Public Participation in Urban Biodiversity and Green Zones

This module introduces terms and concepts related to the topic of urban biodiversity and green zones. Different use cases of participatory methods for biodiversity planning, expansion, and conservation in urban contexts are discussed. Participatory approaches and methods for biodiversity work in urban environments in practice are illustrated.

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Learning Objectives

Section 1: To become familiar with introductory terms and concepts related to the topic of urban biodiversity and green zones.

Section 2: To get acquainted with different use cases of participatory methods for biodiversity conservation in urban contexts.

Section 3: To see how different participatory approaches and methods work in practice for biodiversity conservation in urban contexts. To see what results can be achieved with such methods.

Module Structure

Module section	
Introduction to Urban Biodiversity and Green Zones and Concepts	
Uses of Participatory Approaches for Urban Biodiversity	
Breakpoint Activity	
Case Study 1: Urban Menomonee Valley in Milwaukee	
Case Study 2: Interconnected Green Corridors in Medellin	
Breakpoint Activity	
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Section 1

To become familiar with introductory terms and concepts related to the topic of urban biodiversity and green zones.

Urban Biodiversity & Green Zone: Introduction

What is biodiversity?

Biodiversity is the variety of life on Earth and its interactions. The Convention on Biological Diversity recognizes 3 levels of biodiversity:

- Species diversity – the variety of different species
- Genetic diversity – the genetic variations contained within species
- Ecosystem diversity – the variety of systems that have living and non-living elements. There are unique ecosystem dynamics in various habitats such as forests, deserts, grasslands, tundra, freshwater, and marine ecosystems.

Urban Biodiversity & Green Zone: Introduction

Urbanization as encroachment of natural spaces **VS** Urban spaces as biodiversity hotspots

Before Industrial Revolution	Beginning of the 21st century	During the 21st century
0.1 to 1.0 species per million per year	100 species per million per year	1000 species per million per year

Urban Biodiversity & Green Zone: Introduction

Why should we care about biodiversity loss?

- Life forms on Earth are interconnected through the food chain and symbiotic relationships.

- Damage to some species can result into harm to others.

- As this damage increases and expands, more and more life forms and ecosystems are lost.

- As we are deeply dependent on biological systems for our survival, loss of biodiversity can eventually threaten the well being of our own species.

View short video on why we should care about biodiversity: https://youtu.be/K8yXhMopuow

Urban Biodiversity & Green Zone: Introduction

From land-use perspective, cities are an efficient solution to housing large number of people. To date, about **3% of the earth landmass is urbanized while housing 55% of the world's population** (68% by 2050).

Nonetheless, cities negatively impact biodiversity both directly and indirectly.

- **Direct Negative Impact**

  ○ Encroaching on habitats
  ○ Fragmentation of habitats
  ○ Introduction of invasive or harmful species
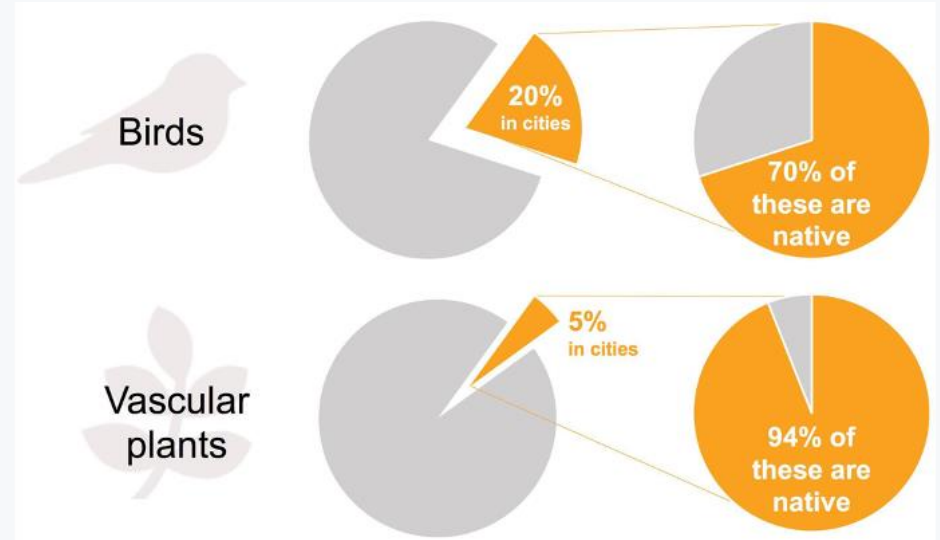 ○ Introduction of chemicals and pesticides

- **Indirect Negative Impact**

  ○ As consumption centers of biological and mineral resources, leading to large scale species overuse and habitat change globally
  ○ The emissions and impacts of such consumption

Urban Biodiversity & Green Zone: Introduction

However, if planned and implemented adequately, cities can have a positive impact on biodiversity conservation.

