State of the Urban Forest

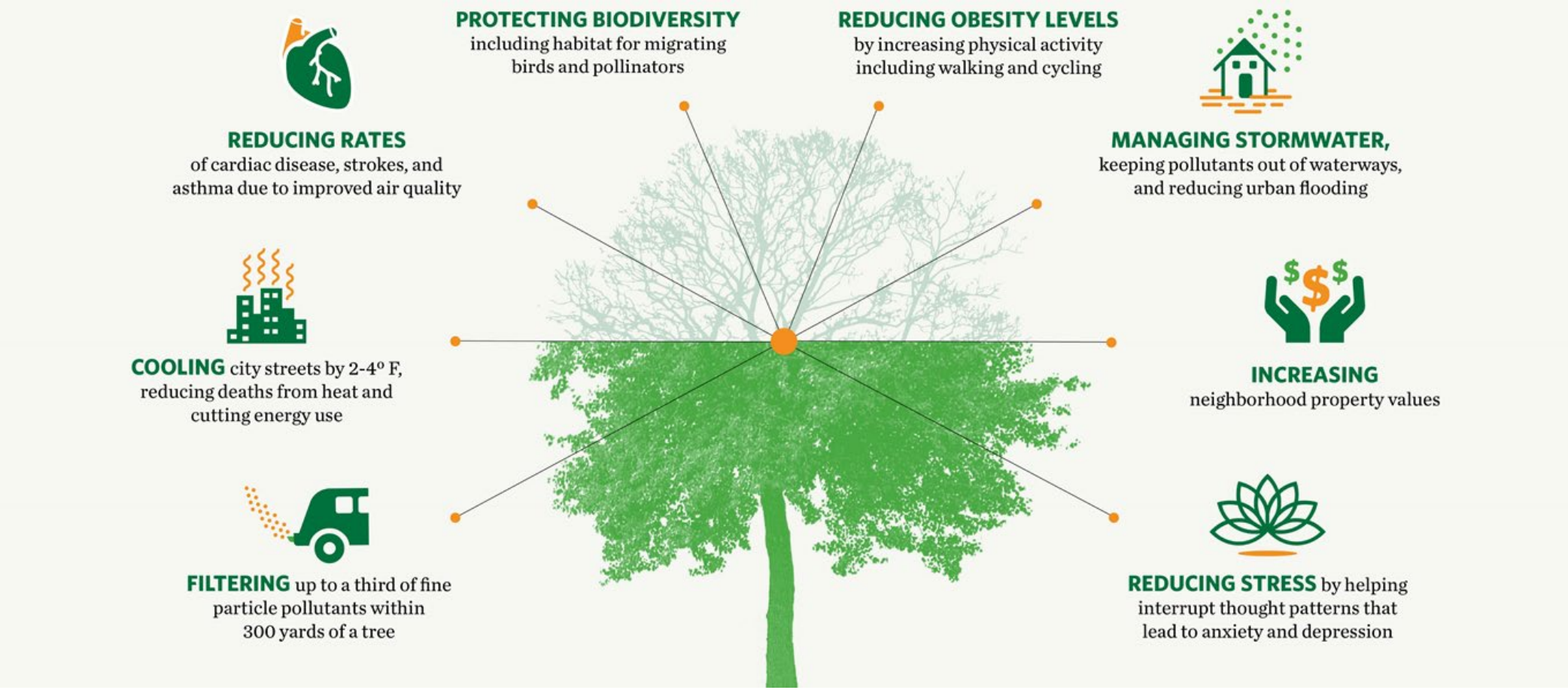
2023 Urban Forestry Assessment

- Crystal Courtney – Natural Resources, Division Manager
- Robin O. Hunt – Natural Resources, Forestry Supervisor
- Matt DiBona – Sr. GIS Analyst

Outline:

- State of the Urban Forest – Benefits and Cincinnati urban tree canopy (UTC)
- How the Urban Forest is Managed – Cincinnati Urban Forestry Program
- How the assessment process works
- Budgetary shortfall
- Recommendations for 2023 (FY24) Assessment

Benefits of Urban Tree Canopy

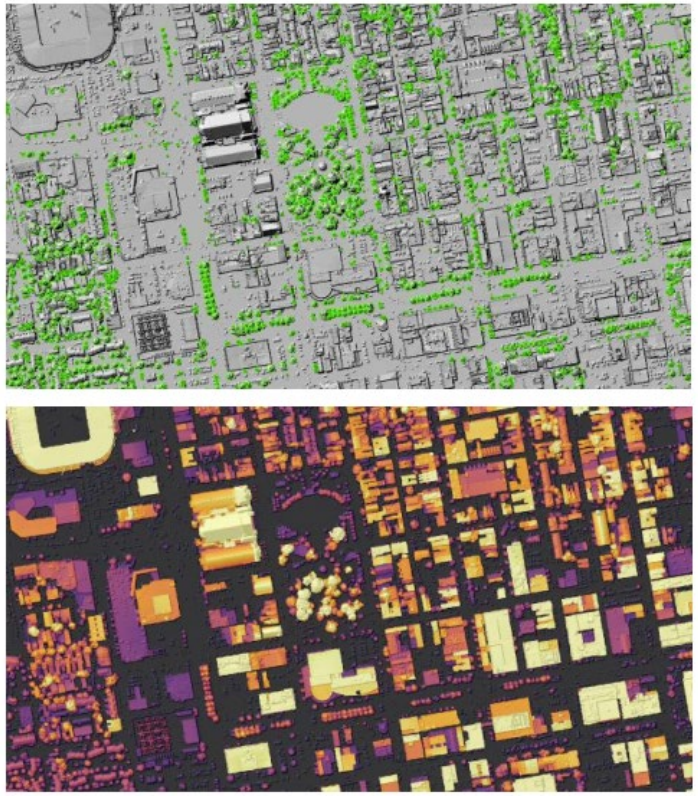


Urban Tree Canopy Analysis (UTC) *2020*

Remote sensing technology & GIS to provide mapping and analytics of our canopy and more

USFS / ODNR Grant in Partnership with MSD, CPB & CAGIS to purchase LiDAR in 2020 for UTC & impervious surface updates

Tree Canopy Mapping



Locations of individual trees and their crowns (top) that were derived from the 2020 LiDAR (bottom).

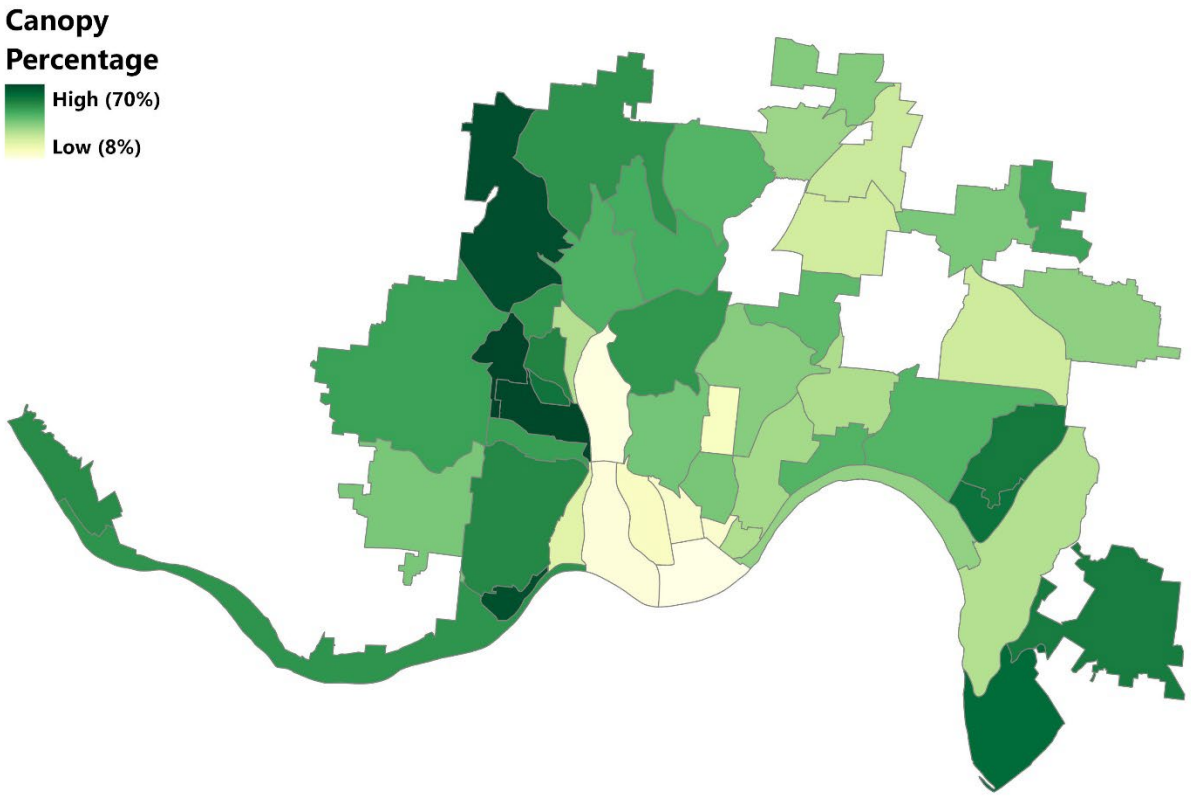
UTC 2020 Group

AppGeo · City of Cincinnati · SavATree · Guind Institute for Environment · University of Vermont Spatial Analysis Lab · ZAMIN STUDIO

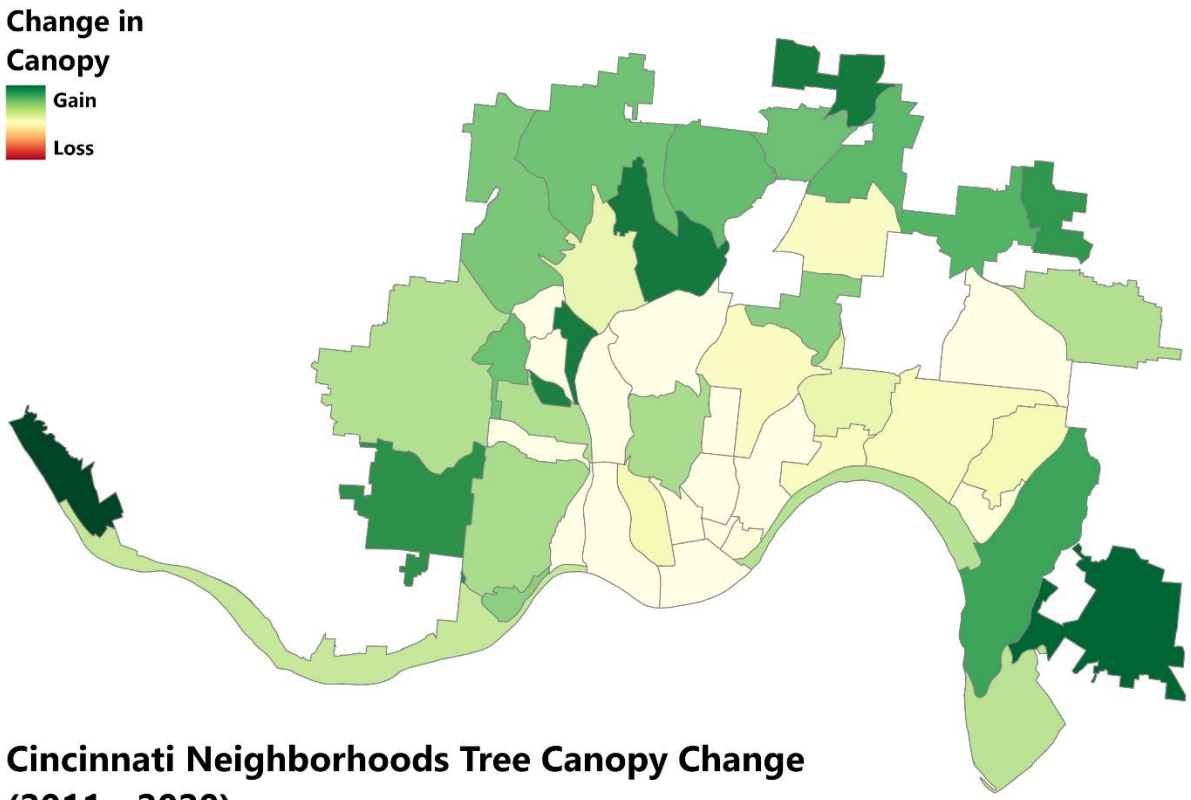
Land Cover Mapping

High-resolution land cover developed for this project.

