reduced use of transportation and building energy. Watersheds contain the human habitat; preservation of services (water quality and quantity, biodiversity and assimilative capacity) is essential for sustainability. Thus, LI ensures sustainability on all levels of the watersheds and prevents disruption and damage in urban/suburban areas, loss of biodiversity, and ecosystem changes. These principles implement a better planning philosophy prioritizing compact and mixed use urban patterns, increased density and walkable urban areas. A framework is needed to

create urban entities designed on the principles of energy and environmental sustainability. LI accommodates a broader range of development standards necessary for community-oriented design. The resulting framework is focused on regional planning and is a complete antidote to the conventional planning practices which lack connectivity and rely on arterials, collectors and cul-de-sacs for traffic mobility and provide connectivity, compactness and structured open space. The resulting urban designs use the transect methodology in conjunction with water resources protection, environmental and sustainability concepts to minimize the effects of the impervious surfaces. LI promotes numerous environmental qualities characteristic for traditional neighborhoods. It includes technologies for preserving the natural hydrological cycle including pervious pavements, light brick, light infrastructure, natural drainage, gravel swales and very light infrastructure with reduced amounts of curbs. Furthermore, reduced maintenance is accomplished by using xeriscape and reducing the irrigation, elimination of the pesticides and agricultural pollution.

This is a condensed version of the article "Sustainability and New Urbanism at the Regional Scale" by Dr. Georgio Tachiev, an Environmental Engineer at Florida International University. The following pages further discuss the regional nature of Light Imprint.