Scope of Work #10:

Developing Standards and Metrics to Target the Conservation of "Green Spaces" in Underrepresented and Low-Income Urban and Rural Communities

Project Report

Introduction

As part of the Chesapeake Bay Program Goal Implementation Team (GIT) Project Initiative, the Chesapeake Bay Trust funded Scope of Work (SOW) #10 to be performed by Skeo Solutions and directed by the Chesapeake Conservancy Partnership (CCP). The purpose of SOW #10 is to develop a map tool to support the conservation of "green spaces" in underrepresented and low–income urban and rural communities. The selected consultant, Skeo Solutions, conducted the project from April 2021 to June 2022 which included identifying metrics, developing thresholds, and producing a map tool that shows the levels of green spaces in these communities. The outcome of this work is a new Geographic Information Systems (GIS) web-based map application that will help conservation organizations identify areas most in need of green space to support underserved, low-income communities of color. This report summarizes the research and final map framework recommendations, the advisory committee role, the listening session process and outcomes, considerations for future work and next steps.

Research and Final Framework

Skeo conducted an initial literature review to determine the most relevant and authoritative data sources to use for this project. Local, state, regional, and national tools and datasets were researched and summarized in a table included in Appendix H to determine which would be most applicable to the goals of this project based on the scope and direction from the advisory committee. This initial table outlines information on the scale, location, and type of data to compare different existing resources that could be used for reference in creating a new tool. Based on the scope of work, from the project team (CCP, the advisory committee and Skeo) determined that data included needed to cover the full extent of the Chesapeake Bay watershed to ensure all data is consistent and equitable in terms of not favoring any one state, region, or locality. The final selection of datasets was also dependent on the most authoritative, current, and relevant options based on the literature review and advisory committee feedback. Consideration for the final data layers also included relevance in viewing them alongside the green spaces data in the context of equity and conservation efforts.

Building from these authoritative GIS data sources, the project team determined standards and metrics to interpret the data in the map layers based on the literature review and feedback from both the advisory committee and community listening sessions. The project team determined that the green spaces throughout the watershed should be delineated according to access type, with open and limited access areas being featured with the option to view those with closed or unknown access if needed. The project team determined that the standards for the demographic data were to primarily highlight people of color and low-income populations at the census block group level, as this is the smallest unit this data is collected, while including other relevant information to help identify potentially vulnerable and

historically disinvested populations. The project team also decided to use the metrics determined by EJScreen as a national authoritative source rather than creating an independent set of metrics.

Lastly for the green space accessibility data, the project team determined that a 10-minute walk around open and limited access green spaces was the primary standard to measure accessibility based on the literature review. Based on additional feedback from the advisory committee and community listening sessions, Skeo also created data layers for a 5-minute walk distance and 10-minute drive in rural areas to support needs for both urban and rural populations. The advisory committee also recommended including a metric for considering green space acreage in relation to the number of people served. Skeo created an accessible green space acres per capita data layer to better understand and visually compare the amount of acres of green space available relative to the surrounding population density to help determine areas with less available green space acreage. The project team decided that several additional layers would help provide context for conservation priorities, including tree canopy cover, water and wetlands, impervious surfaces and flood hazard areas. However, the project team prioritized keeping additional layers to a limited number for ease of use and offer an option to import additional layers of interest, such as more detailed local data.

The final GIS data layers selected were grouped under the categories of watershed green spaces, demographics, and green space accessibility. The watershed green spaces tab includes data layers for all open and limited access green spaces, closed and unknown access green spaces, tree canopy cover, water and wetlands, impervious surfaces, and flood hazard areas. The demographics tab includes data on populations of people of color, low income, linguistic isolation, over age 64, under age 5, social vulnerability, and life expectancy values. The green space accessibility tab includes accessibility of green spaces within a 10-minute walk (.5-mile radius), within a 5-minute walk (.25-mile radius), within a 10 min drive for rural areas (5-mile radius), a walkability index, and accessible green space acres per capita data layers. The map layers, metrics and data sources are summarized in Appendix A.

The source of the watershed green spaces data is from the Chesapeake Conservancy adaptation of the USGS Protected Areas Database, the Conservation Innovation Center land cover dataset, and FEMA flood hazard area maps. The demographic data comes from the EPA EJSCREEN dataset that utilizes Census and American Community Survey data, as well as the CDC Social Vulnerability Index data. The data within the green space accessibility group was primarily created using the ArcPro GIS software, with the walkability index coming from the EPA Smart Location Database. Additional details on the data and data sources can be found in the O&M Plan section in the appendix.