- Cincinnati Park Board
- Metropolitan Sewage District (Impervious Surface Updates)
- CAGIS (Cincinnati Area Geographics Information System)
- OKI Regional Council of Governments
- Groundworks Ohio
- Cincinnati Office of Environment and Sustainability
- Greater Parks of Hamilton County
- Hamilton County Planning



Cincinnati Neighborhood Tree Canopy 2020



Cincinnati Neighborhoods Tree Canopy Change (2011 - 2020)

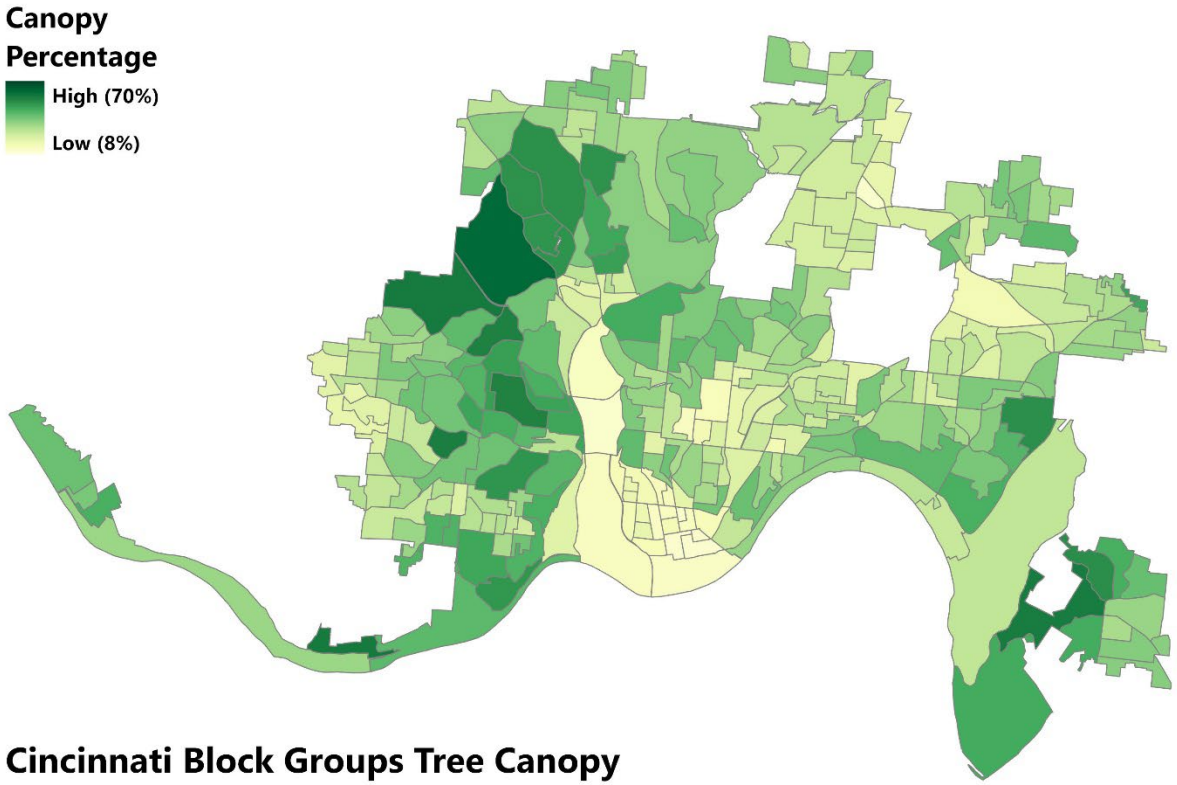
Calculated using Tree Canopy % from 2011 subtracted by Tree Canopy % from 2020, if this value is negative then this represents a loss in tree canopy over the time frame given

Cincinnati Urban Tree Canopy

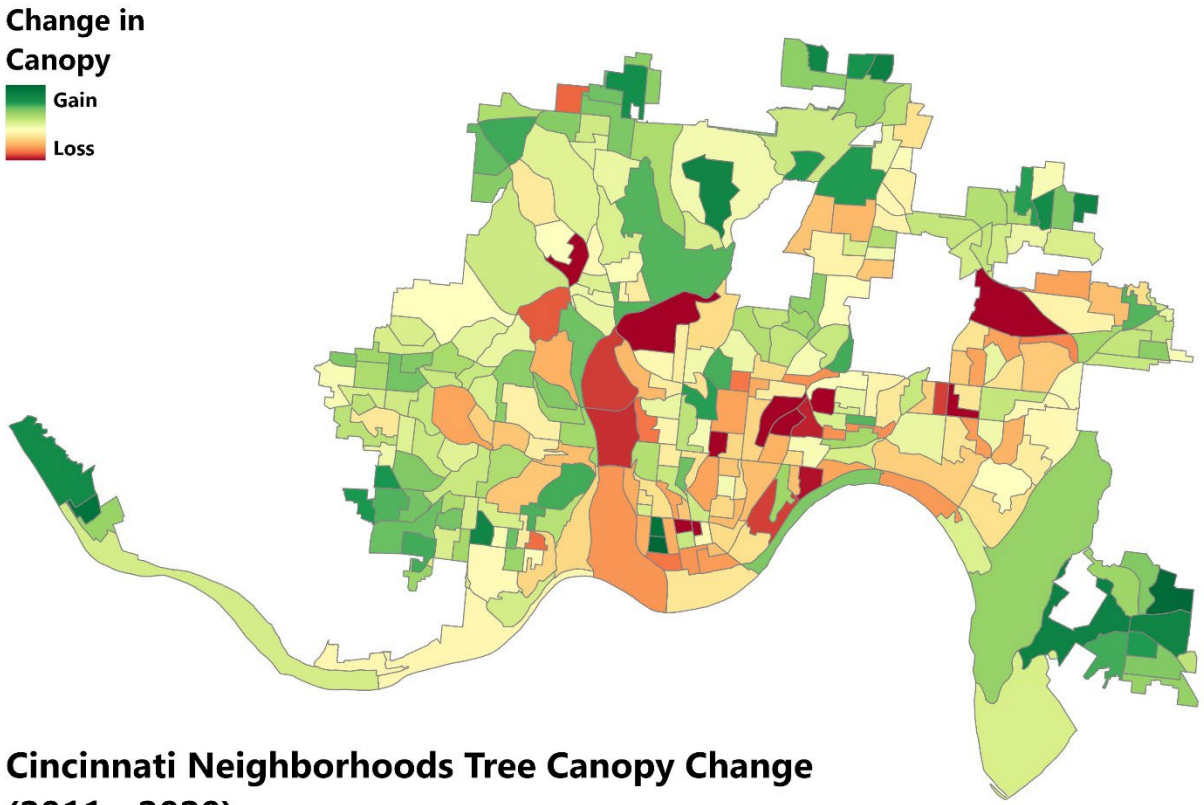
43% Tree Canopy in 2020

(Canopy Increase 38% to 43%)

*Average American City = **27%***



Cincinnati Block Groups Tree Canopy

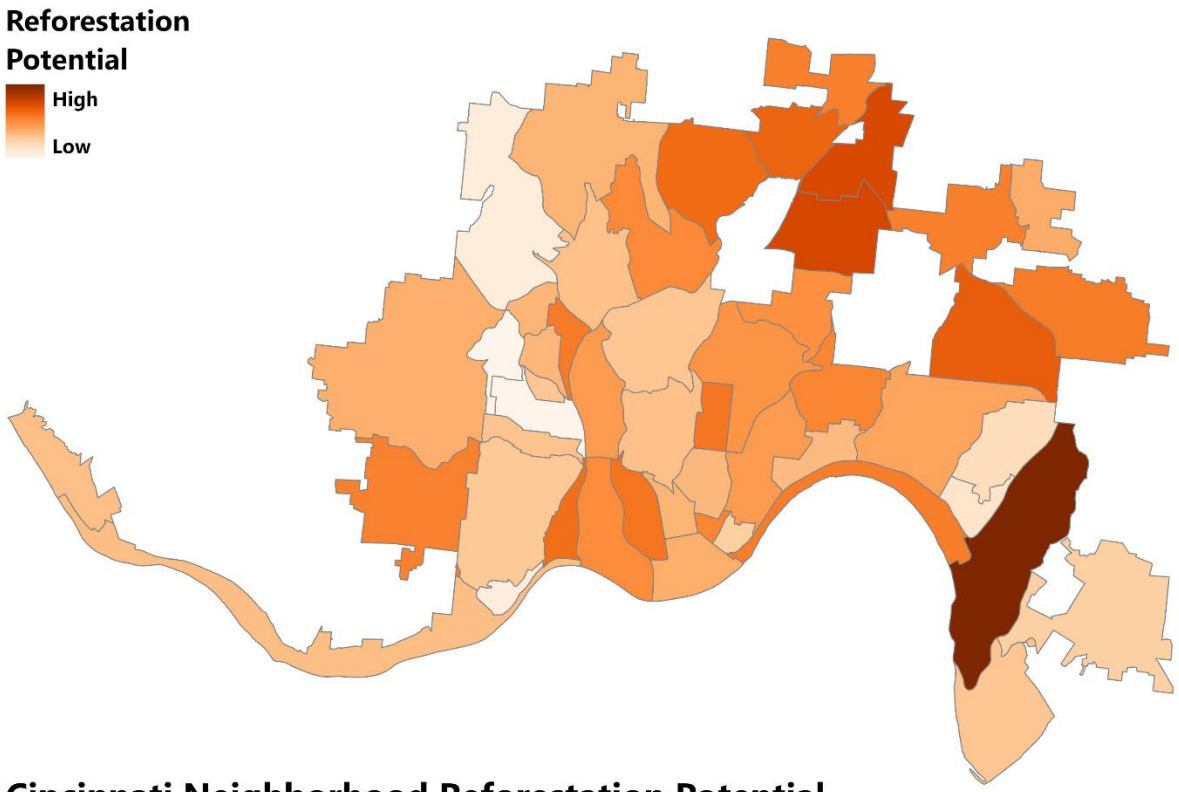


Cincinnati Neighborhoods Tree Canopy Change (2011 - 2020)

