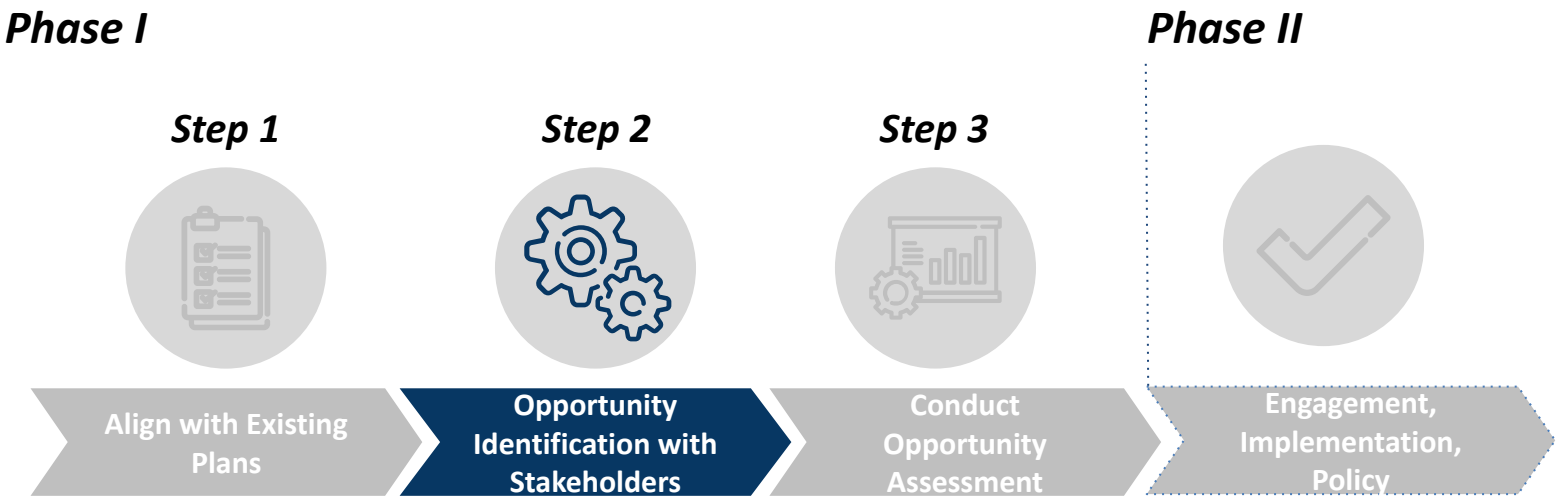
Managing Urban Landscapes for Climate Action

A Strategy Development Guide for Communities & Local Governments to Manage Urban Landscapes & Organic Resources to Achieve Climate Action and Community Resilience Objectives



THE TRUST FOR PUBLIC LAND

University of Colorado Boulder

CENTER FOR REGENERATIVE SOLUTIONS

CITY OF BOULDER

How to Navigate this Strategy Development Guide

This strategy development guide is broken down into four sections - an **Introduction, and Steps 1-3 of Phase I**. In each of the steps, you will find **guidance, templates, and examples**.

Guides hyperlinked below:

Introduction

You are here

Phase I

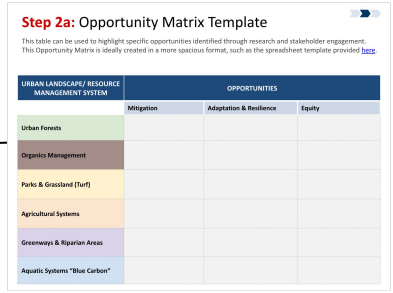
Step 1

Step 2

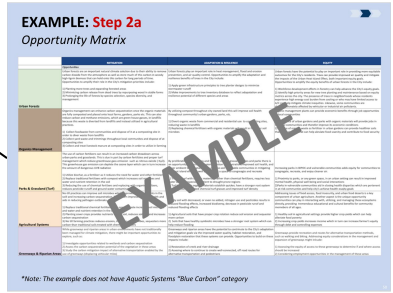
Step 3

Phase II *Forthcoming*

Guidance



Templates



Examples

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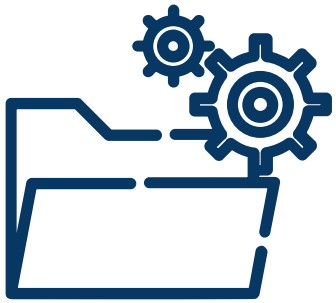
Download Templates Before Proceeding

This opportunity discovery process relies on the use of tools and tables that you may want to fill in or reference as you go along.