Advisory Committee

To guide the project, the Chesapeake Conservancy Partnership formed an advisory committee. Advisory committee members and affiliations are included in the appendix. The committee met five times during the project to provide input and direction on the following topics:

- August – provided input on potential indicators and precedent models
- October – provided input on recommended indicators/methods, identified outreach options
- December – provided input on draft maps and listening session approach
- February – provided input on listening session feedback and final map application
- May – provided input on final map application, report outline and additional outreach venues

Community Listening Sessions

The project includes a series of listening sessions to gather input from community and justice organizations focused on green space conservation and/or serving low income, people of color on the value and useability of the tool. The Chesapeake Conservation Partnership (CCP) and Skeo hosted a series of three listening sessions at the following dates and times.

- Thursday, January 20, 12:00-1:30 p.m.
- Tuesday, January 25, 6:00-7:30 p.m.
- Wednesday, January 26, 6:00-7:30 p.m.

The CCP sent an invitation out to approximately 45 organizations identified by the Advisory Group guiding this scope of work. We received 42 RSVPs and a total of 14 participants. Five participants requested a stipend which was offered in the invite in the form of an electronic $50 gift card. The Listening Sessions were conducted by Zoom and included an overview and demonstration of the current map set and a series of discussion questions to gather information on metrics, standards and usability. A memo summarizes the input shared by the participants is included in the Appendix.

In general, participants shared that they feel these map tools will be very useful to their work and are looking forward to being able to access them. Participants offered feedback on the following topics:

- changes in the map layers
- data descriptions or caveats to include
- additional data layers that could be added
- increase readability and user-friendliness
- functionality of the final interactive map set

In addition to the Listening Sessions, CCP and Skeo presented the draft tool at the Choose Clean Water Conference in Richmond, VA on May 25th, 2022. The presentation consisted of a 1 hour and 45-minute workshop session that explained the scope of the project, outlined the process over time, and performed a live demonstration of the final application. Approximately 25-30 people participated in this session and provided feedback on:

- Potential for additional data layers to be incorporated such as transit access, and the demographic index from EJSCREEN
- Discussion of future methodologies to improve upon this work, such as conducting a network analysis for access to the green spaces
- the ability for other GIS staff to utilize this data for their own analyses

Considerations

Based on the literature review research and feedback from the advisory committee and community listening sessions, the project team identified the following considerations that factored into the tool development and potential future iterations.

- The project team decided to use a Euclidean buffer in ArcPro to create the accessibility layers rather than a network analysis. Skeo used ArcPro to show a 5- and 10-minute walk and 10-minute drive distance by using a Euclidean buffer of .25 miles, .5 miles, and 5 miles respectively. The

project team determined that the network analysis was not feasible due to limitations based on the size of the watershed and budget of the project. However future iterations of this could run a full network analysis to produce a result similar to that of the Trust for Public Lands ParkServe Tool.

- The project team also decided to change the deliverables from individual GIS map layers to a complete web application that includes the data layers with additional functionality capabilities. The web application allows users to view selected map layers together, import other layers, look up data for each census block group, as well as print maps and tables of specific locations. Moving the final product into a web application allows for the data to reach a wider audience and increased functionality that makes the data layers interactive depending on the needs of the user.
- The project team considered whether to develop an index that would include weighting and combining layers to show a gradient of values representing limited open space along with demographic data. Rather than creating a combined index or model that weighted demographic and green space factors uniformly across the watershed, the project team determined that is would be more beneficial and transparent to the user to include all the relevant data layers individually in an application format to allow users to manipulate the data according to their individual needs and goals. This, the final deliverable is accessible by everyone throughout the watershed regardless of areas of expertise and GIS experience.
- The project team evaluated whether to include a stakeholder-weighted index similar to NeighborSpace of Baltimore County Inc. (NBCI) Community Sustainability and Open Space Evaluation & Prioritization Model. The project team determined that the NBCI could not be accurately scaled up to the watershed wide level because the stakeholder-based weights are specific to Baltimore County. The methods used in the NCBI Community Sustainability and Open Space Evaluation & Prioritization Model worked at a localized level and relied on detailed feedback from community stakeholders over a longer time scale. These exact methods were not able to be replicated at a watershed wide scale for this project due to limitations in time, difference in units, and the requirements/ laws specific to Baltimore County. Other counties or states may choose to weight the factors differently based on local goals and needs. To conduct a watershed-wide stakeholder weighted system was not feasible within the time and budget of this project. However, the methods used to create the model may be used and referenced in creating future iterations of this work. The weighting of indicators in the model was stakeholder driven and utilized parcel level information that allowed for more granular detail of green space and accessibility. See the Community Sustainability Model research section in the appendix for more details on the methodology of this model.
- Another consideration for expanding upon this work in future models includes looking at different methodology approaches for defining green space accessibility. Different methods of defining a “community” can be explored and using an alternative scale than looking at census block groups. A buffer distance could be added around each census block group and be used to capture additional green space acreage within the defined buffer area. Other methods may include conducting network analyses to get a more accurate walk or drive time around each green space that accounts for barriers such as rivers, superblocks and highways, or creating a community survey aspect to allow people on the ground in each community to report on what is/ isn’t walkable and where the points of access are for each green space. The green spaces themselves and the protected areas database is continually being improved upon by the Chesapeake Conservancy and additional updates in data collection and updates should be