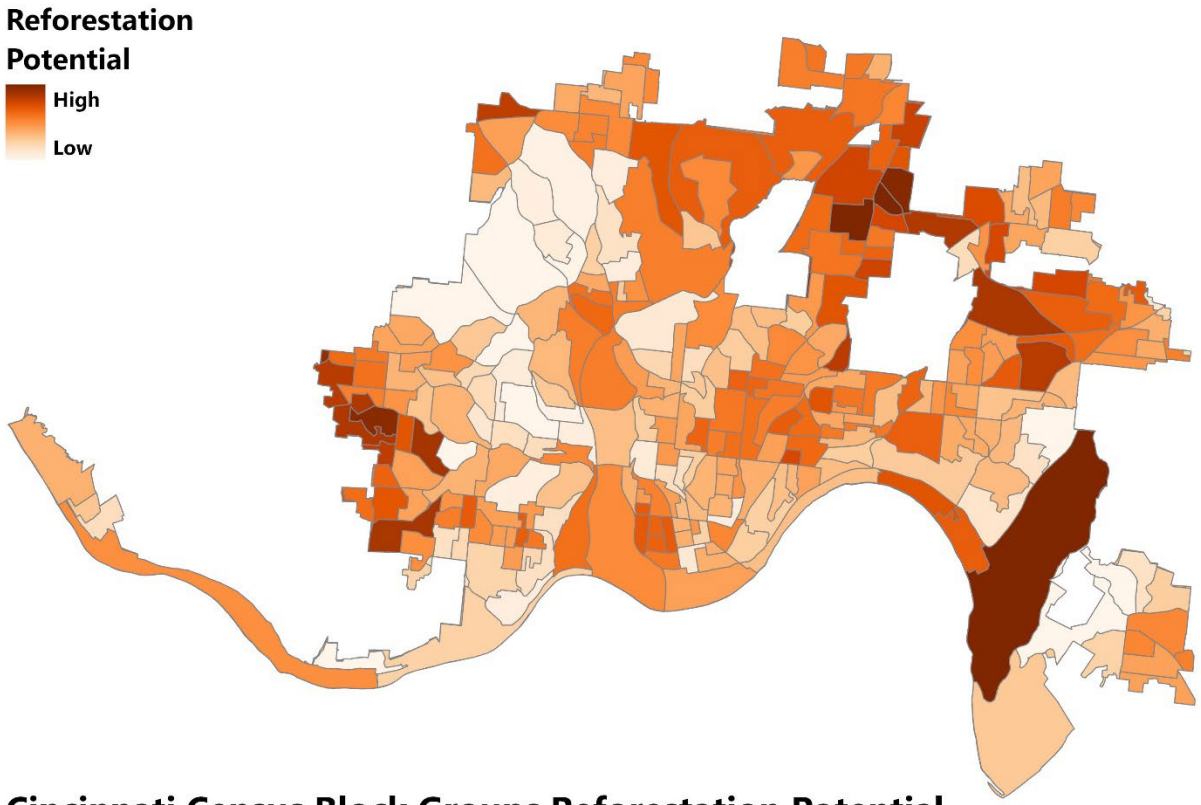
Calculated using Tree Canopy % from 2011 subtracted by Tree Canopy % from 2020, if this value is negative then this represents a loss in tree canopy over the time frame given

Cincinnati Urban Tree Canopy at the Block Group Level

Canopy loss has been felt in our communities



Cincinnati Neighborhood Reforestation Potential

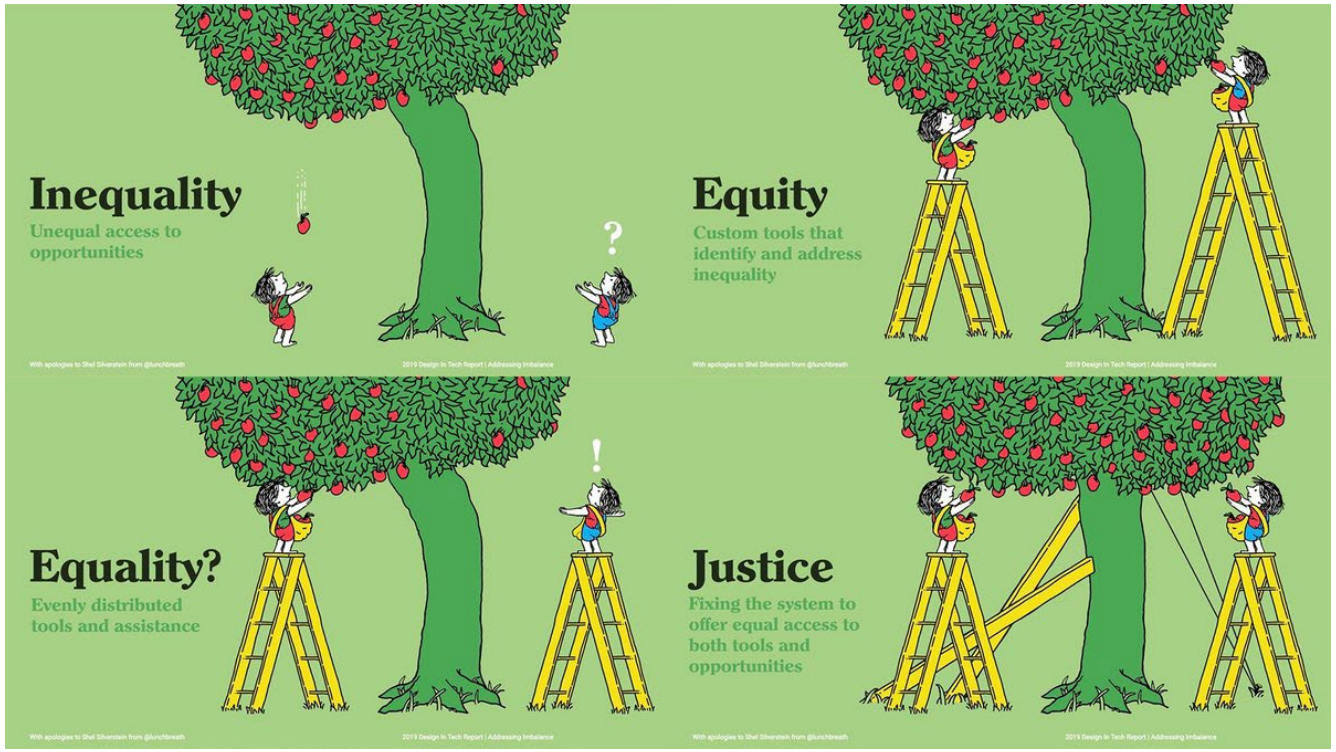


Cincinnati Census Block Groups Reforestation Potential

Cincinnati Reforestation and Canopy Investment

UTC also tells us where we can plant

In Planning a Resilient Canopy into the Future……



https://onlinepublichealth.gwu.edu/resources/equity-vs-equality/

Creating *prioritizations based on demographic groups more* ***susceptible*** *to environmental risks is critical for* ***equitable*** *and sustainable canopy investment.*

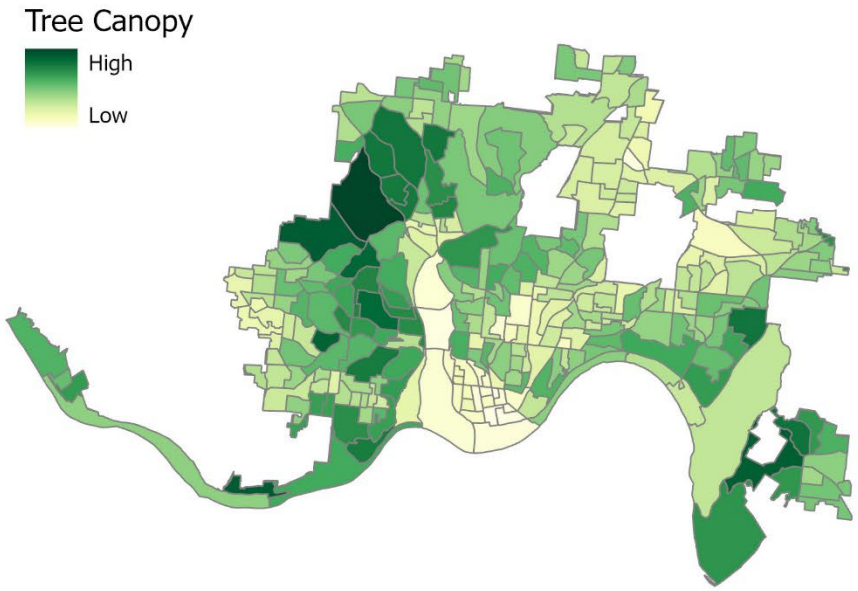
What environmental services are Just? And to whom?

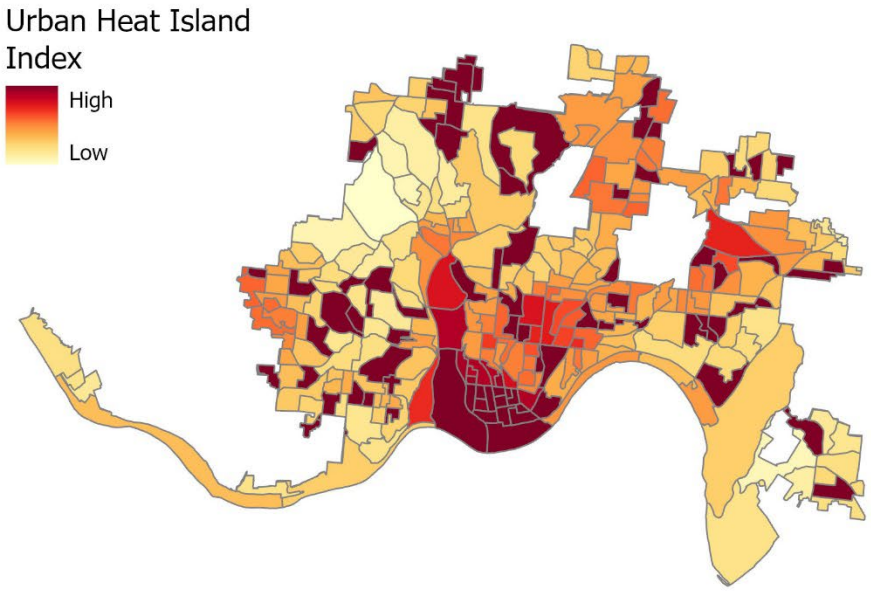
Environmental Issues

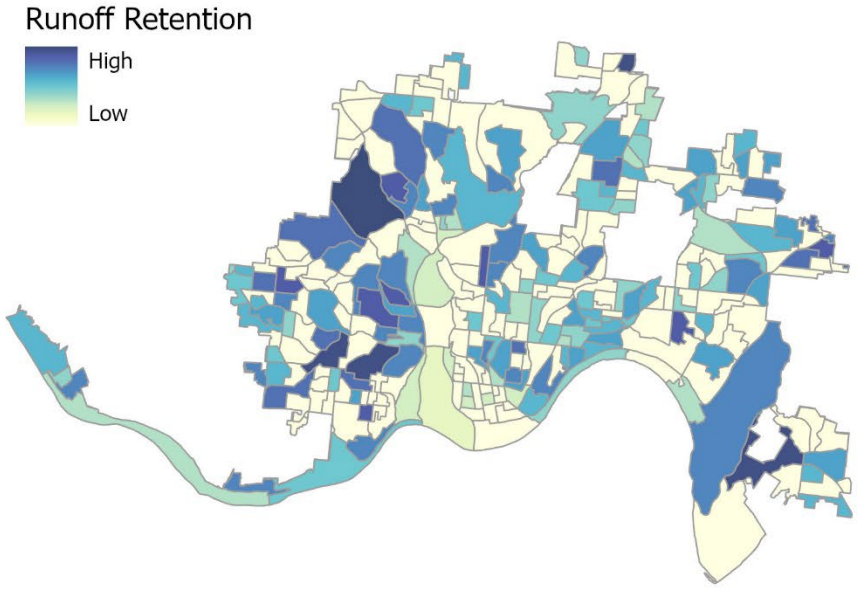
-

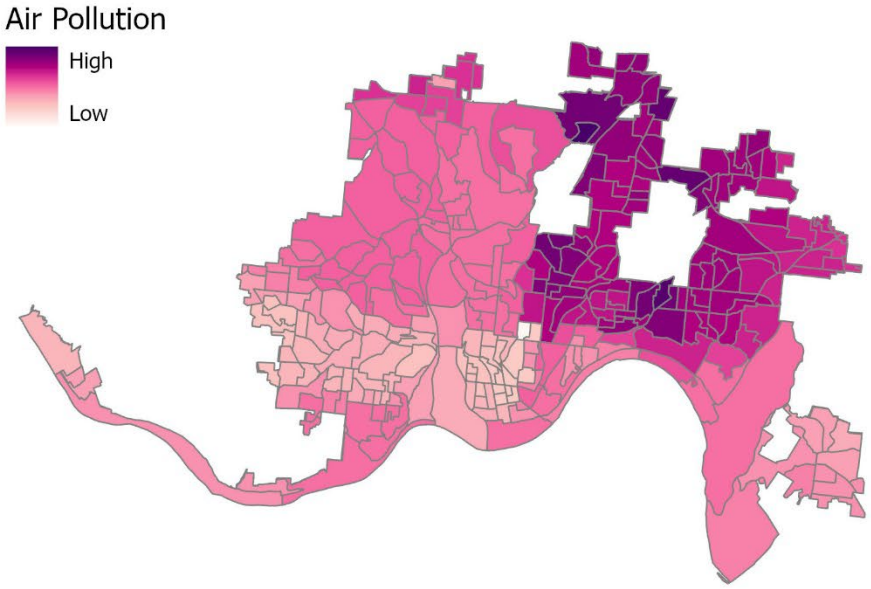
Geospatial Modeling to Determine Environmental Impacts based on InVEST Modeling