All templates referenced in this guide exist on a Spreadsheet for you to access and save. There will also be links to the templates throughout this document.



To work in **Google Drive** (recommended):

Click File -> Make a Copy

To work in **Excel**:

Click File -> Download -> Microsoft Excel (.xlsx)

NOTE:

The Introduction to this guide presents a framework (right) for thinking about ecosystems-based climate action. If you have not reviewed the introduction, we suggest that you take a moment to familiarize yourself with the framework as it will make it easier to follow the pages and instructions that follow.

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Step 2: Opportunity Identification with Internal Stakeholders

Opportunity Identification with Stakeholders

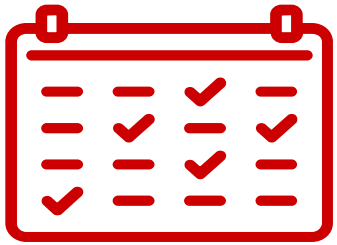
OPPORTUNITY IDENTIFICATION Now that you have completed your data gathering process in Step 1, Step 2 is about using that information to identify potential opportunities for managing urban landscapes and organic resources for climate action. The following slides will describe how to achieve this through the creation of a draft opportunity matrix and an opportunity ranking exercise to be completed with internal stakeholders.

ROLES IDENTIFICATION The stakeholder engagement process will be an important part not only for identifying opportunities but also for enabling members of various departments to reflect on their roles in this type of work.

Step 2: Opportunity Identification with Internal Stakeholders

Opportunity Identification with Stakeholders

2a



Develop a Draft Opportunity Assessment

Step 2a: OPPORTUNITY MATRIX FORMATION First, take some time to **identify initial opportunities in mitigation, adaptation & resilience, and equity** across urban landscapes and resource management systems in a **Draft Opportunity Matrix**. This rough draft will serve as an engagement tool with internal stakeholders and later to identify assessment scenarios.

2b

Engage Internal Stakeholders Using Opportunity Matrix and Ranking Templates

Step 2b: ASSESS POTENTIAL IMPACT Next, conduct an **initial relationship building/information gathering process** with members of relevant departments. Use the **Draft Opportunity Matrix** to spark conversation and ideas.

Then, use the **ranking templates** to receive more granular feedback on how various departments are thinking about and acting on various facets of this work.

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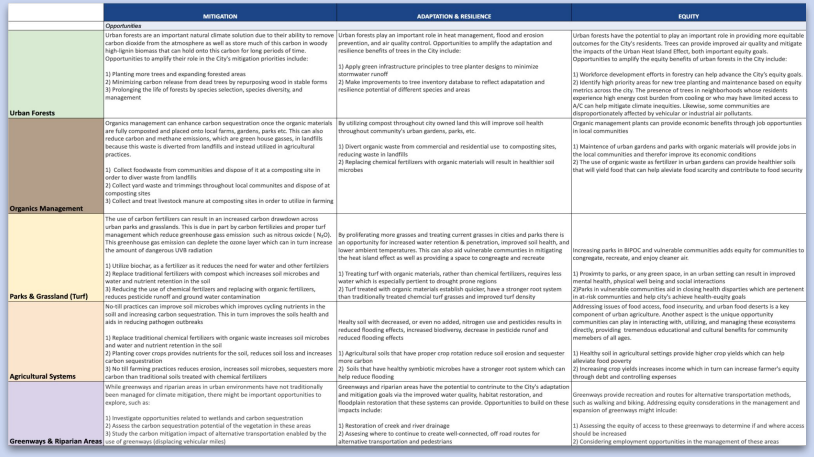
Step 2: Two Steps to Opportunity Identification



