EnviroAtlas

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Integrating Local "Green" Assets into Brownfields Redevelopment: Tools and Examples

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Abstract

EnviroAtlas is a free, online public mapping tool that characterizes green infrastructure and its connection to human health and wellness. The high resolution data contained in this tool can be used to incorporate local green infrastructure into brownfields redevelopment to benefit public health. Quantitative and qualitative environmental mapping tools, combined with methods such as Health Impact Assessment (HIA), can help decision makers assess and optimize a broad spectrum of project consequences. EnviroAtlas can be used by HIA practitioners, planners, researchers, public health professionals, and engaged citizens to gain a greater understanding of the linkages between a community's "green" assets and their benefits including promoting physical activity, cognitive function, children's health, and environmental justice.

A guide for using EnviroAtlas to integrate community green space into HIA has been developed to close data gaps and increase the utilization of available tools. High-resolution green infrastructure data and information may be of particular interest for brownfields HIAs due to the environmental health implications of brownfields sites.

Background

What is EnviroAtlas?

EnviroAtlas is a suite of tools and resources that includes an ecosystem services mapping application and an Eco-Health Relationship Browser. Hundreds of data layers for the contiguous US and select communities can be viewed in the interactive mapping application or downloaded for further analysis. Data for natural resources, potential stressors, and demographics are available, lending support to a systems approach to considering health in decision-making. Additionally, the Eco-Health Relationship Browser provides a review of the current state of eco-health science, focusing on the hazard buffering and health promotional benefits of green infrastructure.

What is HIA?

Health Impact Assessment (HIA) provides a methodology for incorporating considerations of human health into planning and decision-making processes. HIA promotes interdisciplinary action, stakeholder participation, and timeliness, and takes into account equity, sustainability, and best available evidence.

Brownfields and HIA

HIA can provide a systematic way to consider health in brownfields redevelopment. In addition to reducing the risk of human exposure to environmental contamination, brownfields redevelopment assessment can provide the opportunity to add health-promoting assets to a community, such as parks, shade trees, and community gardens.

HIA and Ecosystem Services

Many of the decisions that we make, from how we develop the infrastructure in our communities, to the ways that we manage surrounding land and resources, affect public health through their impacts on the provision of ecosystem services (Figure 1).

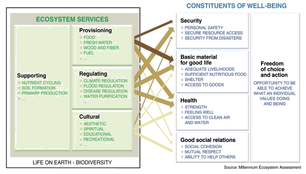
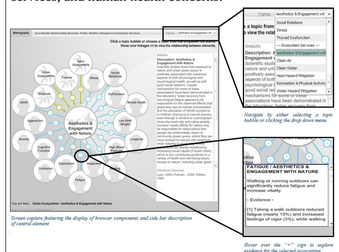


Figure 1: Model of the relationship between ecosystem services and human well-being (Millennium Ecosystem Assessment 2005).

Eco-Health Relationship Browser

The Browser is a tool that visually illustrates linkages between key ecosystems, ecosystem services, and human health concerns.



Screen capture featuring the display of browser components and side bar description of central element

Figure 2: Screen captures from the Eco-Health Relationship Browser

While developed from a broad selection of recent, peer reviewed evidence, the Browser is not exhaustive. Most of the studies included highlight statistically significant, plausible associations rather than cause-effect relationships.

The Eco-Health Relationship Browser may aid in HIA by:

- Identifying issues of concern for assessment
- Illustrating the evidence-based connections between health and ecosystem services
- Highlighting the potential outcomes of different decision alternatives
- Providing examples of how relationships between ecosystems, ecosystem services, and health have been previously assessed

Recommended EnviroAtlas Resources for Each Step of the HIA Process

SCREENING	SCOPING	ASSESSMENT	RECOMMENDATIONS	REPORTING	MONITOR/ EVALUATE
Determine the need and value of an HIA	**Determine who will be involved, what will be evaluated, analysis methods, and a plan and timeline**	**Profile existing health conditions; Evaluation of impacts and consideration of sub-populations**	**Strategies to address selected health impacts**	**Develop final report; Communicate findings**	**Track impact of HIA (process, decisions & health outcomes)**
Eco-Health Relationship Browser Documents potential health impacts related to natural resources	**Eco-Health Relationship Browser** Can guide selection of potential HIA focus areas	**Interactive Map** Ecosystem services layers can be overlaid with demographics	**Eco-Health Relationship Browser** Highlights the potential outcomes of different decision alternatives	**Mapping & Analysis Tools** Maps can be created and printed directly from EnviroAtlas	
Interactive Map Helps to identify environmental stressors and disparities	**Fact Sheets** Highlight the environmental, social, and economic importance of ecosystem services	**Mapping & Analysis Tools** Overlay local data onto the online tool or use drawing/analysis tools	**Fact Sheets** Contain suggestions on the application of each EnviroAtlas map to public health and well-being		
Case Studies & Use Cases Provide examples of EnviroAtlas applications (under development)		**GIS Tools** Download GIS tools to further assess existing conditions	**Case Studies & Use Cases** Can provide examples of applications to health (under development)		
Fact Sheets Contain information on relevance of each EnviroAtlas map to public health and well-being		**Metadata** Support detailed understanding or additional analysis of EnviroAtlas metrics/data			