reflected in any new methods for determining green space accessibility. See the O&M plan in the appendix for more details on methodology limitations and suggested improvements.

Creating a model to measure community sustainability for the Chesapeake Bay watershed in the future should consider strategies that bring together environmental justice and equitable development principles that community-based organizations, local and regional decision-makers, and developers can use to build healthy and inclusive communities. Similar to NCBIs model, the indicators chosen for watershed sustainability can be divided into categories such as social, economic and environmental/ biodiversity factors that are region specific and shaped by the priorities of communities and stakeholders throughout the watershed. Extensive outreach and engagement will be needed to reach a representative range of communities and ensure their feedback is incorporated in weighting the factors in a model that will be appropriate for both urban and rural areas. Additional details and research on regional/ watershed sustainability models and methodology are available in the Community Sustainability Research section in the appendix.

Next Steps

To finalize this work, the final Green Space Equity application will be transferred to the Chesapeake Conservancy ArcGIS Online platform. The draft application will be transferred to a Chesapeake Conservancy staff member and the final version will be hosted and shared from their platform. This publicly shared final application can then be linked on any website for public use, and the individual GIS data layers can also be used separately in other online maps or applications.

The final application will be maintained according to the O&M plan which includes steps for annual data source checks and updates if needed. Certain data layers such as the watershed green spaces may be updated automatically, while others will need to be manually updated from new datasets published from EPA, CDC, and FEMA dataset sources. Data layers requiring GIS software to make updates may be completed annually or quarterly dependent upon how often the source data is updated. Questions or feedback regarding to tool will be directed to a Chesapeake Conservancy staff member via an email listed in both the application and user guide for the public.

Appendices

- **A.** Data Summary Table
- **B.** Advisory Committee Members and Affiliations
- **C.** List of Organizations for Listening Session Outreach
- **D.** Listening Session Summary (separate attachment)
- **E.** Community Sustainability Model Research
- **F.** Operational Guide
- **G.** How to User-Guide
- **H.** Table of Potential Data Layers Reviewed (separate attachment)
- **I.** QAPP (separate attachment)

Appendix A- Data Summary Table

App Tab	Map Layer	Metrics	Data Source
Green Spaces	Open and Limited Access Green Spaces	Data filtered according to the "Access" field: only Open and Restricted.	Chesapeake Conservancy adapted from the U.S. Geologic Survey (USGS) Protected Areas Database
	Closed and Unknown Access Green Spaces	Data filtered according to the "Access" field: only Closed and Unknown.	Chesapeake Conservancy adapted from the U.S. Geologic Survey (USGS) Protected Areas Database
	Tree Canopy	Data filtered for Tree Canopy, Tree Canopy over Structures, Tree Canopy over Impervious Surfaces, and Tree Canopy over Impervious Roads	Chesapeake Conservancy: Conservation Innovation Center: Chesapeake Bay High-Resolution Land Cover
	Impervious Surfaces	Data filtered for Structures, Impervious Surfaces, and Impervious Roads	Chesapeake Conservancy: Conservation Innovation Center: Chesapeake Bay High-Resolution Land Cover
	Water and Wetlands	Data filtered for Water and Wetlands	Chesapeake Conservancy: Conservation Innovation Center: Chesapeake Bay High-Resolution Land Cover
	Flood Hazard Areas	All FEMA designated areas for 1% Annual Chance Flood Hazard, Regulatory Floodway, Area with Reduced Risk Due to Levee, Special Floodway, Area of Undetermined Flood Hazard, Area of Minimal Flood Hazard, 0.2% Annual Chance Flood Hazard, and Future Conditions 1% Annual Chance Flood Hazard	Federal Emergency Management Agency (FEMA) Flood Insurance Maps
	Chesapeake Bay Watershed	N/A	Chesapeake Bay Program
Demographics	People of Color	Full dataset according to the national percentile for people of color population for census block groups	EPA EJSCREEN Demographic Indicators
	Low Income	Full dataset according to the national percentile for low-income population for census block groups	EPA EJSCREEN Demographic Indicators
	Demographic Index	Full dataset according to the national percentile for demographic index for census block groups	EPA EJSCREEN Demographic Indicators
	Linguistic Isolation	Full dataset according to the national percentile for linguistically isolated population for census block groups	EPA EJSCREEN Demographic Indicators
	Low Life Expectancy	Full dataset according to the national percentile for low life expectancy for census block groups	EPA EJSCREEN
	Under Age 5	Full dataset according to the national percentile for under age 5 population for census block groups	EPA EJSCREEN Demographic Indicators