	MITIGATION	ADAPTATION & RESILIENCE	EQUITY
	Opportunities		
Urban Forests	Urban forests are an important natural climate solution due to their ability to remove carbon dioxide from the atmosphere as well as store much of this carbon in woody high-lignin biomass that can hold onto this carbon for long periods of time. Opportunities to amplify their role in the City's mitigation priorities include: 1) Planting more trees and expanding forested areas 2) Minimizing carbon release from dead trees by repurposing wood in stable forms 3) Prolonging the life of forests by species selection, species diversity, and management	Urban forests play an important role in heat management, flood and erosion prevention, and air quality control. Opportunities to amplify the adaptation and resilience benefits of trees in the City include: 1) Apply green infrastructure principles to tree planter designs to minimize stormwater runoff 2) Make improvements to tree inventory database to reflect adapatation and resilience potential of different species and areas	Urban forests have the potential to play an important role in providing more equitable outcomes for the City's residents. Trees can provide improved air quality and mitigate the impacts of the Urban Heat Island Effect, both important equity goals. Opportunities to amplify the equity benefits of urban forests in the City include: 1) Workforce development efforts in forestry can help advance the City's equity goals. 2) Identify high priority areas for new tree planting and maintenance based on equity metrics across the city. The presence of trees in neighborhoods whose residents experience high energy cost burden from cooling or who may have limited access to A/C can help mitigate climate inequities. Likewise, some communities are disproportionately affected by vehicular or industrial air pollutants.
Organics Management	Organics management can enhance carbon sequestration once the organic materials are fully composted and placed onto local farms, gardens, parks etc. This can also reduce carbon and methane emissions, which are green house gasses, in landfills because this waste is diverted from landfills and instead utilized in agricultural practices. 1) Collect foodwaste from communities and dispose of it at a composting site in order to diver waste from landfills 2) Collect yard waste and trimmings throughout local communites and dispose of at composting sites 3) Collect and treat livestock manure at composting sites in order to utilize in farming	By utilizing compost throughout city owned land this will improve soil health throughout community's urban gardens, parks, etc. 1) Divert organic waste from commercial and residential use to composting sites, reducing waste in landfills 2) Replacing chemical fertilizers with organic materials will result in healthier soil microbes	Organic management plants can provide economic benefits through job opportunities in local communities 1) Maintence of urban gardens and parks with organic materials will provide jobs in the local communities and therefor improve its economic conditions 2) The use of organic waste as fertilizer in urban gardens can provide healthier soils that will yield food that can help alleviate food scarcity and contribute to food security
Parks & Grassland (Turf)	The use of carbon fertilizers can result in an increased carbon drawdown across urban parks and grasslands. This is due in part by carbon fertilizes and proper turf management which reduce greenhouse gass emission such as nitrous oxicde (N_2O). This greenhouse gas emission can deplete the ozone layer which can in turn increase the amount of dangerous UVB radiation 1) Utilize biochar, as a fertilizer as it reduces the need for water and other fertilizers 2) Replace traditional fertilizers with compost which increases soil microbes and water and nutrient retention in the soil 3) Reducing the use of chemical fertilizers and replacing with organic fertilizers, reduces pesticide runoff and ground water contamination	By proliferating more grasses and treating current grasses in cities and parks there is an opportunity for increased water retention & penetration, improved soil health, and lower ambient temperatures. This can also aid vulnerable communities in mitigating the heat island effect as well as providing a space to congregate and recreate 1) Treating turf with organic materials, rather than chemical fertilizers, requires less water which is especially pertient to drought prone regions 2) Turf treated with organic materials establish quicker, have a stronger root system than traditionally treated chemical turf grasses and improved turf density	Increasing parks in BIPOC and vulnerable communities adds equity for communities to congregate, recreate, and enjoy cleaner air. 1) Proximity to parks, or any green space, in an urban setting can result in improved mental health, physical well being and social interactions 2)Parks in vulnerable communities aid in closing health disparities which are pertenent in at-risk communities and help city's achieve health-euqity goals
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Greenways & Riparian Areas	While greenways and riparian areas in urban environments have not traditionally been managed for climate mitigation, there might be important opportunities to explore, such as: 1) Investigate opportunities related to wetlands and carbon sequestration 2) Assess the carbon sequestration potential of the vegetation in these areas 3) Study the carbon mitigation impact of alternative transportation enabled by the use of greenways (displacing vehicular miles)	Greenways and riparian areas have the potential to contrinute to the City's adaptation and mitigation goals via the improved water quality, habitat restoration, and floodplain restoration that these systems can provide. Opportunities to build on these impacts include: 1) Restoration of creek and river drainage 2) Assesing where to continue to create well-connected, off road routes for alternative transportation and pedestrians	Greenways provide recreation and routes for alternative transportation methods, such as walking and biking. Addressing equity considerations in the management and expansion of greenways might inlcude: 1) Assessing the equity of access to these greenways to determine if and where access should be increased 2) Considering employment opportunities in the management of these areas