- Cities harbor a surprisingly high proportion of Earth's species biodiversity.

- Many of them are native or even endemic to their region.

- As we increasingly plan the construction and expansion of cities, we have a unique opportunity to integrate biodiversity protection into our planning.

Birds

20% in cities

70% of these are native

Vascular plants

5% in cities

94% of these are native

Source: Urban Biodiversity Hub (ubhub.org)

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Urban Biodiversity & Green Zone: Introduction

Value of biodiversity can be described by the ecosystem services it provides

Supporting Services

- Nutrient cycling
- Soil formation, structure and quality
- Habitat provision
- Pollination
- Building protection structure (rain, wind, sun)

Provisional Services

- Food
- Raw materials
- Genetic resources
- Air purification
- Water filtration
- Medicinal resources
- Energy Efficiency
- Thermal insulation
- Ornamental resources

Cultural Services

- Cultural
- Spiritual and historical
- Recreational
- Science and education Therapeutic
- Mental health
- Physical health

Regulating Services

- Climate regulation
- Carbon storage
- Carbon sequestration
- Flood control
- Landslide control
- Heat island effect
- Stormwater management
- Wastewater treatment
- Disease control

Link: IUCN

Urban Biodiversity & Green Zone: Introduction

Where

- Parks, gardens and green open areas
- Wetlands and rivers
- Streets and other urban infrastructure
- Roofs and walls

Urban Biodiversity & Green Zone: Key Concepts & Ideas

Key Concepts

- Native species
- Exotic species
- Invasive species
- Domesticated species

Exotic species – Example of exotic animals that were used in Armenian cities, such as in restaurants, for human entertainment.

Domesticated cats, when left outdoors are largest anthropogenic threat to birds in cities.

Native - Cydonia oblonga (quince)

Invasive – Ailanthus altissima

Urban Biodiversity & Green Zone: Key Concepts & Ideas

Streetscapes

- Cities have many elements that can hinder or promote biodiversity. Among these are transportation, power, solid waste, and wastewater infrastructures.

- Street landscaping, if done correctly, can offer important continuity to habitats of various species while improving comfort and air quality.

  - Sidewalks and roadsides
  - Parking lots
  - Rain gardens
  - Highways
  - Front lawns

Urban Biodiversity & Green Zone: Key Concepts & Ideas

Parks and Recreation Areas

- Large city parks
- Cultural parks
- Pleasure parks
- Neighborhood parks
- Pocket parks
- Playgrounds
- Botanical gardens
- Wetland parks, etc.

Urban Biodiversity & Green Zone: Key Concepts & Ideas

Green roofs and walls

- A roof of a building that is partially or completely covered with vegetation.

- A green wall is made of plants grown in a supported vertical system. Green walls can be on external or internal structures.

Bosco Verticale, Milano, Italy

Urban Biodiversity & Green Zone: Key Concepts & Ideas

Urban Agriculture

All forms of agricultural production occurring within or around cities.

Types

- Urban gardens and farms
- Rooftop gardens and farms
- Edible Landscaping, urban foraging
- Urban livestock and beekeeping

Urban Biodiversity & Green Zone: Key Concepts & Ideas

Natural Landscapes

- Gorges
- Hillsides
- Flood Catchment Areas

Urban Biodiversity & Green Zone: Key Concepts & Ideas

Rewilding

A form of ecological restoration in urban areas where humans step back and leave the area to nature.

Examples

- Dublin rewilding since 2015
- Germany: Dessau, Hanover and Frankfurt am Main began a five-year rewilding project in 2016 (https://www.staedte-wagen-wildnis.de)
- The High Line
- The Wild Mile (https://www.wildmilechicago.org/)
- Promenade Plantée, Paris

Urban Biodiversity & Green Zone: Key Concepts & Ideas

Invasive Species in Urban Spaces

A non-native or indigenous organism that causes ecological, economic or social harm in an environment.

Impacts

- Ecological - compete with native species
- Economic - damage to crops or infrastructure
- Societal - harm health or quality-of-life

Urban Biodiversity & Green Zone: Key Concepts & Ideas

Soil Biodiversity

Healthy soils lead to plant growth, improve health, provide water purification, and carbon sequestration and storage, which can mitigate climate change and aid in climate change adaptation.

Designing greener cities can positively impact soil biodiversity and ensure minimum impact whenever possible

Soil biodiversity loss due to soil sealing and urbanization and through land use change, introduction of invasive species, and pollution.

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Urban Biodiversity & Green Zone: Key Concepts & Ideas

Pesticides

- Pesticide use has a harmful impact on biological diversity. It can have short-term toxic effects on directly-exposed organisms, including beneficial ones, as well as long-term effects on the ecosystem.

