

# Ecological Restoration Brief

Reprinted from TXSER Quarterly Newsletter

ERB No. 12

September, 2014

## Urban Riparian Biodiversity and Ecosystem Services

By: Ingrid Karklins

B.S. Candidate, Department of Ecosystem Science & Management  
College of Agriculture and Life Sciences, Texas A&M University,  
College Station, TX

Urban riparian ecosystems are dramatically altered from their pre-existing natural condition due to influences such as alterations in flow regime, high nutrient loads from soil amendments, disruption of hyporheic function, and reduced water quality and quantity (Catford et al. 2013). Restoration goals should begin with an evaluation of existing species diversity and functional groups and their contributions to natural goods services. All riparian species should be evaluated, including non-natives. While riparian zones are commonly recognized as “sponges” that maintain water quality and regulate hydrologic fluxes (Bardgett et al. 2001), arguably one of the most important urban riparian ecosystem services is that of providing for human health and well-being. This latter benefit results from a surprisingly rich species diversity and human-nature interactions.

Plant and invertebrate species richness actually increases with moderate levels of urban development. This substantiates the intermediate disturbance hypothesis in which moderate levels of disturbance result in the greatest diversity of both early and late successional species (McKinney 2008). Much of this diversity is due to the homeowner fondness for imported exotic landscape species (Goddard et al. 2010) which easily escape and establish in urban parks and along urban creeks. Plant species naturally migrate to riparian areas through passive dispersal via wind and water or active dispersal via avian and other species that have a natural affinity for waterways.



Photo Credit: Ingrid Karklins

There is also evidence that urban invertebrate and vertebrate biodiversity is rising. For example, there are more bumblebee species in urban areas in San Francisco and Britain

than in rural areas, and frog species populations are increasing in urban areas in Britain (Goddard et al. 2010). This species diversity can be attributed to the popularity of wildlife gardening in urban areas. Nationwide incentives such as the National Wildlife Federation's Certified Wildlife Habitat Program engage backyard naturalists and citizen-scientist-driven activities (Goddard et al. 2010). New South Wales, Australia advocates native plant gardening on private properties that are near creeks to reduce habitat fragmentation and create riparian buffers (Goddard et al. 2010). These kinds of activities provide communities with a sense of ownership and investment in natural resources in their homes and neighborhoods.

Greenbelts along urban riparian areas are often set aside for recreational areas that provide an important way for people to reconnect to nature (Groffman et al. 2003). This enhanced interaction with nature results in improved human well-being and quality of life (Goddard et al. 2010). Even fragmented and novel ecosystems can provide quality of life enhancements to urban populations (Bestelmeyer) by providing a flash of green and feather amidst asphalt and concrete vistas.



**Local community volunteers plant trees along an Austin Creek.**  
Photo Credit: [www.treefolk.org](http://www.treefolk.org)

The Gwynne Falls Trail in Baltimore Ecosystem Study (Bestelmeyer) is an urban Long Term Ecological Research site. A trail system runs along 14 miles of a stream valley as an integrated "human riparian ecosystem" that connects 30 socioeconomically declining neighborhoods with green spaces and historic landmarks. One objective of the trail project that was successfully met was to bring underserved communities together through neighborhood-coordinated ecological restoration activities (Groffman et al. 2003).

Such human interaction with riparian zones through the use of nature trails and involvement in restoration efforts has a feedback effect in which people develop an

enhanced appreciation of these natural resources with a desire to nurture and maintain them (Groffman et al. 2003). In addition to the Gwynne Falls Trail, some examples of this "human riparian ecology" are occurring in the Puget Sound, and the Seine River in France. As a result of this interaction, riparian vegetation and stream health are improved hand-in-hand with and enhanced human quality of life (Groffman et al. 2003).

Ultimately, human interactions with urban riparian ecosystems result in a win-win situation with happy and healthy people, increased species diversity, and improved abiotic conditions such a water quality and quantity (see figure 1). Further research can more specifically determine exotic species functional roles in delivering ecosystem services.