- Cincinnati Park Board
- Metropolitan Sewage District
- CAGIS
- OKI
- Groundworks Ohio
- Cincinnati Children's Hospital
- University of Vermont Spatial Analysis Lab









Equity

POPULATION Demographics

-

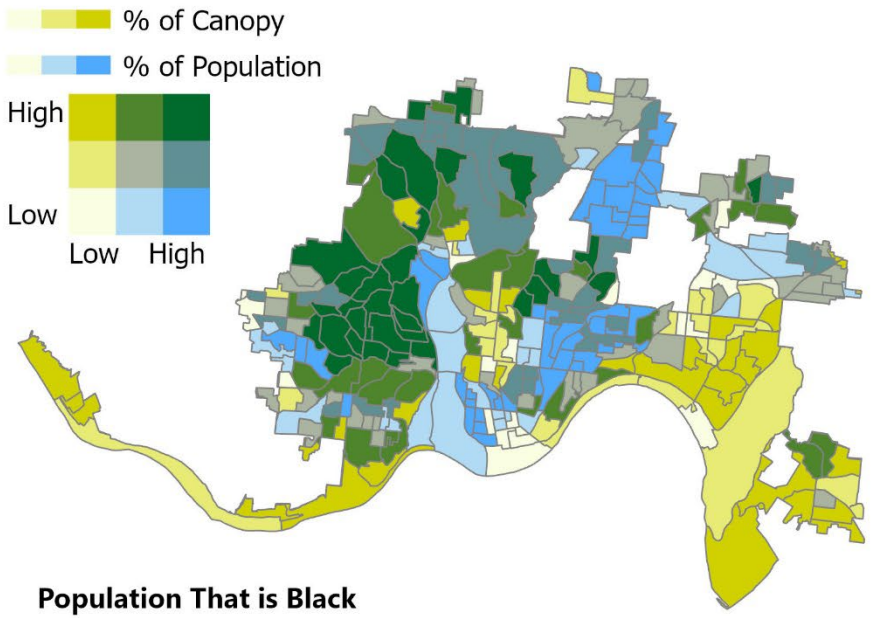
Tree Canopy in Relation to Community Susceptibility

(some of many considered)

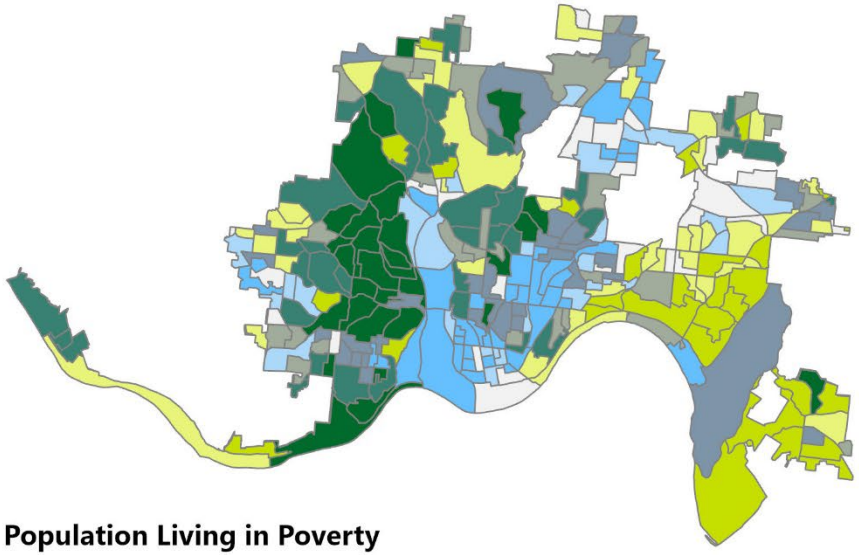
---

*Other include:

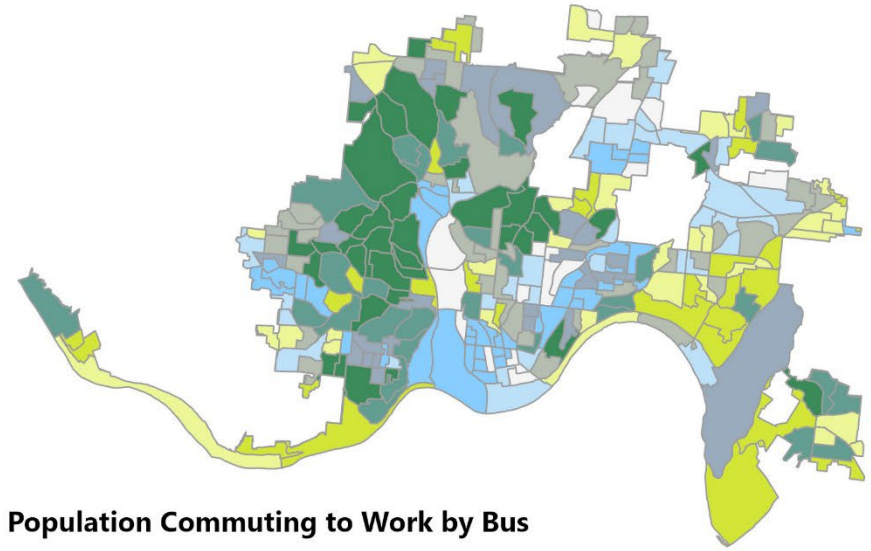
- Hispanic population
- Individuals who have suffered strokes
- Seniors older than 65
- Children younger than 5
- Individuals walking to work
- Areas with sewage overflow, and event count



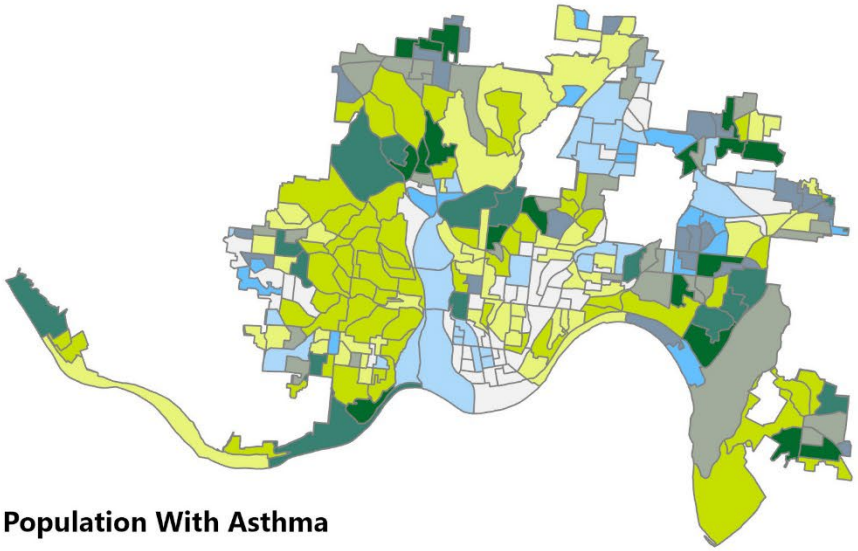
Population That is Black



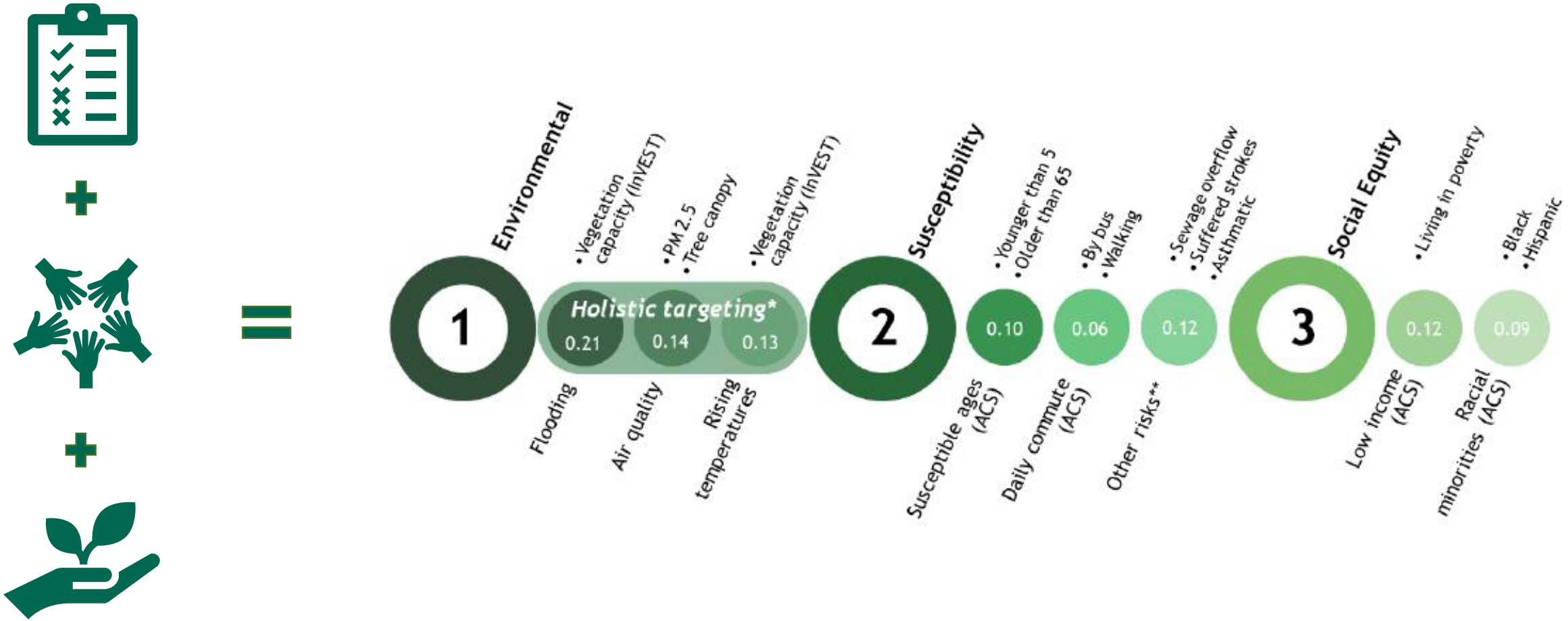
Population Living in Poverty



Population Commuting to Work by Bus



Population With Asthma



Holistic Reforestation / Urban Canopy Resilience

Equity Prioritization: ranking susceptibility and social equity variables by all stake holders