Step 2a: Opportunity Matrix Formation: Once you complete a Draft Opportunity Matrix (see next page), you have a tool to engage representatives of key departments to solicit their ideas and spark innovative thinking. The following slides include guidance and templates to use in your own meetings.

Goal: During one or multiple meetings, stakeholders can work to build on the ideas in the Draft document, come up with additional areas of opportunity, and find intersections across departments. The result will be a comprehensive and detailed list of potential areas of analysis and action.

CLIMATE ACTION OBJECTIVE	BENEFIT	URBAN FORESTRY	ORGANICS MANAGEMENT	PARKS & GRASSLAND (TURF)	AGRICULTURAL SYSTEMS	GREENWAYS & RIPARIAN AREAS	AQUATIC SYSTEMS "BLUE CARBON"
Mitigation	Carbon Sequestration	●	●	●	●	●	●
	Emissions Reduction	●	●	●	●	●	●
Adaptation & Resilience	Heat Management	●	●	●	●	●	●
	Reduced Flood Risk	●	●	●	●	●	●
	Reduced Fire Risk	●	●	●	●	●	●
	Improved Air & Water Quality	●	●	●	●	●	●
	Increased Biodiversity	●	●	●	●	●	●
Equity	Equity Based Economic Opportunities	●	●	●	●	●	●
	Equitable Distribution of Ecosystem Services	●	●	●	●	●	●

Step 2b: Assess Potential Impact: Once familiarized with the framework and opportunity areas, participants will be primed to participate in a ranking exercise to identify potential priorities across various management areas. The following slides include guidance on this ranking process, definitions, and templates to use in your own meetings.

Goal: During one or multiple meetings, stakeholders can assess priorities across urban landscape management systems. The result will be a summary of potential priorities. The prioritization can be used to identify preliminary areas of analysis for the opportunity assessment.

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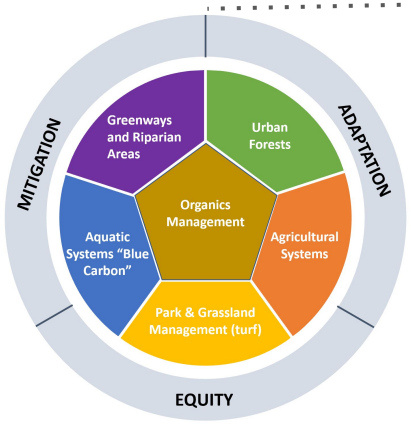
Step 2a: Opportunity Matrix: Identifying Intersections

The Opportunity Matrix is based on the framework presented in the Introduction section of this guide. This framework integrates the **six urban landscape/organic resource management systems** (Urban Forests, Organics Management, Parks & Grassland, Agricultural Systems, Greenways & Riparian Systems, and Aquatics Systems "Blue Carbon") and the **three climate action objectives** (Mitigation, Adaptation & Resilience, and Equity). The matrix is a place to **identify and document intersections of opportunity** between urban landscape management and climate action objectives.