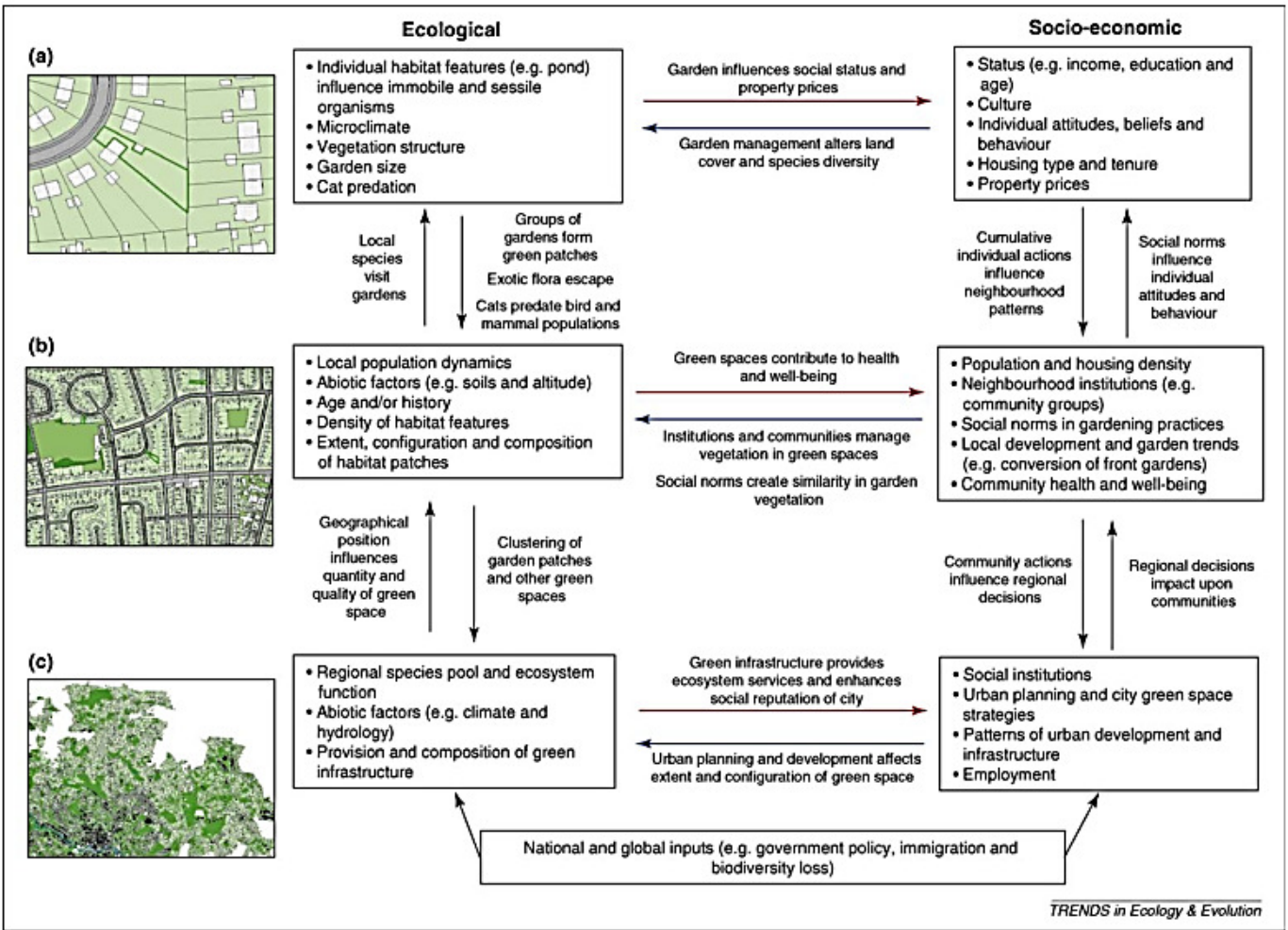


Figure 1. Green space and socio-economic feedback mechanisms in urban areas (Goddard et al. 2010)

References:

Bardgett, R. D., J. M. Anderson, V. Behan-Pelletier, L. Brussaard, D. C. Coleman, C. Ettema, A. Moldenke, J. P. Schimel, and D. H. Wall. 2001. The influence of soil biodiversity on hydrological pathways and the transfer of materials between terrestrial and aquatic ecosystems. *Ecosystems* 4:421-429.

Bestelmeyer, B. T. 2006. Threshold concepts and their use in rangeland management and restoration: the good, the bad, and the insidious. Pages 325-329. *Restoration Ecology*. Wiley-Blackwell.

Catford, J., R. Naiman, L. Chambers, J. Roberts, M. Douglas, and P. Davies. 2013. Predicting novel riparian ecosystems in a changing climate. *Ecosystems* 16:382-400.

Goddard, M. A., J. Dougill, and T. G. Benton. 2010. Scaling up from gardens: biodiversity conservation in urban environments. *Trends in Ecology & Evolution* 25:90-98.

Groffnam, P. M., D. J. Bain, L. E. Band, K. T. Belt, G. S. Brush, J. M. Grove, R. V. Pouyat, I. C. Yesilonis, and W. C. Zipperer. 2003. Down by the riverside: urban riparian ecology. *Frontiers in Ecology and the Environment* 1:315-321.

McKinney, M. 2008. Effects of urbanization on species richness: A review of plants and animals. *Urban Ecosystems* 11:161-176.

**The Society for Ecological Restoration, Texas Chapter promotes ecological restoration as a means of sustaining the diversity of life on Earth and re-establishing an ecologically healthy relationship between nature and culture.**

**For more information on TXSER visit: [www.txser.org](http://www.txser.org)**