Figure 3: Where EnviroAtlas resources can be used at each step of the HIA process

Figure 4: Fact sheet for the community map Percent Tree Cover

Interactive Map

The interactive map is a primary component of EnviroAtlas. EPA researchers and partners are developing and incorporating the best available science to map and analyze indicators of ecosystem services, societal demands for them, and their stressors. Data are summarized at two scales: 12 digit hydrologic watershed basins (12-digit HUCs) for the contiguous United States, and U.S. Census block groups for selected communities. Finer-scaled data are also available online.

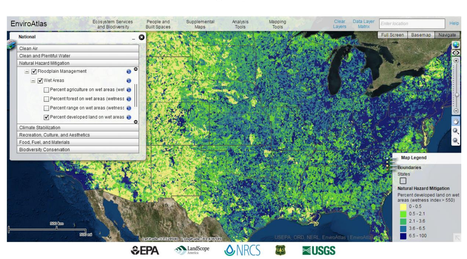


Figure 5: Screen capture of Interactive Map displaying Percent Developed Land on Wet Areas for the Nation

Ecosystem Services and Biodiversity data are organized into seven benefit categories:

- Clean air
- Clean and plentiful water
- Natural hazard mitigation
- Climate stabilization
- Recreation, culture, and aesthetics
- Food, fuel, and materials
- Biodiversity conservation

The community component includes high-resolution social and economic benefits estimation, and information on health issues associated with each benefit category.

A few examples of the topics included in the community component are:

- Residential proximity to green space and walking distances to parks
- Potential of near-road tree cover to buffer air pollution from traffic
- Capacity of natural vegetation to protect water quality and reduce urban heat-island effect
- Adverse health events avoided and dollars saved due to air pollutant removal by trees

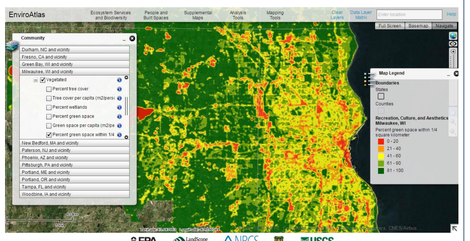


Figure 6: Screen capture of Interactive Map displaying Percent Green Space within ¼ square kilometer in Milwaukee, WI

EnviroAtlas Case Studies and Use Cases

Tree Planting: As a part of the project *Trees Across Durham*, EnviroAtlas community data for Durham, NC, were used to aid in prioritizing planting locations that maximize the environmental, social, and economic benefits for the public.

Conservation of Natural Lands: The *Southeast Atlantic Landscape Conservation Cooperative* has used EnviroAtlas data layers to help them develop a stakeholder-driven conservation blueprint for the region.

Community Education: The Eco-Health Relationship Browser and EnviroAtlas community 1 meter resolution land cover maps are utilized as a part of the *Durham Neighborhood Compass*. The compass was developed to aid community members in identifying where their public service efforts may have the greatest impact.

Green Infrastructure and Select 2015 Brownfields Assessment and Cleanup Grant Awardees

City of New Bedford, MA

Brownfields site: Payne Cutlery Neighborhood, **a former industrial and mill housing area**

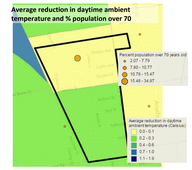
Goals: Build upon initial **planning for the reuse** of the former Payne Cutlery Mill site and other underutilized areas in the neighborhood, plan for **short-term recreational uses** of the future South Coast Railway site

How EnviroAtlas maps can help weigh 3 proposed redevelopment scenarios by Paul Lukez Architecture:

1. Recreation and Wellness

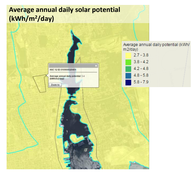
Existing opportunities for recreation and wellness can be examined with the EnviroAtlas maps, Estimated Walking Distance to the Nearest Park Entrance, and Percent Residential Population within 500m of a Park Entrance. These maps demonstrate relatively low access to parks. Close park proximity may be especially important for youth, so the population under 13 for each block group can be overlaid to add an additional perspective.

