

## **Green Infrastructure Definitions**

Prepared by for the Metro-Ecosystem Study by Swati Sheladia, EPA Office of Sustainable Ecosystems & Communities  
Washington, DC 1998

### State/Local Adopted Definitions

#### **1. Definitions used in Maryland:**

**“Green infrastructure”**: A statewide network of protected areas representative of Maryland’s natural and cultural landscape. (MD Department of Natural Resources Ecosystem Council. December 1996. Ecosystem-Based Management: Recommendations of the Ecosystem Council. MD DNR. Annapolis, MD. pp. 6.)

**“Ecosystem management goals”** as outlined by MD Department of Natural Resources: Maintain viable population of native species, represent all natural community types across their natural heritage range of variation, maintain evolutionary and ecological processes (disturbance regimes, hydrological processes, nutrient cycles), lengthen time frame and scale of management activities and concepts to ensure legacy of healthy functioning natural systems, recreation compatible with above goals, provide economic use and development as compatible with above stated goals . (MD DNR Ecosystem Council. December 1996. Ecosystem-Based Management: Recommendations of the Ecosystem Council. MD DNR. Annapolis, MD. pp. 19.)

**“Natural infrastructure”**: In reference to greenways, protecting and connecting important natural corridors throughout the state. – *Refers to natural corridors only, not ecosystem protection* (<http://www.dnr.state.md.us:80//greenways/intro.html>)

#### **2. Definitions used in Minneapolis- St. Paul, MN:**

**“Ecological infrastructure”**- in Minneapolis/St. Paul Metro Region- Greenways and Natural Areas Collaborative has worked to “develop a vision and a framework for preserving and restoring key ecological features and functions while accommodating growth in the metro region...This trend reflects a growing national awareness that communities anticipating growth must plan not only for traditional systems such as roads and utilities; they also need to plan for nature and draft a blueprint for their ecological infrastructure.” ; Divide areas into 3 categories- natural areas, greenways and open space (Metro Region MN DNR. December 1997. Metro-Greenprint: Planning for nature in the face of urban growth, Greenways and Natural Areas Collaborative. St. Paul, MN.)

#### **3. Definitions used in Florida:**

**“Green infrastructure”** – Florida Preservation 2000 – Criteria for acquisitions that form complete patterns of protection for natural areas and functioning ecosystems, to better accomplish the intent of multiple benefits (e.g., fish and wildlife habitat protection, recreation space, and water recharge areas). Discussion of ecosystem services attributed

to land acquisition and protection – gas regulation, climate regulation, water regulation, water supply, erosion control, soil formation, nutrient cycling, waste treatment, pollution, food production, raw materials, and several others (p. 4) (Land Acquisition and Management Advisory Council. October 1, 1997. Florida Preservation 2000 Program Remaining Needs and Priorities: A Report prepared for the Florida Legislature.)

#### **4. Related definitions of similar concepts in the literature (engineering, ecology, etc.)**

**“Advanced/alternative infrastructure design”**- from engineering focused paper - focus on environmental management (creating suburban ecologies in neighborhoods), energy conservation (passive and photovoltaic community systems), automated infrastructure systems (construction with robots and maintenance with sensors) and alternative transportation networks (trains running on solar and air cushions); incorporation of sustainable development principles in construction technologies (Lozar, C. 1993. Advanced Technology Proposals for Infrastructure Rebuilding for Sustainable Development. In Gifford, J., D. Uzarski, and S. McNeil. 1993. Infrastructure Planning and Management. American Society of Civil Engineers. NY, NY, pp. 217-221.)

**“Community infrastructure design”** - involves transport networks (solar, energy storage), recycled housing stock infrastructure, urban planning (energy credits, allowable density, ecological design), air pollution and community design, sanitation systems (reuse, recycled water and sun purification), electrical network and energy distribution (renewable, mini-grades), waste control life cycle management (BTU life cycle content) *Most items are technology intensive solutions/approaches to achieving sustainability goals.*(Lozar, C. 1993. Advanced Technology Proposals for Infrastructure Rebuilding for Sustainable Development. In Gifford, J., D. Uzarski, and S. McNeil. 1993. Infrastructure Planning and Management. American Society of Civil Engineers. NY, NY, pp. 217-221.)