- While the largest use of pesticides is in agricultural areas, urban areas can also impact biodiversity by the use of pesticides. Equally important, pesticide use can harm humans and their domesticated animals.

- Since 2009 when the EU established the Sustainable Use Directive on Pesticides (SUDP) a movement of towns going pesticides-free is growing. More and more citizens are opposing the use of pesticides in the parks and streets where they work, live and play.

- In the EU, there is a Pesticide Free Towns Network, the members of which work to eliminate pesticide use, replacing it with sustainable and natural alternatives. The network also exchanges knowledge and experience. For additional information visit: https://www.pan-europe.info/campaigns/pesticide-free-towns or https://www.pesticide-free-towns.info/

A pesticide-free park in City of Evanston, Illinois, United States

Urban Biodiversity & Green Zone: Key Concepts & Ideas

Adapting the built environment to wildlife: Countering habitat fragmentation and animal vehicular deaths

- The built environment can be modified to make it more hospitable to wildlife, particularly by countering the habitat fragmentation that the built environment can cause.

- Examples of modifications could include building wildlife bridges, tunnels, corridors, passageways, nest platforms, and so on.

Stork nest platforms in Lithuania

Wildlife bridge in the Netherlands

A turtle culvert under train tracks in Japan

Bee "highway" in Oslo, Norway

Penguin tunnel under a highway in New Zealand

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Urban Biodiversity & Green Zone: Key Concepts & Ideas

Adapting the built environment to wildlife: Preventing bird glass collisions

- An estimated 400 million to a billion bird deaths occur in the U.S. annually due to collision with buildings.

- This makes window collisions the second largest anthropogenic cause of bird deaths after domestic cats.

- Bird-safe windows create visual cues for birds to avoid flying into glass.

- For ideas on how to prevent this catastrophic urban impact on birds, visit: https://abcbirds.org/glass-collisions/
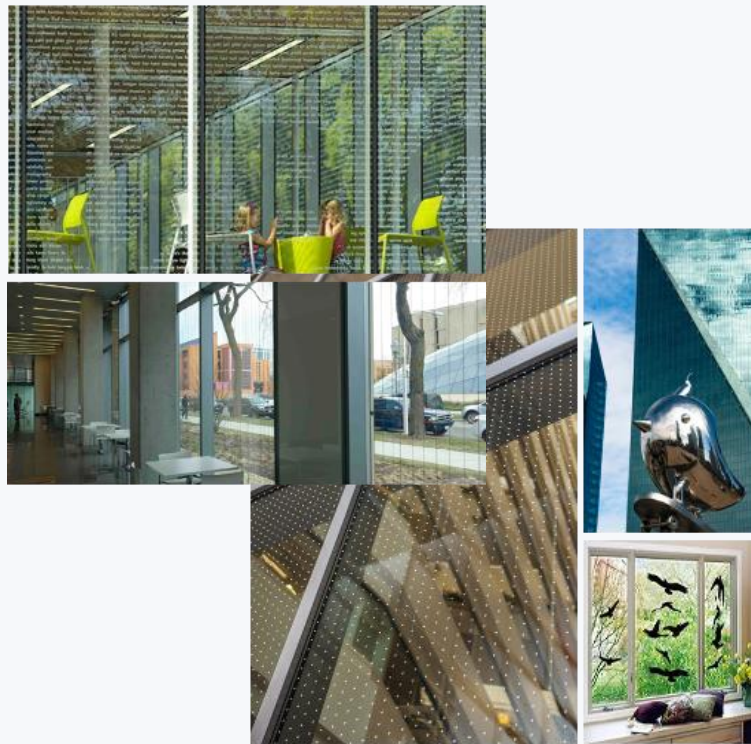
Urban Biodiversity Management

- There are tools available to city planners and policymakers for managing urban biodiversity, including enabling its enhancement and conservation.

- Municipalities would need to be guided by local factors, such as budget, legislation and the like to decide which of these tools or approaches are best suited to them.

- In many of these, public participatory tools are employed at various stages of urban biodiversity management: planning, implementation, maintenance, and monitoring.

- For a compilation of biodiversity management tools visit the Urban Biodiversity Hub website: UBHub.org.

- To illustrate these tools, two are briefly highlighted in the next slides: Local Biodiversity Strategy and Action Plan (LSBAP) and the City Biodiversity Index (a.k.a., the Singapore Index).