URBAN LANDSCAPE / RESOURCE MANAGEMENT SYSTEM	OPPORTUNITIES		
	Mitigation	Adaptation & Resilience	Equity
Urban Forests			
Organics Management			
Parks & Grassland (Turf)			
Agricultural Systems			
Greenways & Riparian Areas			
Aquatic Systems "Blue Carbon"			

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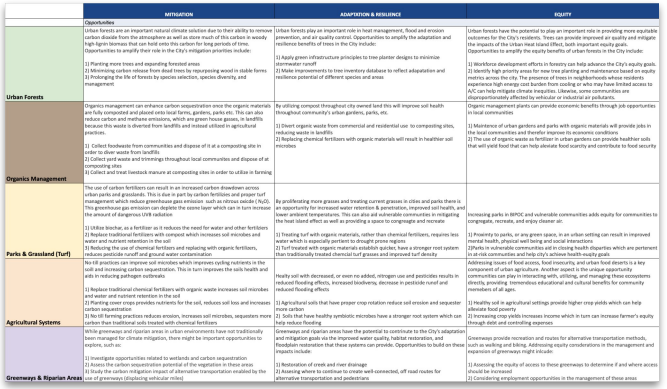
Step 2a: Develop a Draft Opportunity Matrix

Based on your review of the city's plans and your own knowledge, you may wish to **develop a draft opportunity matrix that highlights illustrative examples of the types of actions that departments and work areas within your city could take to manage ecosystems for climate action.** This matrix will become a living document you can use to spark conversation with internal stakeholders as they make sense of their role in this work during stakeholder engagement sessions or other points of interaction. Additionally, the document can be updated to reflect concrete action areas identified throughout the course of this assessment.

It is important to engage individuals early in the creation of an opportunity matrix. This ensures that those involved feel empowered to be a part of the process of co-creation and not simply handed a document created without their input.

You may choose to provide a short description of the intersection between two areas (e.g., between urban trees and equity), as well as an example or two of specific actions that a city could take.



	MITIGATION	ADAPTATION & RESILIENCE	EQUITY
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Agricultural Systems	No-till practices can improve soil microbes which improves cycling nutrients in the soil and increasing carbon sequestration. This in turn improves the soils health and aids in reducing pathogen outbreaks 1) Replace traditional chemical fertilizers with organic waste increases soil microbes and water and nutrient retention in the soil 2) Planting cover crops provides nutrients for the soil, reduces soil loss and increases carbon sequestration 3) No-till farming practices reduces erosion, increases soil microbes, sequesters more carbon than traditional soils treated with chemical fertilizers	Healty soil with decreased, or even no added, nitrogen use and pesticides results in reduced flooding effects, increased biodiversity, decrease in pesticide runof and reduced flooding effects 1) Agricultural soils that have proper crop rotation reduce soil erosion and sequester more carbon 2) Soils that have healthy symbiotic microbes have a stronger root system which can help reduce flooding	Addressing issues of food access, food insecurity, and urban food deserts is a key component of urban agriculture. Another aspect is the unique opportunity communities can play in interacting with, utilizing, and managing these ecosystems directly, providing tremendous educational and cultural benefits for community members of all ages. 1) Healthy soil in agricultural settings provide higher crop yields which can help alleviate food poverty 2) Increasing crop yields increases income which in turn can increase farmer's equity through debt and controlling expenses
Greenways & Riparian Areas	While greenways and riparian areas in urban environments have not traditionally been managed for climate mitigation, there might be important opportunities to explore, such as: 1) Investigate opportunities related to wetlands and carbon sequestration 2) Assess the carbon sequestration potential of the vegetation in these areas 3) Study the carbon mitigation impact of alternative transportation enabled by the use of greenways (displacing vehicular miles)	Greenways and riparian areas have the potential to contribute to the City's adaptation and mitigation goals via the improved water quality, habitat restoration, and floodplain restoration that these systems can provide. Opportunities to build on these impacts include: 1) Restoration of creek and river drainage 2) Assessing where to continue to create well-connected, off road routes for alternative transportation and pedestrians	Greenways provide recreation and routes for alternative transportation methods, such as walking and biking. Addressing equity considerations in the management and expansion of greenways might include: 1) Assessing the equity of access to these greenways to determine if and where access should be increased 2) Considering employment opportunities in the management of these areas

A template for this draft Opportunity Matrix can be found here.