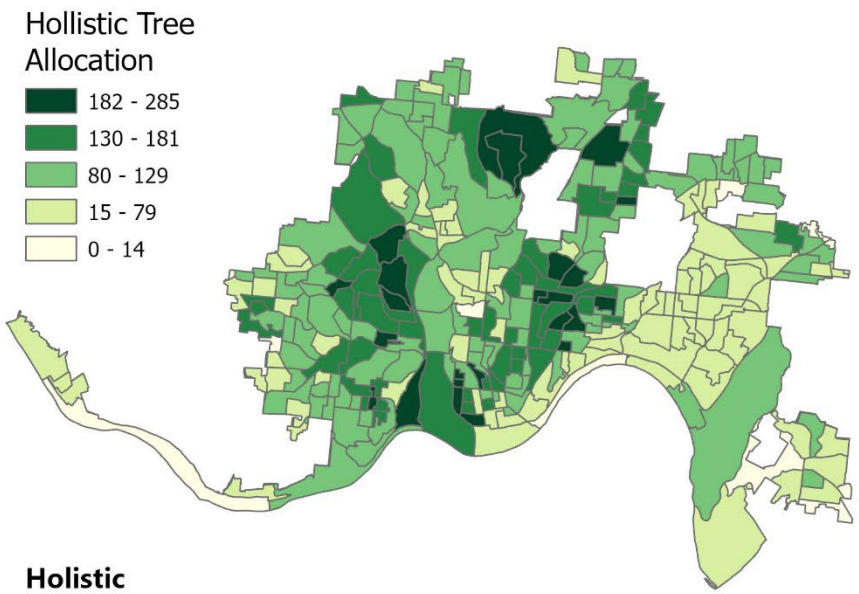
Cincinnati Park Board
Metropolitan Sewage District (Impervious Surface Updates)
CAGIS (Cincinnati Area Geographics Information System)
OKI Regional Council of Governments
Groundworks Ohio
Cincinnati Office of Environment and Sustainability
Greater Parks of Hamilton County
Hamilton County Planning

Cincinnati Reforestation Investment Plan

-

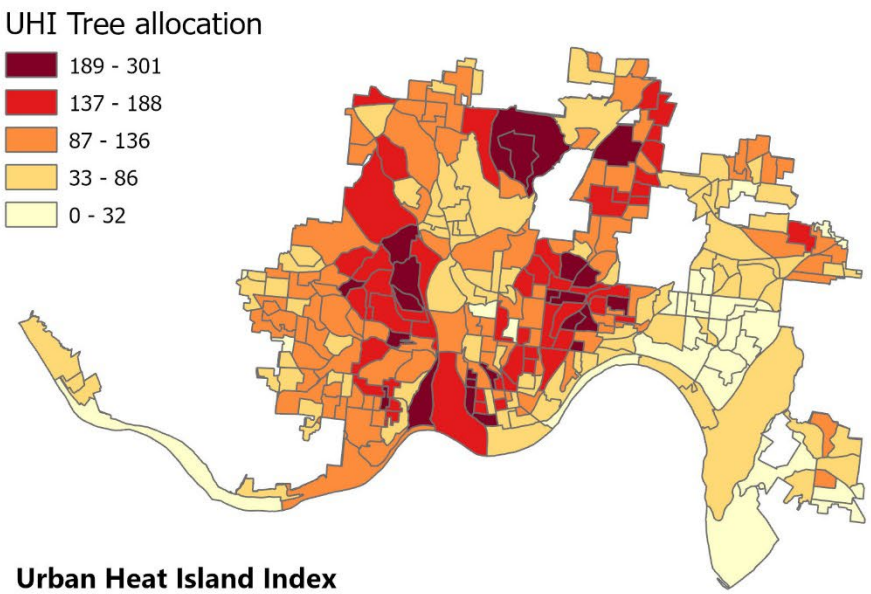
The Number of Trees to Allocate Within Target Environmental Subspeciality Areas in Cincinnati

*Out of 30,000 Trees by 2030



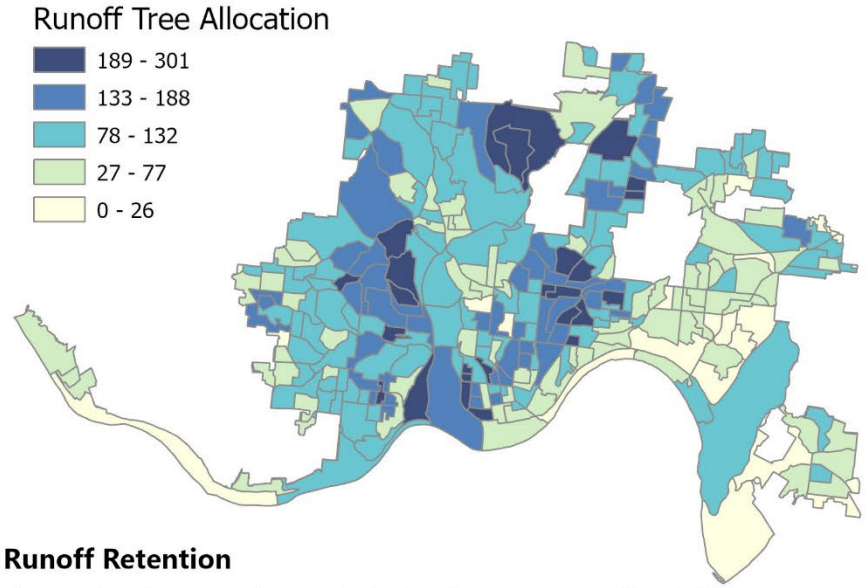
Holistic

The number of trees to allocate within the City to target all combine



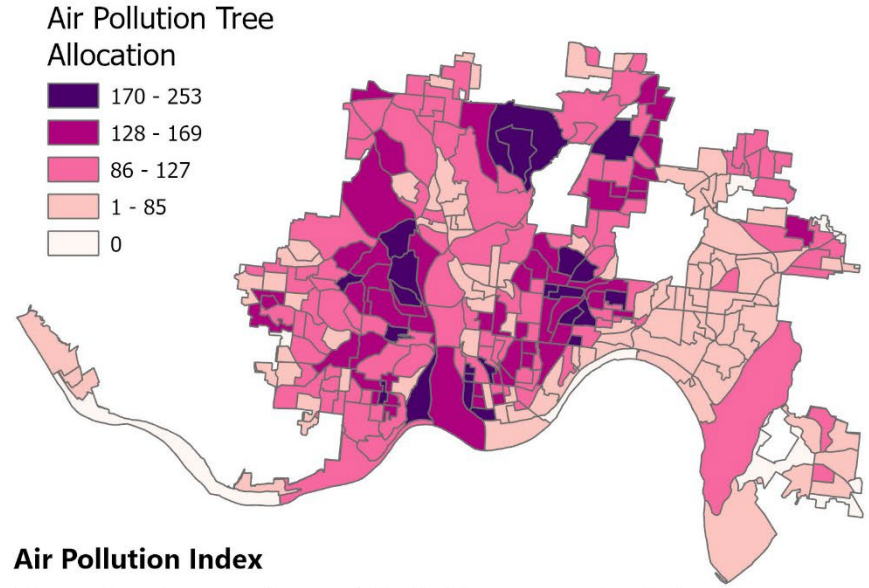
Urban Heat Island Index

The number of trees to allocate within the City to target UHI



Runoff Retention

The number of trees to allocate within the City to target runoff and CSO



Air Pollution Index

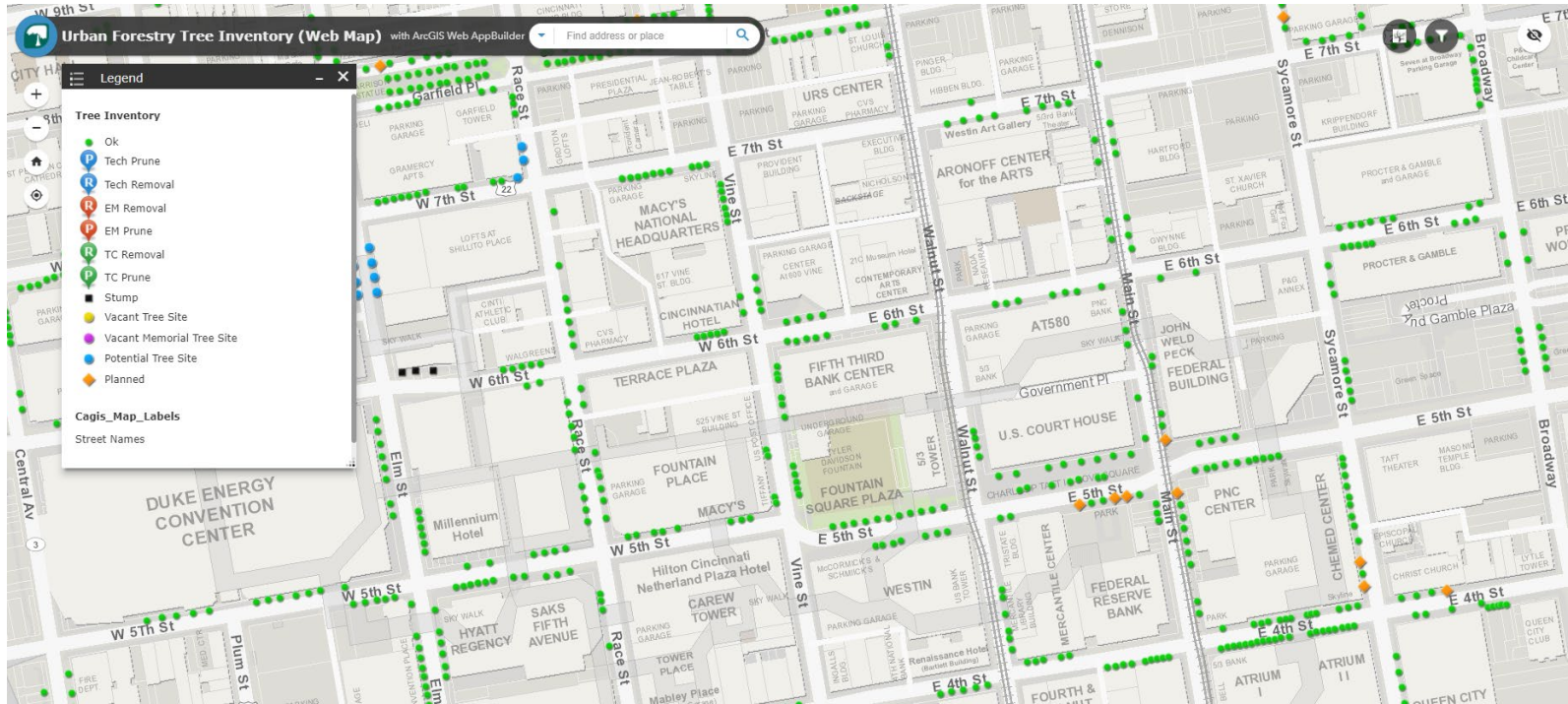
The number of trees to allocate within the City to target air pollution.

