



# BALTIMORE ECOSYSTEM STUDY

## Baltimore, Maryland



Reprinted from Experimental Forests of  
the Northern Research Station NRS-INF-07-09

The Baltimore Ecosystem Study (BES) is a Long-Term Ecological Research (LTER) project initiated in 1997 that explores metropolitan Baltimore as a social-ecological system. BES is one of two LTER sites that began with an urban and interdisciplinary focus. The research program advances scientific understanding of urban ecosystems and serves as a resource for education and decision making by communities and land managers responsible for sustaining livelihoods and quality of life for millions of citizens in the Baltimore metropolitan area. The project involves researchers and educators from the Northern Research Station and over 30 colleges, universities, community groups, and government agencies.



### Assets:

**Scientists:** 6 Northern Research Station scientists are conducting research affiliated with the Baltimore Ecosystem Study (2 on-site, 4 off-site)

**Scientific Support:** 2 on-site and 2 off-site full-time technicians and/or professionals and up to 5 part-time technicians support the work of these scientists

**Cooperators:** Cary Institute of Ecosystem Studies administers the project, and the Center for Urban and Environmental Research and Education and the University of Vermont's Spatial Analysis Laboratory are primary cooperators, plus an additional 30 or more government agencies, universities, and community groups.

### Needs:

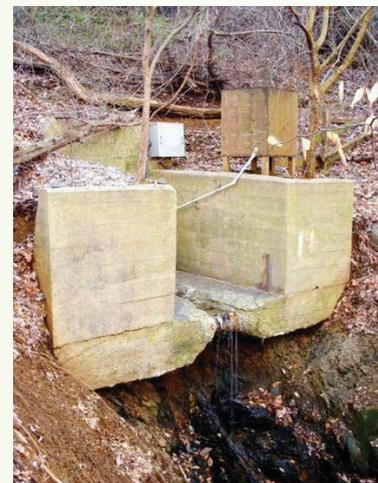
**Annual operating costs:** \$822,000

#### Critical Needs

- Climate controlled and regular storage facilities
- 3 gauging stations in area of eddy flux tower
- Household data collections
- Remotely sensed imagery
- Permanent technical support staff and half-time GIS/cartographic staff

#### Long-term needs:

- Permanent laboratory and office space
- Administrative support staff
- GIS Computational Capacity (hardware and software)



**The Baltimore Ecosystem Study is hosted by:**

Center for Urban and Environmental Research and Education  
1000 Hilltop Circle, Baltimore, MD 21250

Key Contact:

Kenneth Belt, 410-455-8011, email [kbelt@fs.fed.us](mailto:kbelt@fs.fed.us)

# More About the Baltimore Ecosystem Study (BES)

**Location:** Lat: 39°24'47" N, long. 76°31'19" W

The Baltimore Ecosystem Study encompasses the city of Baltimore, MD, and the surrounding 5-county area.

**Vegetation:** The Baltimore city and county area includes nearly 60,000 ha of intact forests, some 120 years old or older. The Baltimore metropolitan area was previously dominated by hardwood deciduous forests with smaller areas of riparian and wetland vegetation. After European colonization and before the development of the city, the forested areas were transformed to agricultural uses. Forest cover, mostly outside the city, is dominated by chestnut oak, yellow-poplar, box elder, green ash, sycamore and silver maple. Overall, Baltimore city has a canopy cover of approximately 21 percent with the majority of tree stems occurring in remnant forest patches, vacant land, and residential areas that are dominated by ash species, American elm, American beech, black cherry, black locust, and tree-of-heaven.

**Climate:** The Baltimore metropolitan area has hot humid summers and cold winters with average annual air temperatures of 58 °F (14.5 °C) in the city. Precipitation is distributed evenly throughout the year and average 43 inches (108 cm) per year in the city of Baltimore. The greatest rainfall intensities occur in the summer and early fall.

**Research—past and present:** Research outcomes include an urban watershed monitoring network for water quality and flows (13 gauging stations installed); a network of permanent (11) and extensive (400) plots to measure various ecosystem characteristics; the only permanent urban eddy flux tower in the U.S.; development of innovative low-impact storm water management techniques; assessments of community well-being and social capital and relating these measurements to environmental quality and stewardship; long-term U.S. Census data (1790-present) and parcel level data (1880-present) related to landuse and landcover change, environmental justice, and valuation of ecosystem services; development of management and planning tools such as iTree and urban tree canopy protocols; and the implementation of classroom enrichment, teacher training, and science instruction throughout the Baltimore region, including training and recruitment of minorities into natural resource professions.



**Research opportunities:** The Baltimore Ecosystem Study program encourages researchers from the biological, physical, and social sciences to collect new data and synthesize existing information on how the ecological, social and engineered systems of Baltimore interact and work. As a part of the National Science Foundation's Long-Term Ecological Research network, BES also seeks to understand how Baltimore's human ecosystems change over long time periods (e.g., decades).

**Facilities:** The Baltimore Ecosystem Study is equipped with an Ameriflux eddy flux tower and 13 urban watershed stream monitoring stations. There are 11 permanently marked vegetation/soil monitoring plots, over 400 geographically referenced 0.1 ha plots, long-term household (3,300 telephone, 999 field observation) and neighborhood surveys (26), and a comprehensive, long-term GIS database of the Baltimore metropolitan area.

More information can be found at: <http://beslter.org/>