Urban Biodiversity Management

Local Biodiversity Strategy and Action Plan (LBSAP)

- A LBSAP offers an approach to assessing, planning & implementing biodiversity targets at the local level. It does so by aligning it with the National Biodiversity Strategy and Action Plan.*

- An LBSAP typically includes:

  - Biodiversity assessment (species, agricultural varieties, habitats)
  - Assessment of the conservation status
  - Creation of priorities and targets for conservation and restoration
  - Establishment of budgets, timelines, responsibilities and partnerships

- The preparation of the LBSAP should be a consultative process, and the relevant stakeholders' interests, roles and responsibilities should be determined as part of the process.

- LBSAP offers great opportunity for public participation at every stage of its process.

Urban Biodiversity Management

City Biodiversity Index (a.k.a., the Singapore Index)

- The Singapore Index is a self-assessment tool for cities to evaluate and monitor their biodiversity conservation progress.

- The index includes 23 indicators in three categories: native biodiversity, ecosystem services provided by biodiversity, and governance and management of biodiversity.

- Each indicator is assigned a score between zero and four points, with a total possible maximum score of 92 points.

- The first year is taken as the baseline year. Future applications of the Index can chart progress in conserving biodiversity.

Source: https://www.cbd.int/subnational/partners-and-initiatives/city-biodiversity-index

Breakpoint Activity

1. Mentally explore your city and identify places of biodiversity. Can you recall any green roofs, walls, natural landscapes or parks that support biodiversity?

2. Think of an area in your city ideal for a rewilding project? Describe the area and what benefits can be obtained from rewilding in that particular space.

3. What are some opportunities and challenges to green infrastructure in your cities?

4. Explore Interesting Resources:
   Urban Biodiversity Hub , UN's, Convention on Biological Diversity , Wilderness in the City , Wild West End , ARUP, ICLEI, UBHub Trends, Urban Agriculture Magazine.

Section 2

To get acquainted with different use cases of participatory methods for biodiversity conservation in urban contexts.

Uses of Participatory Approaches for Urban Biodiversity

Collective monitoring of vulnerable areas and species

Collective solution generation for biodiversity challenges and participatory implementation

Participatory decision-making and prioritization of urban biodiversity challenges

Participation for increasing awareness of local biodiversity challenges and opportunities

Making The Public Participate: Methods & Tools

Method for research & collective analysis

Citizen Science

Open Voting & Wiki Surveys

Participatory Sensing

Participatory Mapping

Method for collective solution generation & execution

Co-Design & Co-Creation

Open Data Initiatives

Hackathons

Serious Gaming

Workshops

Breakpoint Activity

1. Recall the urban biodiversity challenges that were discussed at the beginning of the module.

2. Which are the challenges that would become easier to tackle if public got involved? Choose the top 3.

3. What could the public do to help address these challenges? Create a list of actions.

Section 3

To see how different participatory approaches and methods work in practice for biodiversity conservation in urban contexts. To see what results can be achieved with such methods.

Milwaukee: Urban Menomonee Valley

Context

- Milwaukee is a place along a river that has been both invisible and inaccessible to people for decades.

- It has been mistreated for a hundred and sixty years.

- A linear pocket of land is bordered on one side by the urban Menomonee River (25 acres).

Source: https://www.asla.org/2011awards/436.html

Site Plan, reclaiming a lost wild landscape and connecting it within the urban neighborhood context of Milwaukee's broad Menomonee River Valley
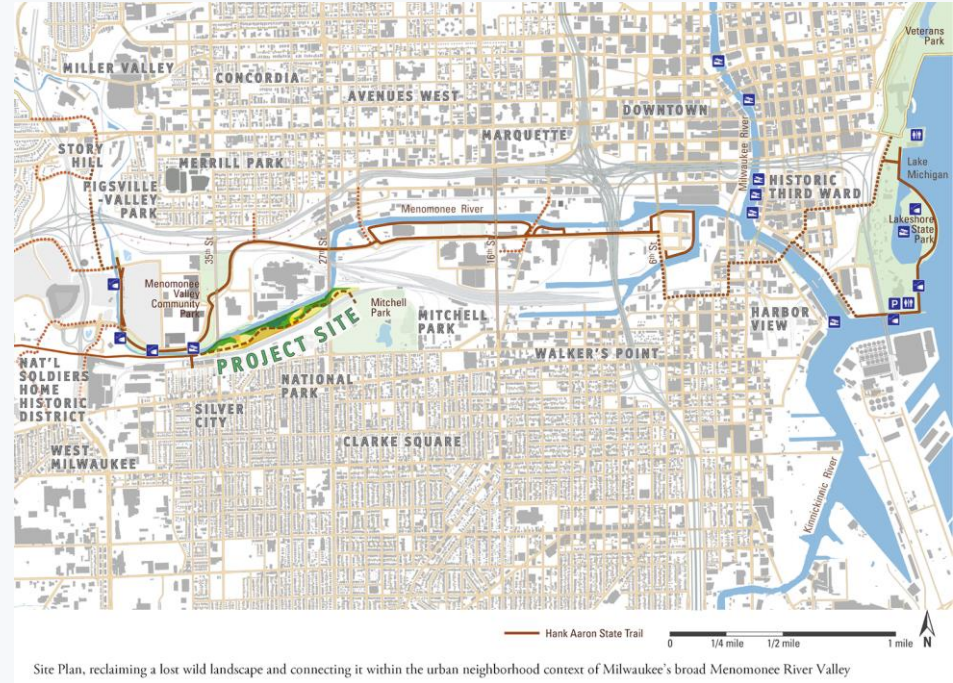
Milwaukee: Urban Menomonee Valley