Urban Forestry Regulations

- Estimated 80,000 street trees along 1,000 miles of public right-of-way, including paper streets

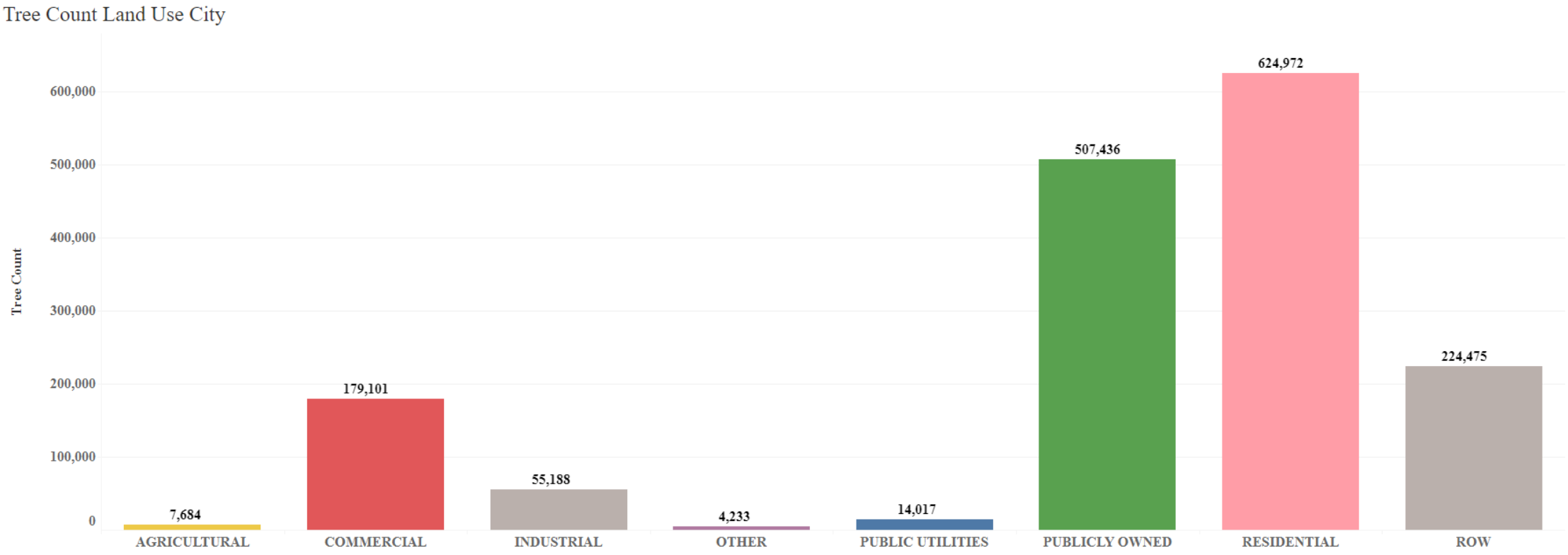
- Cincinnati UF Regulations
  - CMC 743 – Tree protection, permitting, penalties, and CUFB

- UF Funding mechanism
  - **ORC 727.011** to assess for investment and care of street trees within ROW throughout the city.



We have a lot of trees!

Urban Forestry Program manages 9% of our canopy within public right of way, funded through annual assessment – ORC 727.011



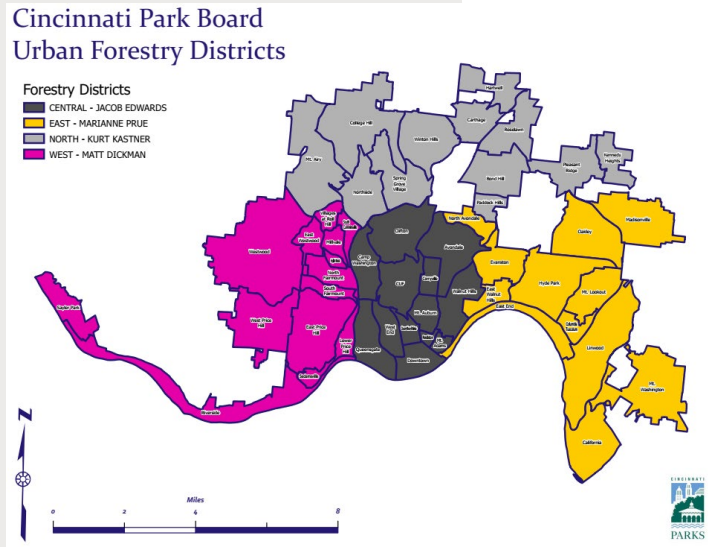
Function of Urban Forestry Program - Core Competencies

- **Front line agency providing the City:**
  - Dedicated professional arboricultural staff
  - 24-7 Emergency management
  - Management and long-term planning to reach city-wide canopy goals
  - Arboricultural guidance for:
    - Other City departments: DOTE, B&I, MSD, WW, PS, CRC, OES, CMO, etc.
    - Community Leaders: community councils, business districts and NP organizations
  - Innovative cutting-edge solutions to UF issues through:
    - Direct research – UTC analysis, Univ. Partners
    - Pilot projects – soil cells/concrete shaving, bio-char, carbon offset opportunities
    - Technological advancements – GIS integration

Who Manages the Urban Forest

Current Staffing and Roles

- 1 UF Supervisor – City Forester
  - Oversees the budget/assessment proceedings
  - Ensures the team is working towards the UF Goals set by the division, department, and City
  - Storm cleanup / On call Emergency Response
- 4 UF Specialist – 4 districts (N, S, E, & W)
  - Oversee contract management within district
    - EM, PM, Stumps, and Plantings
  - City and Community liaison for UF Issues in their district
  - Storm cleanup / On call Emergency Response
- 2 UF Technicians –
- Groundwork –
  - Small tree pruning and watering
    - Clearance for sidewalks and streets
    - Storm cleanup / On call Emergency Response
- GIS Analyst - Geospatially manages:
  - Manages the Urban Forestry Assessment Data
  - Conducts decennial Urban Tree Canopy (UTC) assessment
  - Builds maps specific to community needs/outreach/issues
  - Storm cleanup / On call Emergency Response



Urban Forestry Conflicts / Challenges

Not Warranted	• Some residents do not want trees for various reasons
Urban Growth & Expansion	• Canopy Loss due to development and construction pressure • Conflicts with sidewalks (Results in 7% to 10% of Total Removals)
Vandalism	• Trees destroyed and lost
Changing Climate	• Annual 100-year storm events resulting in tree failures • Landslide vulnerability
Diligent Risk Management	• Large living organisms in dense urban environment

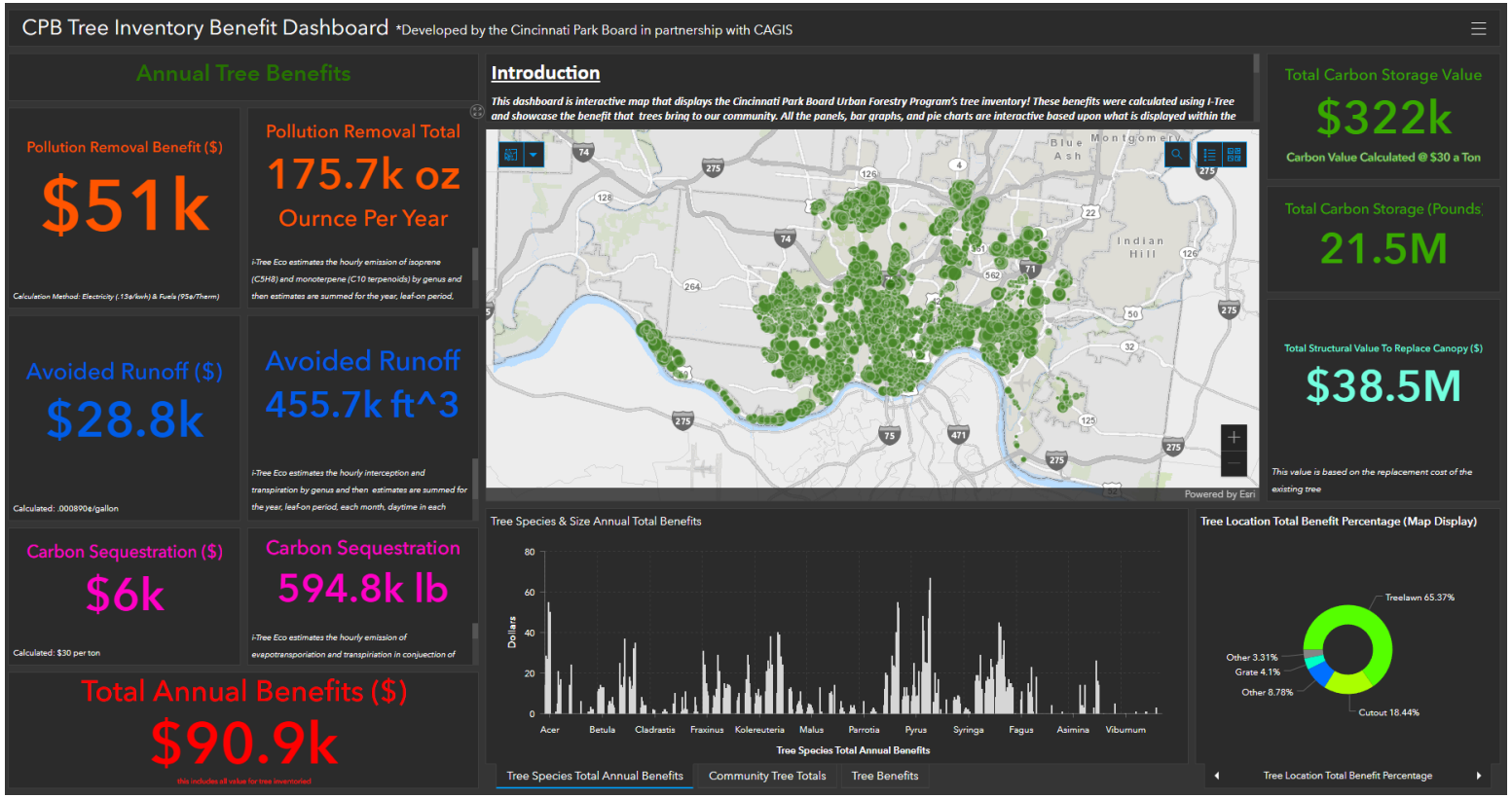
Return on Investment

Cincinnati Dashboard

- Avoided Run Off
- Carbon Storage / Sequestration
- Pollution Removal

Other Benefits not calculated

- Energy Reduction via Shade
- Property Value
- Streetscape / Walkability
- Mental Heath



Cincinnati Tree Street Tree Inventory Benefit Dashboard

https://cagisportal.maps.arcgis.com/apps/dashboards/43832a915d334d8db41f72b42eac2999

Return on Investment

- Not a defined science
- Literature varies widely on the average benefit for street trees
- Cincinnati Street Tree ROI
  - 80,000 Street Trees
  - Budget $2,379,930
  - Budget Cost Per Tree: $29.75
  - Benefit Per Tree $55* *(conservative)*
  - Annual Benefits All Street Trees: $:4,400,00
  - Annual ROI: $2,020,070

  - Dollar Spent Ratio – for every **$1** spent on a street tree the city receives **$1.85** in return

*
https://treenet.org/wp-content/uploads/2017/06/02TS-THE-ECONOMIC-VALUE-OF-TREES-IN-URBAN-AREAS_Killicoat-Puzio-Stringer.pdf

https://treenet.org/resources/the-economic-value-of-trees-in-urban-areas-estimating-the-benefits-of-adelaides-stret-trees/

Assessment & Budget

Assessment Process

Budget Determination

- Cincinnati Park Board Commissioners Approval
- Urban Forestry Advisory Board Recommendation

Nov. - Jan.

(1) Determination of Need Ordinance

- Public Notice (March/April)
- If objected:
  - Ordinance for Equalization Board (April/May)

Feb. - March

(2) Determination to Proceed Ordinance

- Includes recommended adjustments from EQ Board

April - May - June

(3) Levying Ordinance

June - August

Submittal to County Auditor (September) for January next year

- 2023 Assessment presented is billed to property owners in January 2023 to fund FY (24/25)

September

How management of the UF is funded?