For example, the intersection of "Urban Forests" and "Mitigation" could be described as follows:

Urban forests are an important natural climate solution due to their ability to remove carbon dioxide from the atmosphere as well as store much of this carbon in woody high-lignin biomass that can hold onto this carbon for long periods of time. Opportunities to amplify their role in the City's mitigation priorities include:

1) Planting more trees and expanding forested areas
2) Minimizing carbon release from dead trees by repurposing wood in stable forms
3) Prolonging the life of forests by species selection, species diversity, and management

Step 2a: Opportunity Matrix Template

This table can be used to highlight specific opportunities identified through research and stakeholder engagement. This Opportunity Matrix is ideally created in a more spacious format, such as the spreadsheet template provided here.

URBAN LANDSCAPE / RESOURCE MANAGEMENT SYSTEM	OPPORTUNITIES		
	Mitigation	**Adaptation & Resilience**	**Equity**
Urban Forests			
Organics Management			
Parks & Grassland (Turf)			
Agricultural Systems			
Greenways & Riparian Areas			
Aquatic Systems “Blue Carbon”			

EXAMPLE: Step 2a

Opportunity Matrix

	MITIGATION	ADAPTATION & RESILIENCE	EQUITY
	Opportunities		
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**Note: The example does not have Aquatic Systems "Blue Carbon" category*

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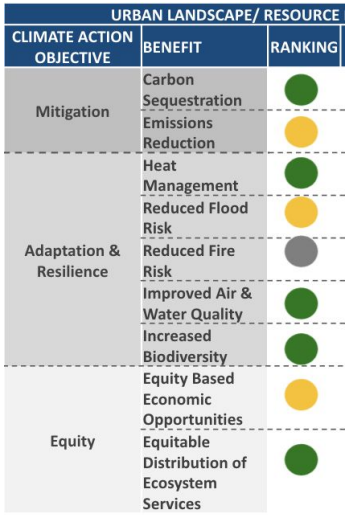
Step 2b: Intersection Identification & Ranking Engagement Process

In this next part, you will engage internal stakeholders in a **participatory process to assess intersections between the city's priorities and benefits of managing urban landscapes** for climate action to create mitigation, adaptation, and equity benefits. The templates provided consider ten ecosystem service benefits outlined in the Introduction:

- ***Carbon Sequestration***
- ***Emissions Reduction***
- ***Heat Management***
- ***Reduced Drought Risk***
- ***Reduced Flood Risk***
- ***Reduced Fire Risk***
- ***Improved Air & Water Quality***
- ***Increased Biodiversity***
- ***Equity Based Economic Opportunities***
- ***Equitable Distribution of Ecosystem Services***



Your city may choose to modify this list to fit unique needs and priorities as well as language stakeholders are familiar with.

The goal is to prompt representatives from various departments to **consider how their work intersects with climate action and urban landscape management.** The templates include tables for them to describe the opportunities they see as well as a space to rank them as "high," "medium," or "neutral/uncertain" opportunity areas based on criteria outlined below.

Step 2b: Ranking Opportunities Disclaimer

Disclaimer

The ranking of opportunities is intended to help inform your city's decision as an **INITIAL ASSESSMENT IDENTIFICATION EXERCISE** and is ***NOT*** meant as a final decision making process.