Goal

- Transform the irreversibly altered land and hydrologic conditions to a mosaic of biodiverse landscapes, including forest, prairie, and ephemeral wetland, native to Milwaukee and ecologically appropriate for new conditions.

Approach

- Create an ecological restoration plan with systemic and meaningful community engagement.

Source: https://www.asla.org/2011awards/436.html

Milwaukee: Urban Menomonee Valley

The Guiding Principles

- **Ecological:** Foster successional trajectories toward long-term biotic goals

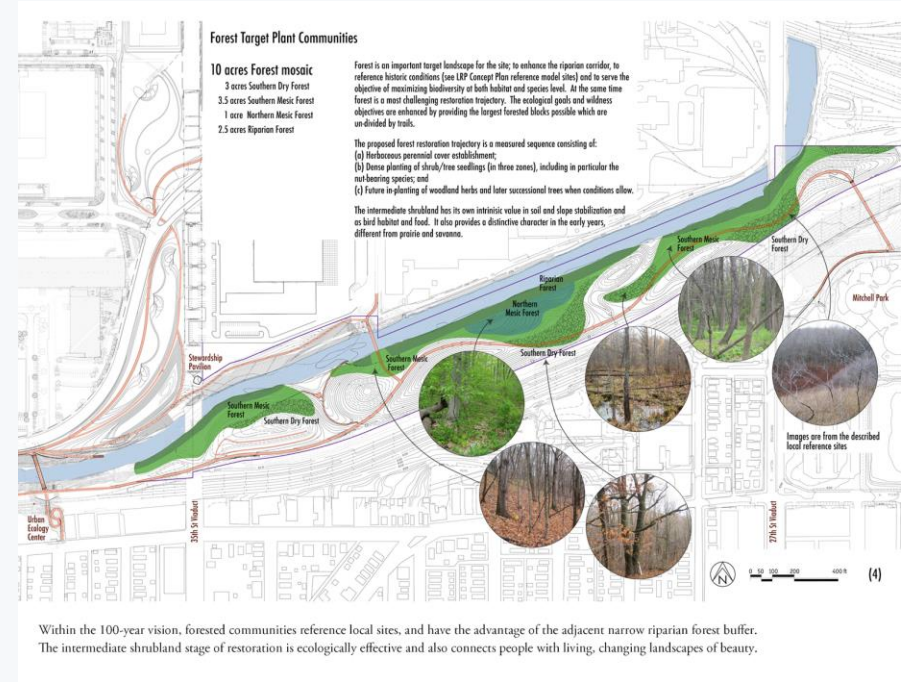- **Learning:** Provide from the beginning for deep environmental education, universally inclusive, engaging all senses.

- **Intrinsic Value of Nature:** maximize biodiversity at both habitat and species levels.

- **Wildness:** Enable individual discovery, in a landscape that provides clues to a deeper understanding and heightened awareness.

THE MENOMINEE RIVER AT WAUWATOSA ON LINE OF T. M. E. R. & L. CO., MILWAUKEE, WIS.

1908

2006
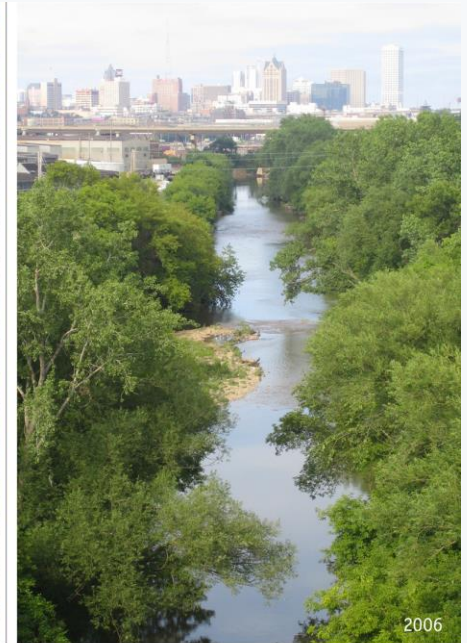
Valuing the opportunity provided by the persistence of a narrow sliver of ecological function, even when surrounded by ecologically depauperate lands.