ORC 727.011 - Special Assessment to control, planting, care, and maintenance of shade trees within ROW

- Front Footage (FF) Method
- **Every** property owner contributes (public, private, nonprofit, and tax exempt)
  - City pays all public property footage (City, County, State and Federal)

Budget Approval Process:

- Operating budget determines fiscal year front footage rate
  - Cincinnati Urban Forestry Advisory Board (CUFB)
  - Park Board Commissioners – make final recommendation to Council

UF Assessment 2022	Parcels	Front Footage (ft)	Revenue
Private Property	102,158	8,366,570	$1,756,979.76
LMI	*56,499*	*4,768,100*	*$1,001,301.00*
Above LMI	*45,659*	*3,598,470*	*$755,678.76*
Public Property	7,361	1,576,736	$331,114.56
City	*3,762*	*1,059,705*	*$222,538.05*
UC , Library, Bord of Education	*333*	*112,754*	*$23,678.34*
County	*1,523*	*228,838*	*$48,055.98*
State	*1,713*	*151,826*	*$31,883.46*
Federal	*30*	*23,613*	*$4,958.73*
Street Intersections		1,500,000	$315,000.00
City Total		3,076,736	$646,114.56
Totals	***109,413***	***11,433,711***	***$2,403,094.32***
Annual Delinquencies			*($100,000.00)*
Total	**109,413**	**11,433,711**	**$2,303,094.32**
31¢ Per Linear Foot where properties abut public right-of-Way			

UF Assessment 2022	Mean	Median
Private Property		
LMI	*$17.70*	*$10.50*
Above LMI	*$16.60*	*$10.50*
Public Property	$45.00	$10.60

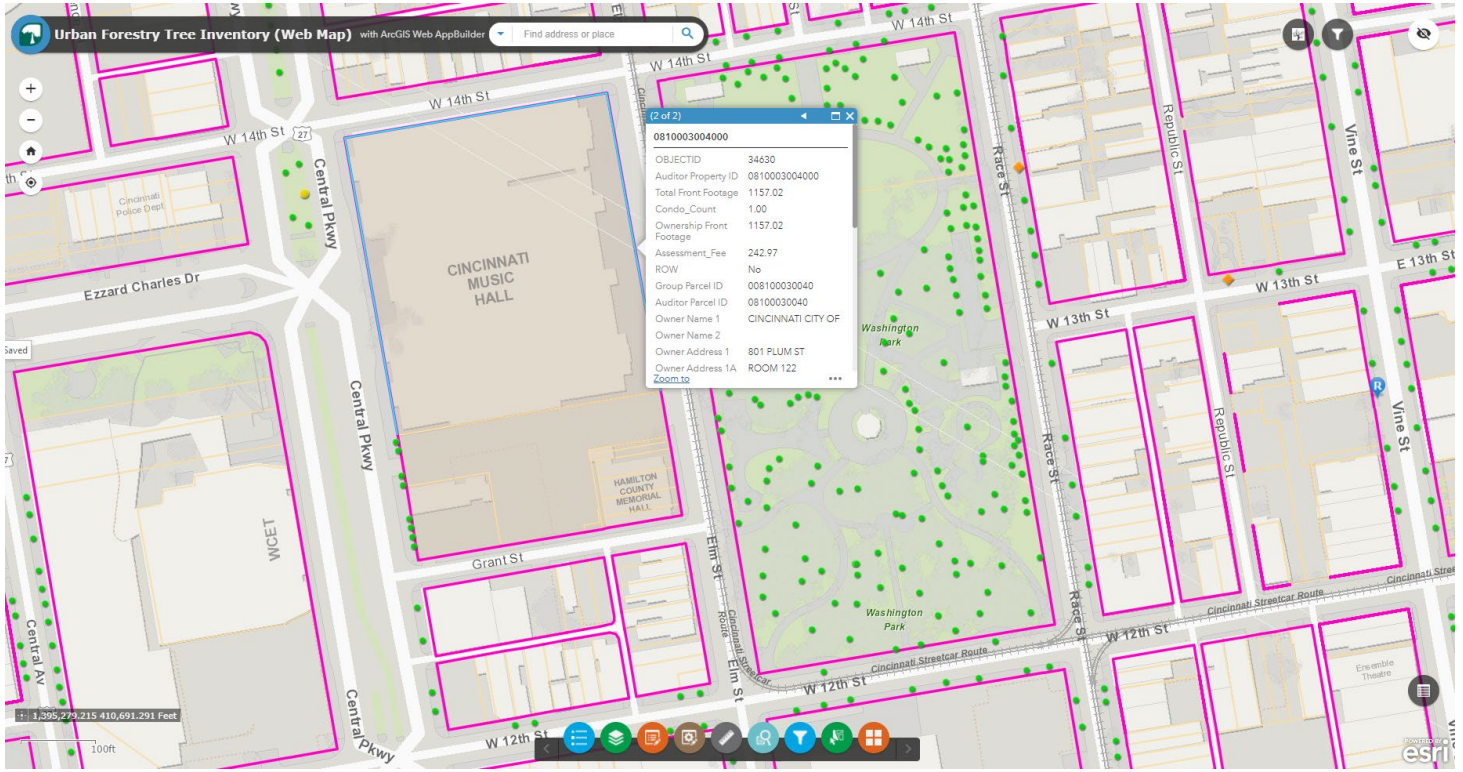
**LMI (low to moderate income) is defined by the Department of Housing and Urban Development and calculated via Census Block / Tracts through GIS applications*

UF Front Footage Assessment

- Music Hall Example
  - ROW Abutting Streets
    - W14th Street
    - Central Parkway
    - Elm Street

- **Total Footage/Fee:**

  1,157ft x ¢.21 =$242.97



UF Budget FY 22 and FY 23 Shortfall

Anticipated costs for FY 22: ($2.4 mil)

- Personnel: $960,000 - 40%
- Equipment: $70,000; 3%
- **Contractual – 56%**
  - EM: $350,000 – 14%
  - PM - $480,000 – 20%
  - Stumps - $132,000; 6%
  - Planting - $365,000; 16%
- Misc- $19,000 – 1%

Projections for FY 22 & 23: ($2.6 mil)

- Personnel - $896,950; 37%
- Equipment: $35,000; 1%
- **Contractual – 69%**
  - EM - $575,000; 24%
  - PM - $640,000; 27%
  - Planting - $130,000; 5%
  - Stumps – $321,000; 13%
- Misc – $52,000; 2%
  - (Fleet repair/fuel and utilities recently added to operating costs)

If assessment maintained at $.21¢/ FF and operations continued unchanged, then by FY ‘24 Forestry would anticipate a budget shortfall of **(- $946,000)**

Addressing Current State: FY 22 and FY 23

Current assessment rate @ 21¢ with the following budget cuts:

Focus strictly on core safety tree care services throughout the city: EM, PM, and priority stump grinding

- **FY 22: $175K reduction**
  - **No spring street tree planting or young tree maintenance**- $114,000
  - **No spring stump removal** - $54,000
  - **No travel/training, small power equipment replacement** – $7,000

- **FY 23: $632K reduction**
  - **Significantly decrease PM Cycle** - $171,000
  - **No street tree planting or young tree maintenance-** $332,000
  - **No Stump removal** - $120,000
  - **No travel/training, small power equipment replacement** – $9,000

- **<u>Anticipated cost borrowing forward to FY 24</u>**
  - **$274,000 –** allows for continued progression of PM Cycle and covers anticipated cost of Emergency Management

Reasons for shortfall

Increase in Arboricultural/Contractual Services.

Insufficient assessment increases within the last 10 years to keep pace with industry costs.

We have a lot of trees!

- *2020 Urban Canopy Analysis has shown we have more canopy than previous assessments and it's growing..... (38% in 2010 to 43% in 2020)*

Over Reliant on Contractual Management of Urban Forest

Increased Vulnerability to Market Fluctuations

Emergency Maintenance (EM)

- 1 contractor to provide:
  - 24/7 emergency service
    - 2-hour response time to open blocked streets
  - Work order management
    - Prioritized: 30, 60, 90-day service request
- ***Rebid in 2021 -***
  - ***32% Annual cost increase***

Preventative maintenance (PM): 6-year pruning/removal cycle

- 5 pruning contractors, 5 removal contractors
  - UF solicits bids (unit/hourly)
- ***Costs have increased 37% compared to previous pruning cycles***

Stump Grinding

- 1 contractor
  - Typically remove 1,200 stumps per year
- ***Due to increased cost for EM and PM this function will only be performed as funds allow for FY 22 and FY23***

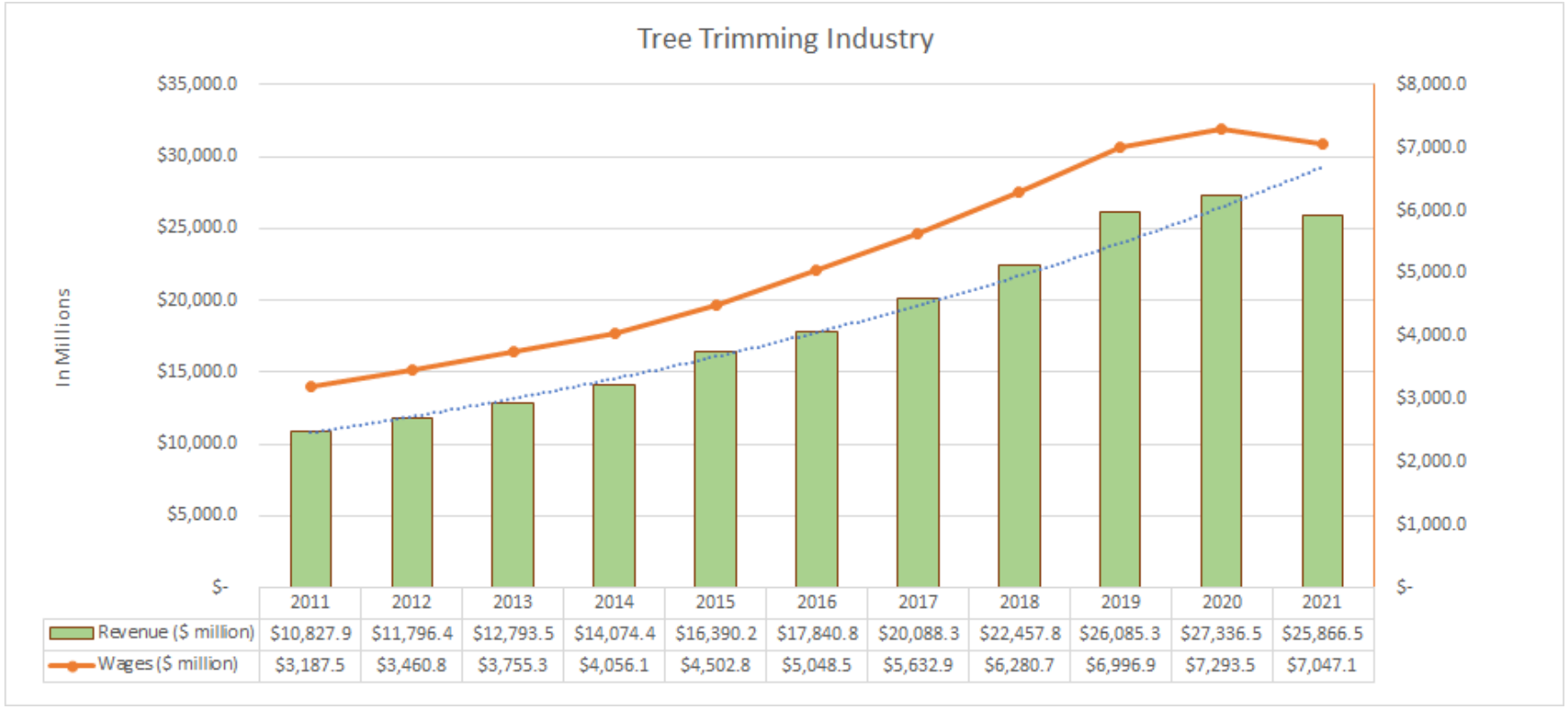
Planting

- 1 contractor
  - Typically plant 1,200 trees per year
  - Goal: at minimum replace every tree removed
  - Additional funds allocated to prioritized low canopy census blocks
- ***Due to increased cost for EM and PM this function will only be performed as funds allow for FY 22 and FY23***

Tree Trimming Industry Market Analysis

Tree Trimming Industry revenue increased 138.9% from $10.8B in 2010 to $25.9B in 2020

- During the same time period wage cost increased 121%.