Step 2b: Ranking Definitions

Ranking these factors by their level of opportunity in your city depends on various considerations. Potential ranking definitions:

RANKING	DESCRIPTION
High Opportunity Area	High benefit level within the community
	High benefit to cost ratio
	Actively involved within climate, resilience, hazard, or equity planning goals and objectives
	Easily implemented and quick time to value
	Addresses equity issues in the most vulnerable communities
Medium Opportunity Area	Some benefits to the community
	May be pricier to implement but still provide good value from the project
	Provides value but may not entirely align with planning goals and objectives
	May take additional time to implement and derive value
	Addresses community issues but may not be the most equitable for vulnerable communities in implementation
Neutral / Uncertain Opportunity Area	Marginal, low, or no benefits given to the community through project implementation
	Too high of a cost to provide benefits
	Not applicable to the planning goals and objectives at this time
	Project does not relate to benefits provided
	May not address equity within community

**May be any or all factors that decide ranking*

Step 2b: Opportunities Ranking

Participants can provide a **brief description of the intersections** between these benefits and existing priorities within the city and/or their department, as well as their **rationale for ranking** it the way they have. Alternatively, the organizer can pre-fill these with generic descriptions to save time and spark discussion. You can choose to fill out **ONE RANKING SHEET PER MANAGEMENT SYSTEM**.

- High Opportunity Area
- Medium Opportunity Area
- Neutral / Uncertain Opportunity Area

URBAN LANDSCAPE / RESOURCE MANAGEMENT SYSTEM (Eg. URBAN FORESTRY)			
CLIMATE ACTION OBJECTIVE	BENEFIT	RANKING	DESCRIPTION
Mitigation	Carbon Sequestration		
	Emissions Reduction		
Adaptation & Resilience	Heat Management		
	Reduced Drought Risk		
	Reduced Flood Risk		
	Reduced Fire Risk		
	Improved Air & Water Quality		
	Increased Biodiversity		
Equity	Equity Based Economic Opportunities		
	Equitable Distribution of Ecosystem Services		

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Step 2b: Opportunities Ranking Template

High Opportunity Area

Medium Opportunity Area

Neutral / Uncertain Opportunity Area

A template for all urban landscape and resource management areas can be found here.

*Copy and paste ranking circles

URBAN LANDSCAPE / RESOURCE MANAGEMENT SYSTEM (Eg. URBAN FORESTRY)			
CLIMATE ACTION OBJECTIVE	**BENEFIT**	**RANKING**	**DESCRIPTION**
Mitigation	Carbon Sequestration		
	Emissions Reduction		
Adaptation & Resilience	Heat Management		
	Reduced Drought Risk		
	Reduced Flood Risk		
	Reduced Fire Risk		
	Improved Air & Water Quality		
	Increased Biodiversity		
Equity	Equity Based Economic Opportunities		
	Equitable Distribution of Ecosystem Services		

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Step 2b: Ranking Summary

After participants have assigned rankings to various urban landscape management opportunities in the city, you can **summarize those rankings**. The purpose of putting it all together is to **begin to identify patterns and ask questions:** *Where are there clusters of high opportunity areas? How might these opportunities build on each other?* In the next step (Step 3), you will be guided through the process of taking these patterns and areas of opportunity to the next level of inquiry. A template is provided here.

CLIMATE ACTION OBJECTIVE	BENEFIT	URBAN FORESTRY	ORGANICS MANAGEMENT	PARKS & GRASSLAND (TURF)	AGRICULTURAL SYSTEMS	GREENWAYS & RIPARIAN AREAS	AQUATIC SYSTEMS "BLUE CARBON"
Mitigation	Carbon Sequestration	◯	◯	◯	◯	◯	◯
	Emissions Reduction	◯	◯	◯	◯	◯	◯
Adaptation & Resilience	Heat Management	◯	◯	◯	◯	◯	◯
	Reduced Drought Risk	◯	◯	◯	◯	◯	◯
	Reduced Flood Risk	◯	◯	◯	◯	◯	◯
	Reduced Fire Risk	◯	◯	◯	◯	◯	◯
	Improved Air & Water Quality	◯	◯	◯	◯	◯	◯
	Increased Biodiversity	◯	◯	◯	◯	◯	◯
Equity	Equity Based Economic Opportunities	◯	◯	◯	◯	◯	◯
	Equitable Distribution of Ecosystem Services	◯	◯	◯	◯	◯	◯

Step 2: Engaging Stakeholders to Create an Opportunity Matrix and Rank Management Systems

Meeting Planning and Facilitation Guidance

The Opportunity Matrix and Ranking exercises described in previous slides can be combined into a single stakeholder engagement session with proper preparation and facilitation.

