What Changed, How, and When?

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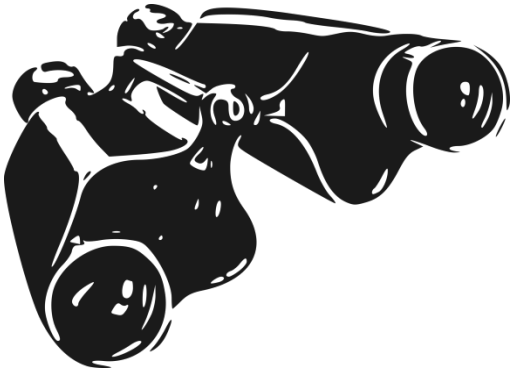
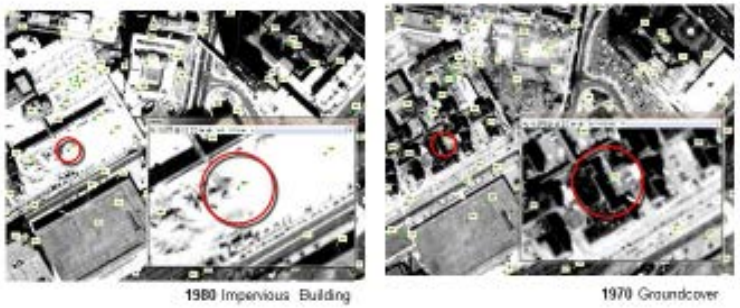
Monitoring Change



Canopy change: aerial photos

Lara Roman
Research
Ecologist



Assessing Ecosystem Services

Table 9.—Summary of urban forest features, Philadelphia parklands, 2012

Feature	Estimate
Number of trees[a]	1,100,000
Tree cover	64%[b]
Most abundant species by:	
Number of trees	ash species, boxelder, spicebush, black cherry, American beech
Leaf surface area	American beech, tulip tree, sycamore species, ash species, black cherry
Trees 1-6 inches d.b.h.	66.7%
Pollution removal	179 tons/year ($6.6 million/year)
VOC emissions	54 tons/year
Carbon storage	273,000 tons ($19.4 million)
Carbon sequestration	6,900 tons/year ($489,000/year)
Value of reduced building energy use	$21,400/year
Value of reduced carbon emissions	$2,400/year
Compensatory value[c]	$350 million

[a] all woody vegetation > 1 inch d.b.h.

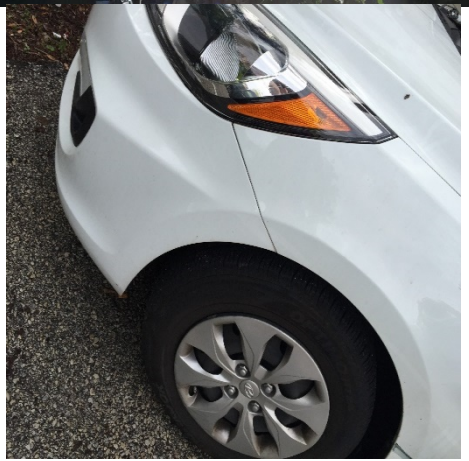
[b] assessed using LiDAR in an earlier report (O'Neil-Dunne 2011)

[c] Estimated value of compensation for the loss of the urban forest structure (a value of the forest's physical structure)

Note: ton = short ton (U.S.) (2,000 lbs)

(Nowak et al, 2016 in p

Canopy Loss Due to Deforestation and Pests



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- Roman, L.A., L.A. Walker, C. Martineau, D. Muffly, S. MacQueen, W. Harris. 2015. Stewardship matters: Case studies in high urban tree survival. Urban Forestry & Urban Greening 14: 1174-1182.
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- Heath, Linda S.; Anderson, Sarah M.; Emery, Marla R.; Hicke, Jeffrey A.; Littell, Jeremy; Lucier, Alan; Masek, Jeffrey G.; Peterson, David L.; Pouyat, Richard; Potter, Kevin M.; Robertson, Guy; Sperry, Jinelle; Bytnerowicz, Andrzej; Jovan, Sarah; Mockrin, Miranda H.; Musselman, Robert; Schulz, Bethany K.; Smith, Robert J.; Stewart, Susan I. 2015. Indicators of climate impacts for forests: recommendations for the U.S. National Climate Assessment indicators system. Gen. Tech. Rep. NRS-155. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 143 p.
- Brandt, Leslie; Lewis, Abigail Derby; Fahey, Robert; Scott, Lydia; Darling, Lindsay. 2016. A framework for adapting urban forests to climate change. Environmental Science & Policy. [In PRESS Available 23 June 2016].[Date Accessed 9-14-2016].[No volume].[No issue]: 1-10.
- Prasad, Anantha M.; Iverson, Louis R.; Matthews, Stephen N.; Peters, Matthew P. 2016. A multistage decision support framework to guide tree species management under climate change via habitat suitability and colonization models, and a knowledge-based scoring system. Landscape Ecology. 31: 2187-2204. doi: 10.1007/s10980-016-0369-7
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