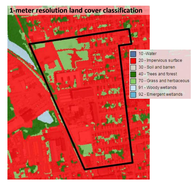
2. Food and Entrepreneurship



The suitability of the neighborhood for food and entrepreneurship redevelopment is affected by the availability of green space for aesthetics, walkability, and heat mitigation. Due to the relative lack of green space, redevelopment plans may want to consider residential access to or views of the gardens, and additional street trees. An assisted living center would bring in an older population that is vulnerable to heat, so temperature reductions by tree cover may improve their safe access to the outdoors.

3. Energy and Technology





Maps of average annual daily solar potential and land cover, found among the EnviroAtlas national and supplemental maps, help put the potential energy sources into perspective. Average annual daily solar potential can help estimate if the energy output would meet desired levels before a detailed analysis is performed. Examination of the land cover can reveal how the placement of solar fields may change the distribution of local tree cover and other green space that currently provide benefits to the neighborhood.

City of Milwaukee, WI

Brownfields site: Greenfield Avenue Sub-District in Milwaukee's Harbor District: **66 acres of vacant and underused brownfields** surrounded by some of Wisconsin's highest density, most predominantly minority, and lowest-income neighborhoods

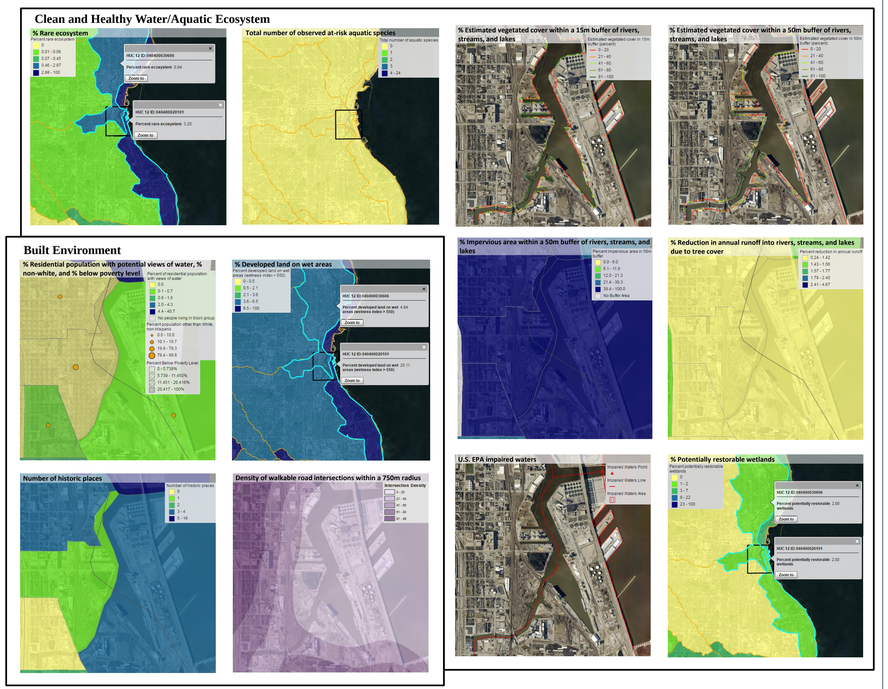
Goals: The planning process will provide market analysis and **land use recommendations**, reconcile conflicts in prior plans, and address road and freight **connectivity** concerns for the entire industrial area. The development and success of this plan are expected to help the city continue implementing its **economic and cultural strategy for sustainable infrastructure** redevelopment along the Lake Michigan waterfront. Redevelopment plans also emphasize revitalizing the ecosystem and economy.

Clean and Healthy Water/Aquatic Ecosystem

EnviroAtlas contains both national and community level indicators of healthy waterways and ecosystems. Sustainable redevelopment may require considering ecosystem health and the benefits that a functioning ecosystem can provide to waterfront developments. Green infrastructure, such as vegetation near waterfronts, can decrease polluted runoff after heavy rains. EnviroAtlas also has measures of current ecosystem health, such as presence of rare ecosystems, at-risk species, and impaired waters. Plans for revitalizing the ecosystem can use the percent potentially restorable wetlands map to assess the maximum amount of restoration possible.

Built Environment

EnviroAtlas maps feature selected aspects of the built environment. Despite the proximity to bodies of water, only a small percentage of residences have a potential view of water, which can benefit cognitive function and mood. Intersection density of walkable roads indicates pedestrian connectivity and walkability. The percentage of developed land on wet areas may be important for developers to know before designs are completed. Identifying the number of historic places adds context to the area for redevelopment and can inform developers of the cultural significance of the area.



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