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Milwaukee: Urban Menomonee Valley

Process

- Establishment of The Urban Ecology Center, an environmental education and **citizen science facility**.

- Analysis of adjoining **neighborhoods**.

- Collaborative natural history analysis.

- Collaborative analysis of sun patterns with topographic aspects.

- **Collaborative analysis** of biotic conditions within the existing riparian forest.

Source: https://www.asla.org/2011awards/436.html

Practicing participatory restoration with schools in the two-mile radius of the Urban Ecology Center, envisioning repeated, deeper learning and action engagement.

Milwaukee: Urban Menomonee Valley

Process

- Establishment of The Urban Ecology Center, an environmental education and citizen science facility.
- Natural history analysis.
- Analysis of sun patterns with topographic aspects.
- Analysis of biotic conditions within the existing riparian forest.
- Analysis of adjoining neighborhoods.
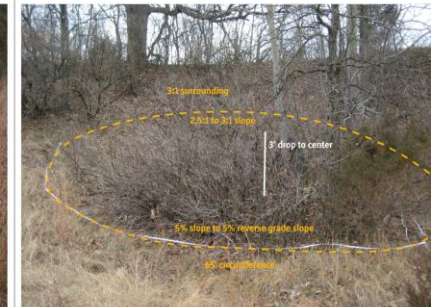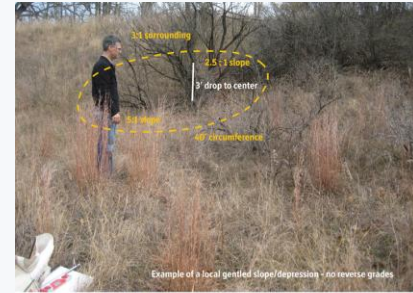
Combination of pictorial and quantitative analysis from reference sites effectively communicates to contractors the goals of micro-gradients and slope variability.

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Milwaukee: Urban Menomonee Valley
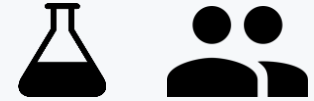
Outcome: The Co-Created Restoration Plan

- Descriptions of **9 community types with 479 native species**.

- **Flexibility, phasing**, and a blending of contracted and community labor. **Responsibilities** for the land manager, etc.

- **Vision of a wild and healthy place** accessible only by walking or biking, big enough to surround you with nature, and without designed structure that can draw attention from the art of life.
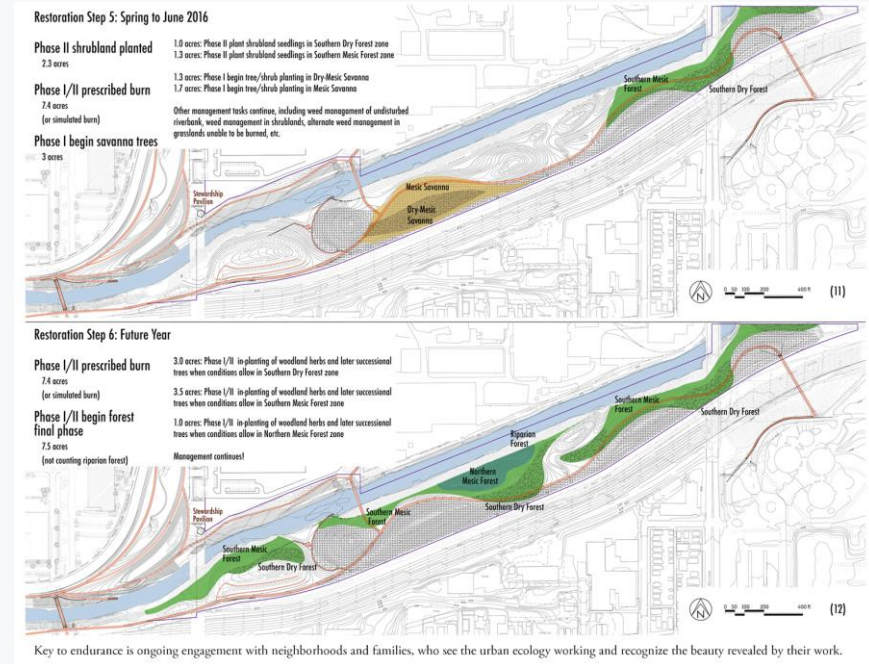
Medellin: Interconnected Green Corridors

Context

- 50 years of rapid urban development and urbanization
- Severe urban heat island effect
- Urban biodiversity is threatened

Challenge

- Reduce average city temperatures, increase urban biodiversity and ensure provision of diverse ecosystem services in Medellin

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Medellin: Interconnected Green Corridors

Approach

- Colombian legislation dedicated a part of cities' budgets to citizen participation projects selected through democratic votes (**participatory budgets**).