App Tab	Map Layer	Metrics	Data Source
	Over age 64	Full dataset according to the national percentile for over age 64 population for census block groups	EPA EJSCREEN Demographic Indicators
	Social Vulnerability Index	Full dataset according to the overall social vulnerability index score for each census tract.	CDC/ ATSDR Social Vulnerability Index
	Counties	N/A	Chesapeake Bay Program
	Census Block Groups	N/A	EPA EJSCREEN
	Congressional Districts	Shown according to political party affiliation	ESRI
Accessibility	10-minute walk	Proxy for a distance walkable in 10 -minutes around each open and limited access green space using a .5 mile buffer.	ArcPro .5 Mile Buffer Geoprocessing on "Open and Limited access Green Spaces" layer
	5-minute walk	Proxy for a distance walkable in 5 -minutes around each open and limited access green space using a .25 mile buffer.	ArcPro .25 Mile Buffer Geoprocessing on "Open and Limited access Green Spaces" layer
	10-minute drive	Proxy for a distance drivable in 10 -minutes around each open and limited access green space using a 5 mile buffer.	ArcPro 5 Mile Buffer Geoprocessing on "Open and Limited access Green Spaces" layer
	Green Space Acres Per Capita	Total sum of open and limited access green spaces acres that are accessible within each census block group.	ArcPro Intersect and Sum Function on Census Block Groups for "Open and Limited access Green Spaces"
	Acres Of Green Space within Census Block Group	Total sum of open and limited access green spaces acres that fall directly within each census block group.	ArcPro Zonal Sum Function on Census Block Groups for "Open and Limited access Green Spaces"
	Walkability Index	Full dataset according to the overall walkability index score for each census block group	EPA Smart Location Database
	Distance to Transit Stop	Full dataset according to the distance to the nearest transit stop from the population centroid for each census block group.	EPA Smart Location Database

Appendix B – Advisory Committee Members and Affiliations

Name:	Organization:
Abel Olivo	Defensores de la Cuenca
Andrew Szwak	LTA - Land Trust Alliance
Barbara Hopkins	NeighborSpace of Baltimore County
Briana Yancy	Diversity Workgroup
Emily Hendrickson	PA DCNR
Jessica Godinez	Hispanic Access Foundation
John McCarthy	Piedmont Environmental Council
John Wolf	USGS CBPO
Katherine Lautar	Baltimore Green Space
Katie Brownson	USFS CBPO
Lauren Imgrund	Pennsylvania DCNR
Parker Agelasto	Capital Region Land Conservancy
Sara Ramotnik	Eastern Shore Land Conservancy

Appendix C – Listening Session Participants

Name	Affiliation	City/Town	State/Province
Eliza Cava	Audubon Naturalist Society	Chevy Chase	MD
Michaila Musman	Casey Trees	Washington	DC
Italia Perett	Casey Trees	Washington	DC
Abel Olivo	Defensores de la Cuenca	Cheverly	Maryland
Darryl Richard Neher	Fauquier Habitat	Warrenton	VA
Rob Jones	Groundwork RVA	Richmond	VA
Mary Correia	Loudoun Habitat for Humanity	Leesburg	VA
Noah Oliver	Private organization	New York	New York
Robert Duke	Robert	Los Angeles	California
Lance Barton	Staunton-Augusta-Waynesboro Habitat for Humanity	Staunton	VA
Toni		Chesapeake	VA
Thomas Young			
Harry Mount		Baltimore	Maryland
kai gray		Virginia Beach	virginia