Duration: ~ 2.5 hours
Participants: Internal stakeholders identified in Step 1c
Format: Ideally conducted in person, but virtual options can be carefully selected to facilitate fruitful discussion and collaboration

You may wish to use the following documents as a reference to plan and facilitate your own stakeholder engagement meeting:

- **Sample Agenda**
- **Sample Facilitation Plan (includes sample guidance questions)**

EXAMPLE: Step 2b

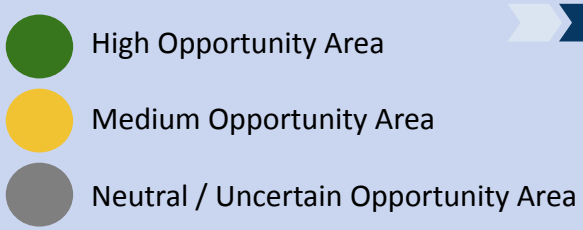
Urban Forestry Opportunities Ranking

- High Opportunity Area
- Medium Opportunity Area
- Neutral / Uncertain Opportunity Area

URBAN FORESTRY			
CLIMATE ACTION OBJECTIVE	**BENEFIT**	**RANKING**	**DESCRIPTION**
Mitigation	Carbon Sequestration	High	Trees draw carbon from the atmosphere via photosynthesis that turns carbon into biomass where it is stored. Trees store and sequester carbon, saving cities large amounts of money each year.
	Emissions Reduction	Medium	Reduced energy use due to shading, reduced ambient air temperature, and reduced wind velocities. In some locations, these avoided emissions can even exceed the direct carbon sequestration benefits of the trees themselves.
Adaptation & Resilience	Heat Management	High	Trees cool urban areas via shade and transpiration, countering the urban heat island effect.
	Reduced Drought Risk	Neutral	Trees capture and store water, increasing soil moisture and saving more water than they consume.
	Reduced Flood Risk	High	Starting with their canopies and extending down into the soil around them, the presence of trees helps to slow the flow of precipitation, allowing for increased infiltration and lessening impacts of heavy water flow downstream.
	Reduced Fire Risk	Neutral	Proper management of urban forestry in the wilderness urban interface can reduce fire hazard and impacts.
	Improved Air & Water Quality	High	Urban trees can provide significant air purification benefits by reducing air pollution, resulting in measurable public health outcomes. Urban trees also protect streams by reducing runoff.
	Increased Biodiversity	High	Urban trees can provide valuable habitat and pollinator resources to animals and insects where they otherwise would not exist in an urban setting.
Equity	Equity Based Economic Opportunities	Medium	Urban forestry programs can create opportunities for economic development in the local community via forestry workforce development, local tree purchasing agreements, energy savings, and increased property values among others.
	Equitable Distribution of Ecosystem Services	High	In addition to buffering environmental stressors, urban forests provide public health benefits and multiple ecosystem services.

EXAMPLE: Step 2b

Opportunities Ranking Summary



CLIMATE ACTION OBJECTIVE	BENEFIT	URBAN FORESTRY	ORGANICS MANAGEMENT	PARKS & GRASSLAND (TURF)	AGRICULTURAL SYSTEMS	GREENWAYS & RIPARIAN AREAS	AQUATIC SYSTEMS "BLUE CARBON"
Mitigation	Carbon Sequestration						
	Emissions Reduction						
Adaptation & Resilience	Heat Management						
	Reduced Drought Risk						
	Reduced Flood Risk						
	Reduced Fire Risk						
	Improved Air & Water Quality						
	Increased Biodiversity						
Equity	Equity Based Economic Opportunities						
	Equitable Distribution of Ecosystem Services						

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