Process

- **75 citizens from disadvantaged backgrounds were trained** by Medellín's Joaquin Antonio Uribe Botanical Garden to become city gardeners and planting technicians

Medellin: Interconnected Green Corridors

Outcome: "The Green Corridors"

- City gardeners planted **8,800 trees and palms and 90,000+ species of lesser plants** in 30 corridors that covered 65 hectares

- 3 years after the programme's beginning, Medellín's **urban heat island effect has been reduced by 2°C**

- A bioclimatic study estimated that in just 1 corridor, the new vegetation growth would **absorb 160,787 kg of CO2 per year** for the initial phase of the plants' lives.

Source: https://c40.my.salesforce.com/sfc/p/#36000001Enhz/a/1Q000000MfJq/jNNO4dftc8c7DuStWPE2ouYg1EiOkDP9Fdjo5PxnJm4

Breakpoint Activity

1. Think about an area in your city, or its immediate vicinity that you think is underutilized, or undervalued in terms of the ecosystem services that it provides.

2. Analyze the neighborhood of the area (e.g. what type of organizations are there in the vicinity; who are the residents; what else is located around it, etc.). List all stakeholders.

3. List the benefits that each stakeholder could get if the area was restored and the activities that each of them could do to help in restoration.

4. Remembering some of the participatory methods that were discussed, think of ways to involve these stakeholders in a restoration project.

Edinburgh: CitySounds

Context

- The University of Edinburgh's Living Lab explores ways that internet-connected devices can be used to improve the urban fabric.

- With CitySounds project, it wanted to explore **how sounds captured in urban greenspace can inform community groups**, planners and citizens about biodiversity, health and well-being and provide a unique resource for artists and data scientists.

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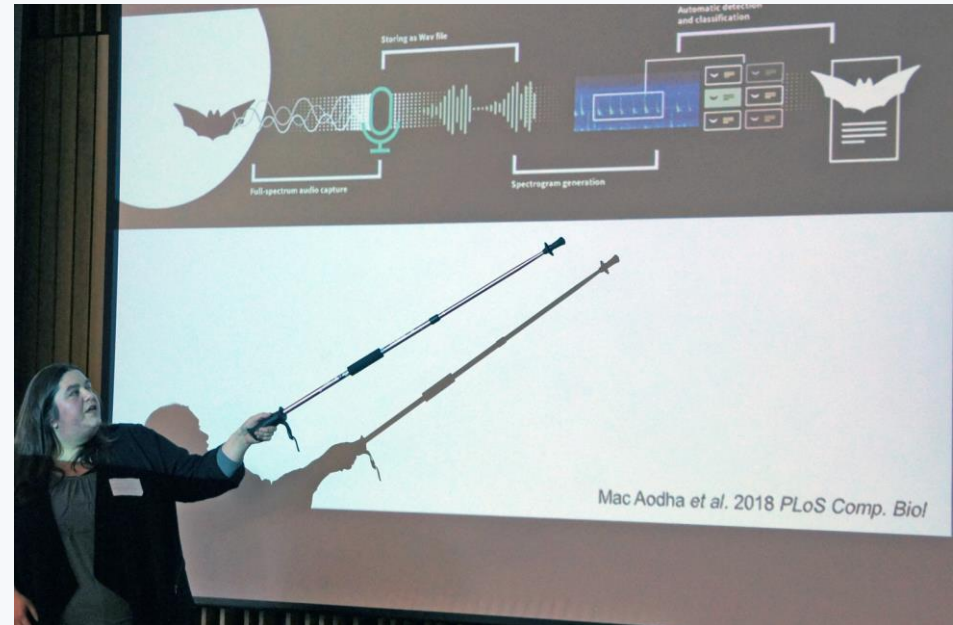
Edinburgh: CitySounds

Process: Involve the stakeholders from the outset

- Management "Kick-Off" meeting for ideation and planning

- Installation of the Audio Capture Devices (ACD's)

- 1st **data literacy and planning co-design workshop** open to interested organizations/researchers

- 2nd data **public data literacy workshop**

- A final **Sonic Art exhibition** open to the public.