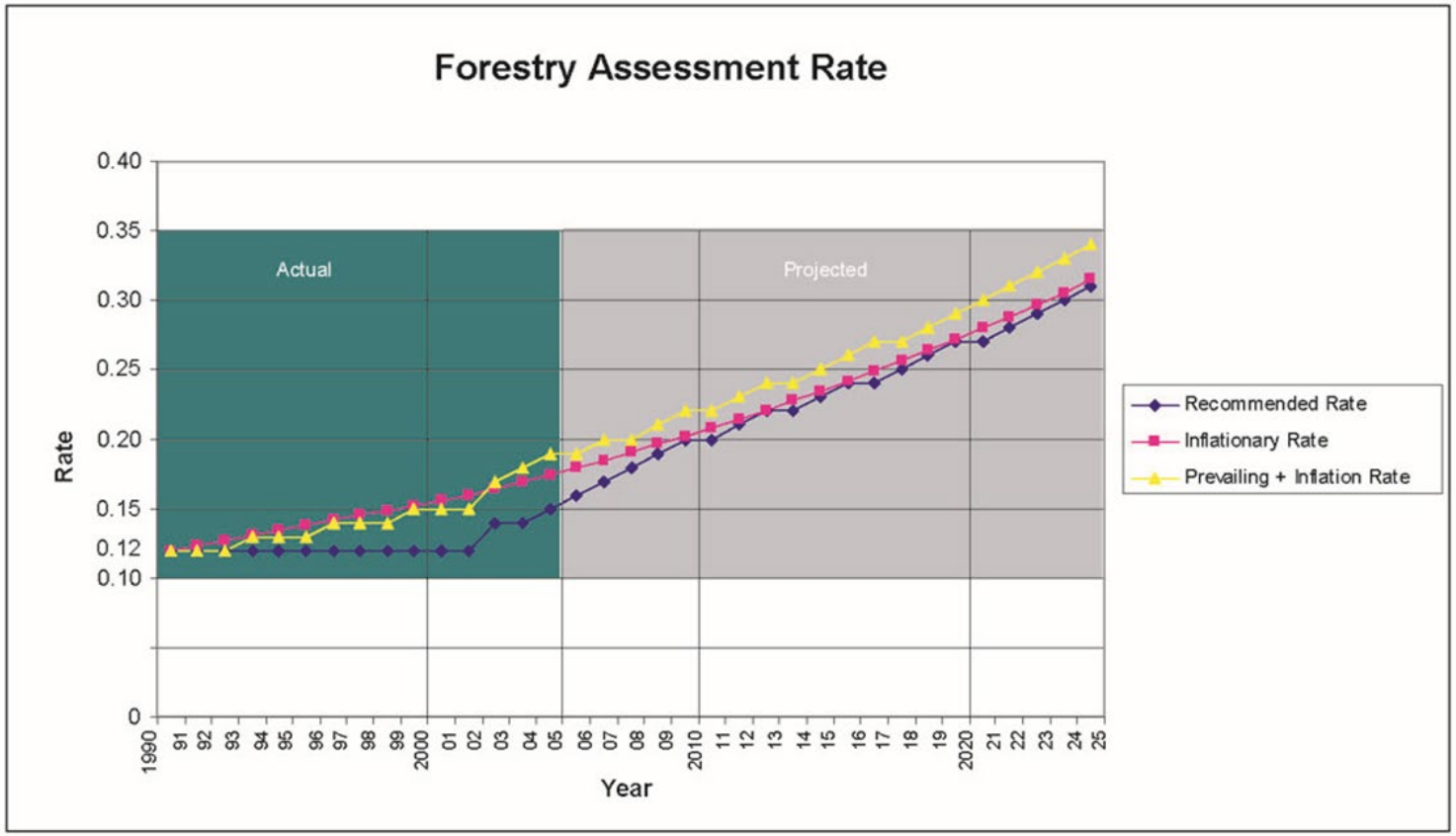
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Revenue ($ million)	$10,827.9	$11,796.4	$12,793.5	$14,074.4	$16,390.2	$17,840.8	$20,088.3	$22,457.8	$26,085.3	$27,336.5	$25,866.5
Wages ($ million)	$3,187.5	$3,460.8	$3,755.3	$4,056.1	$4,502.8	$5,048.5	$5,632.9	$6,280.7	$6,996.9	$7,293.5	$7,047.1

** IBIS Industry Report - Tree Trimming*

Historic Projections (2005)

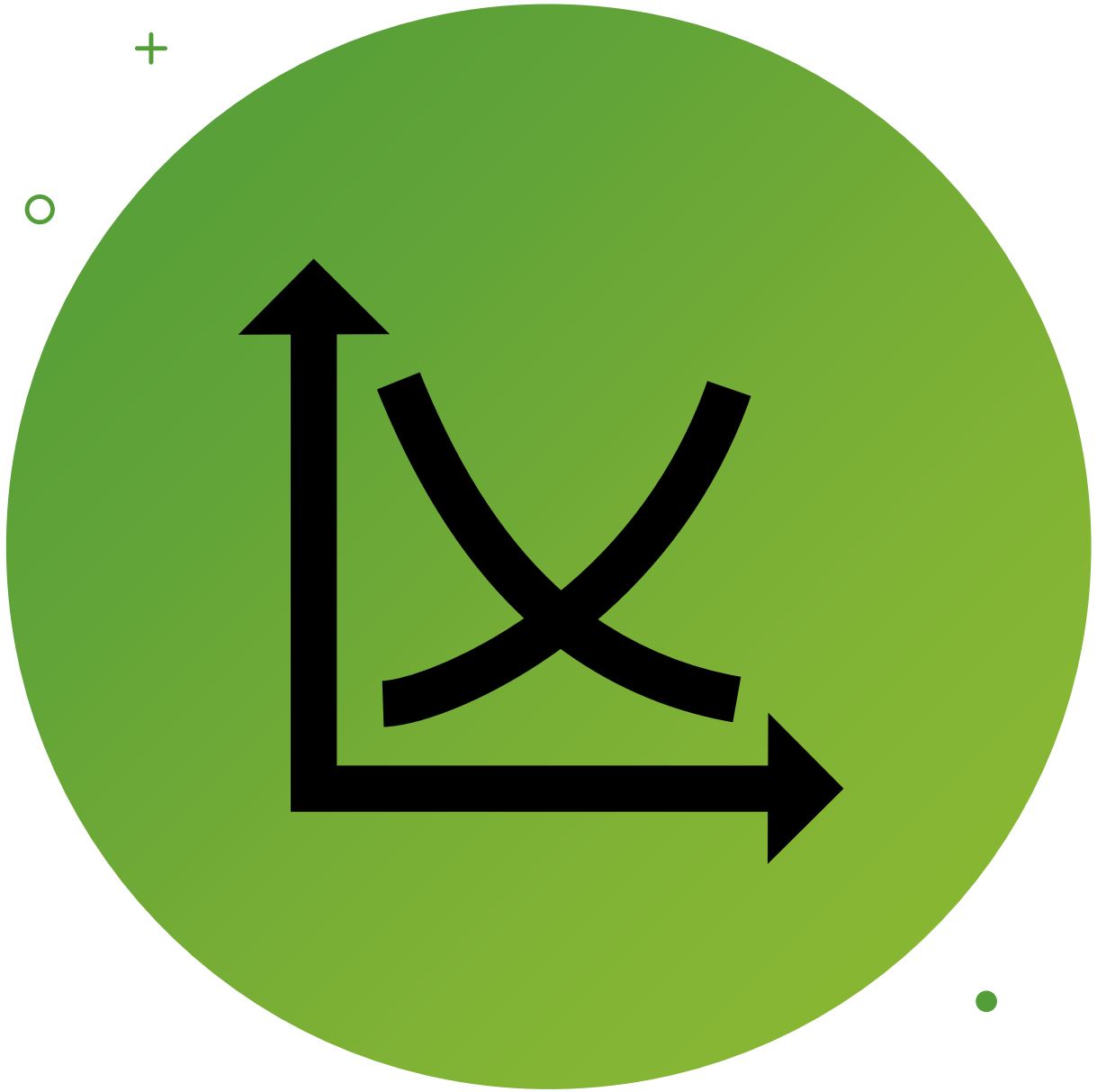
- Our predecessors were asking this same question

- Revealing we are now actualizing historic projections at an estimated $.30



Cincinnati Assessment Comparison

Municipality	Fee	Budget	Per Capita	Per Sq Mile
University Heights	$0.80	$503,668	$39	$276,893
Cleveland Heights	$0.50	$1,692,747	$38	$208,210
Canal Winchester	$9.00	$267,350	$32	$35,131
Toledo	$0.50	$5,000,000	$18	$59,439
Cincinnati	**$0.21**	**$2,305,470**	**$8**	**$28,985**
Shaker Heights	$1.16	$33,846	$1	$5,355



Final Budget Analysis Options

1. No Assessment Increase
    - Decreased service
        - Planting, stump grinding, innovative proactive care
    - Decreased ability to maintain current state of canopy coverage and manage for long term positive impacts
2. 7¢ Increase (28¢)
    - Maintain service level;
    - Anticipated bi-annual increases required
    - Maintain reliance on contractual services
3. 10¢ Increase (31¢) - *Recommended*
    - Increase services
    - Establish in house crew(s) to decrease contractual dependency
    - Provide capacity to improve overall equity of canopy distribution

Assessment Increase

UF Assessment Comparison	0.21	0.31
Public	**$1,756,979.76**	**$2,593,636.79**
City	$330,958.15	$488,557.27
Intersections	$315,000.00	$465,000.00
Delinquency	-$100,000.00	-$100,000.00
City Total	**$645,958.15**	**$953,557.27**
Total	**$2,302,937.91**	**$3,447,194.07**

Property Owner Impact	Median		Median	
Private Property				***Difference***
LMI	$10.50		$15.00	$4.50
Above LMI	$10.40		$15.00	$4.60

How the proposed assessment increase will impact Cincinnati property owners and the City financially.

CPB Recommendation:

Increase Forest Assessment to at least $.31/ FF

- Equates to $3.4M/yr and would cover projected costs through FY 28

Doing so would allow for:

- Continued services to maintain a climate resilient urban forest
  - •Borrowing forward between now and FY 24
  - •Dedicated emergency management for increased storm events
  - •Get pruning cycle back on 6-year track
  - •UTC/Ecological analysis to inform future needs for the city
- Create inhouse crews to minimize contractual reliance
  - •Tree Crew
  - •Planting
  - •Youth to Work?
- Targeted plantings in areas of highest need
  - • Minimum 2,000 trees
- Maintained FF fee for 5-9 years
- Build recommended 10% annual reserve for future market fluctuations

Questions?