**“Ecosystem services”** – natural processes that humans depend on for survival including biological productivity, nutrient cycling, and water cycling which provide clean air and water, maintain the fertility of the soil, and help to regulate the climate. (Edwards, Peter and Cyrus Abivardi. 1997. “Ecological engineering and sustainable development.” Chapter 15 in Urbanska, K. N Webb and P. Edwards. 1997. Restoration Ecology and Sustainable Development. Cambridge University Press, NY, NY. Pp. 325-352)

**“Emergent Property Principle”** – a property of an ecological level or unit that results from the functional interaction of components, and therefore is a property that cannot be predicted from the study of components that are isolated or de-coupled for the whole unit (cited to Salt, 1979 from Odum, E.P. 1993. Ecology and Our Endangered Life Support Systems (Second Addition). Sinauer Associates Inc, Sunderland Massachusetts, p. 29)

**“Green infrastructure”**- green spaces vital to the protection of surface water quality and provide flood benefits, wildlife habitat, and passive recreational opportunities. (Smith, Kendra. 1997. “Fanno Creek Watershed Planning and Enhancement.” From Roesner,

Larry A. (ed.). 1997. Effects of Watershed Development and Management of Aquatic Ecosystems. American Society of Civil Engineers. NY, NY. Pp. 333-346)

**“Greenway” concept** – got their start mainly as recreational amenities but concept has expanded to include a number of objectives – including trails, habitat preservation, outdoor education, economic development, interpretation, and other benefits such as flood control (p. 536); movement has spawned the multi-objective approach (Searns, R. 1997. “Riparian Stewardship in the Post Regulatory Era: The Stick, the Carrot and the Light Bulb.” From Roesner, Larry A. (ed.). 1997. Effects of Watershed Development and Management of Aquatic Ecosystems. American Society of Civil Engineers. NY, NY. Pp. 532-545)

**“Greenway design”**- a good design fully incorporates ecological functions and balances public recreational needs with nature conservation. Functions include facilitating wildlife movement, providing wildlife corridors, protecting water quality as well providing recreation. (Smith, D. and P. Hellmund. (eds.). Ecology of Greenways: Prospectus for the final phase of a major new reference book on ecological design of linear open spaces.)

**“Natural environment”**- It is an essential part of man’s total environment. In terms of function it is that part of man’s life support system that operates without outside energy inputs, that is minimum human management is required for maintenance, it is essentially self-supporting. “Cities need the protection of an adequate life support system, many elements of which natural environment provides free of charge.” (Odum, E P. and H.T. Odum. Natural Areas as Necessary Components of Man’s Total Environment.)

**“Natural Infrastructure”**- from watershed development perspective- “rivers and streams are the single most important component of the natural infrastructure – givers of life, conveyors of our wastes, and places of solace.”(p. 534) (Searns, R. 1997. “Riparian Stewardship in the Post Regulatory Era: The Stick, the Carrot and the Light Bulb.” From Roesner, Larry A. (ed.). 1997. Effects of Watershed Development and Management of Aquatic Ecosystems. American Society of Civil Engineers. NY, NY. Pp. 532-545)

**“Natural infrastructure vs. human-built infrastructure”**- in this case referring to stream and river ecosystems versus roads, highway, stormwater runoff and sewer systems (Searns, R. 1997. “Riparian Stewardship in the Post Regulatory Era: The Stick, the Carrot and the Light Bulb.” From Roesner, Larry A. (ed.). 1997. Effects of Watershed Development and Management of Aquatic Ecosystems. American Society of Civil Engineers. NY, NY. Pp. 532-545)

**“Public infrastructure”**-healthy functioning natural systems such as flood plains and wetlands are a part of the public infrastructure – they are as important economically as roads, water lines and power plants. (Searns, R. 1997. “Riparian Stewardship in the Post Regulatory Era: The Stick, the Carrot and the Light Bulb.” From Roesner, Larry A. (ed.). 1997. Effects of Watershed Development and Management of Aquatic Ecosystems. American Society of Civil Engineers. NY, NY. Pp. 532-545)

**"Sustainable development"** - “maximizing the use of natural resources for permanent construction and minimizing environmental degradation over the life cycle of the construction application.”; optimization of natural resource utilization; investment over long life cycles in railroad, bridge, highway and energy source infrastructure; need to reexamine infrastructure definition in terms of new advanced technology and global concerns about population, habitat, and ecological balance and the need for recycling. (Lozar, C. 1993. Advanced Technology Proposals for Infrastructure Rebuilding for Sustainable Development. In Gifford, J., D. Uzarski, and S. McNeil. 1993. Infrastructure Planning and Management. American Society of Civil Engineers. NY, NY, pp. 217-221.)