Source: https://citysounds.eu/project/
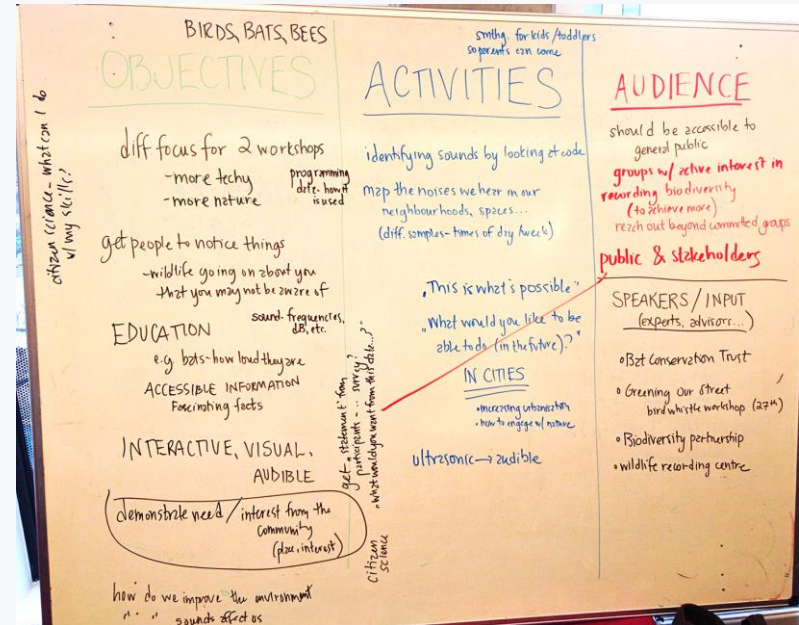
Edinburgh: CitySounds

Installing Audio Capture Devices (ACDs) with open access

- Audio monitoring devices operating 24/7 record 10-sec samples in rotation, focusing on biodiversity. **They pick up birds, rain, traffic noise, etc.**

- WiFi access point is installed in the University Main Library. Data is transferred via WiFi not to keep data on the devices.

- **Open access to the collected data** for small biodiversity organisations with little resources to deal with tech intricacies.

Source: https://citysounds.eu/project/

Edinburgh: CitySounds

Workshops and Open Innovations

- Data and environmental monitoring trainings

- **3 inspirational audio data project** presentations.

- **20+ open applications**, data visualizations and other open projects using the data from the installed devices

- **An open directory** of the projects.

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Edinburgh: CitySounds

The Sonic Exhibition

- Communicate the value of soundscape data to the broader public.
- Soundscape composition was transformed and shaped by visitor-listeners.
- Boxes or portable loudspeakers allowed visitors to move devices around the space to create their own compositions.

Source: https://citysounds.eu/project/

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Edinburgh: CitySounds

Learnings and Challenges

- It's easier to attract a lot more interest in the project once a large volume of data is available in a shareable form.

- People from the Meadows that had little experience with biodiversity monitoring or sound recording were the most difficult to attract.

- Take the message out to the community groups where they already are, inform them and build a relationship with them.

Source: https://citysounds.eu/project/

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Guimarães: Prioritizing Biodiversity

Context

- The city of Guimarães intended to promote biodiversity in urban areas.

- **Invasive species** were a particular threat.

- The municipality implemented the P2GREeN project for reforestation and control of invasive species in the green areas of the city.

Approach

- **Sensitizing and educating citizens** and local stakeholders by involving them in the process

Source: https://urbact.eu/protection-and-promotion-biodiversity

Guimarães: Prioritizing Biodiversity

Process

- Development of [Biodiversity GO!](#) (a mobile app) for co-creation of a biodiversity database.

- Assessment of the city's biodiversity through the "Invasive Alien Species Control Program".

- "The Environmental Education Program" involving kids in tree planting.

- Creation of biodiversity routes, observation centers and promotion of nature tourism.

Source: https://urbact.eu/protection-and-promotion-biodiversity

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Guimarães: Prioritizing Biodiversity

Outcomes

- Planting of 15,000 new plants per year in the green and/or burned areas of the Municipality.

- A collaboration between "Invasive Alien Species Plan Control Program" and "Environmental Education Program" to create species observation centers.

- Creation of biodiversity routes enabling the community to know more about biodiversity and share their knowledge.

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Breakpoint Activity

1. Think about the data that is generated in your city (e.g. from activities of humans and other species, such as movement and interactions, or from natural changes, such as in temperature, etc.). List some sources of data.

2. How could these data help city planners, or other responsible parties plan for biodiversity conservation? List a few ways.

3. How could the public help access these data, or turn them into insights/ information (hint: remember the participatory tools and methods discussed).

4. What technology could be used (hint: try doing a quick Google search of relevant available technologies)

Participation for Biodiversity: Tools to Explore

- Natura Alert
- iNaturalist
- IUCN Urban Alliance
- URBACT Toolbox
- WeObserve
- Community of Practice Co-Creation Toolkit

End

This module is developed in the frames of the German-Armenian Network on the Advancement of Public Participation GIS for Ecosystem Services as a Means for Biodiversity Conservation and Sustainable Development (GAtES)
ace.aua.am/gates

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