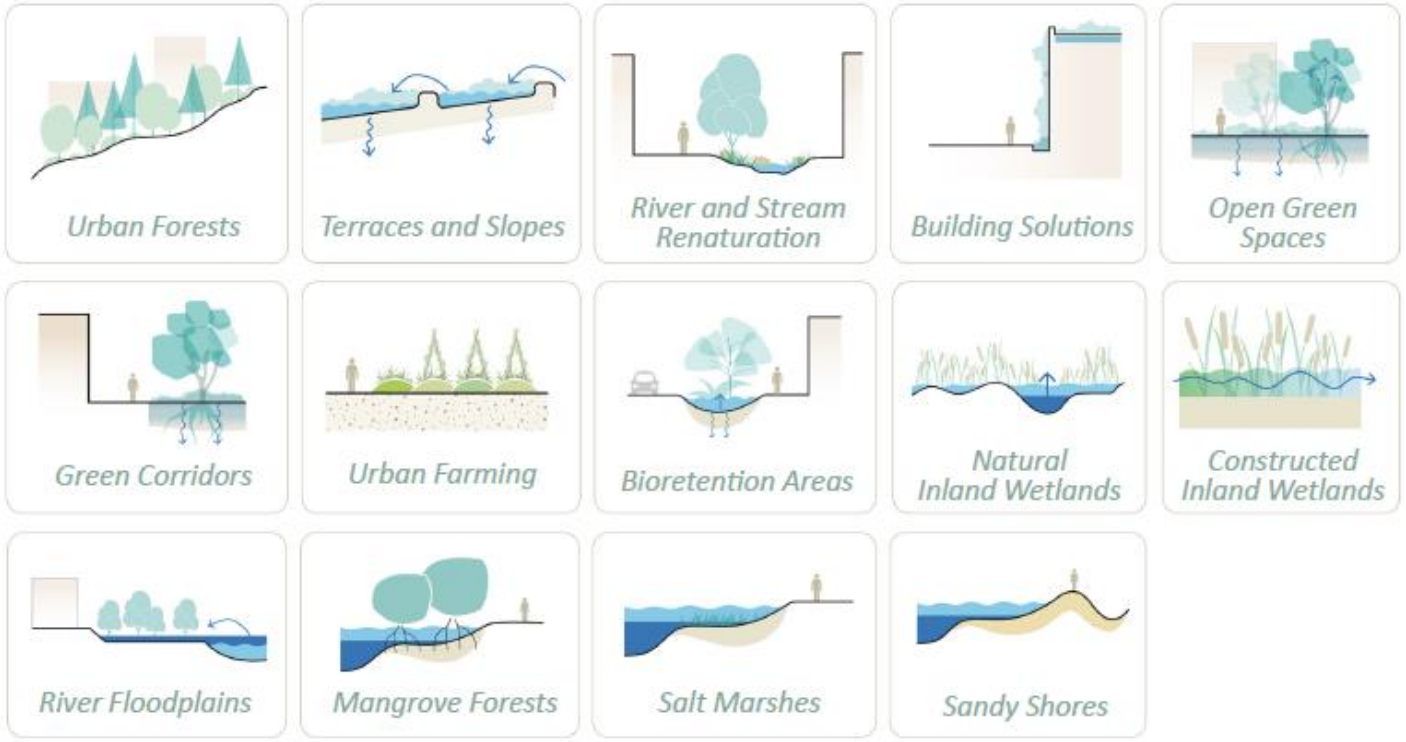
Urban Ecosystem-Based Adaptation Training Programme

Module 4: Practical Applications of EbA in Urban Planning and Design

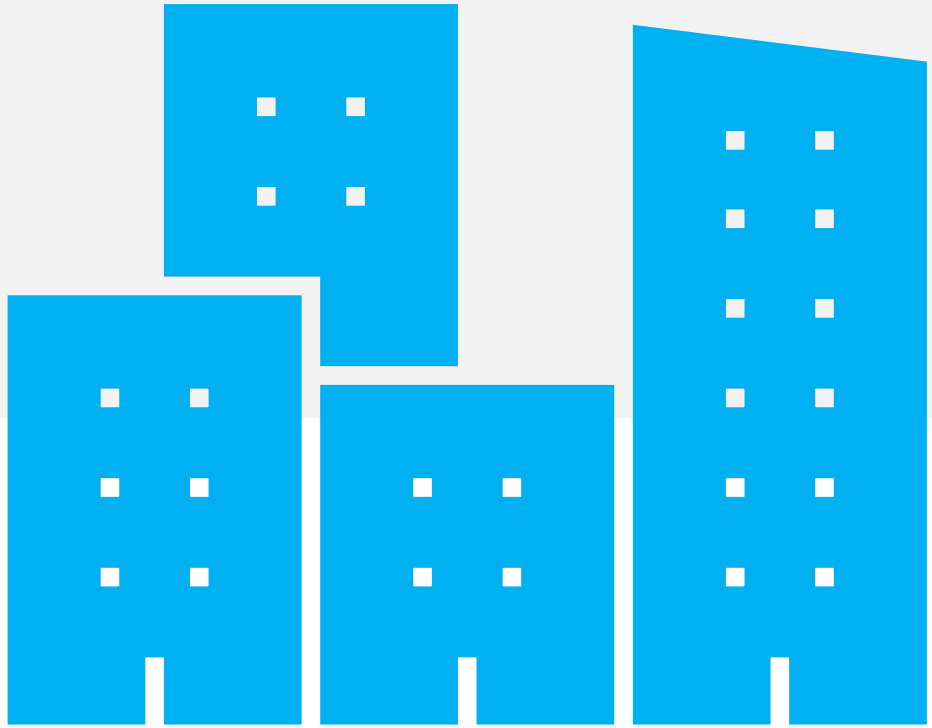


EbA for Urban and Peri-urban Spaces: Using Nature-Based Solutions as a Key Climate Change Adaptation Strategy for Advancing Sustainable Development in Jamaica

Overview of Module 4 - Practical Applications of EbA in Urban Planning and Design

Module 4 is structured around 2 main topics as follows:

- Topic 1: Practical application of EbA in urban and peri-urban planning, project design including review of case studies and cost benefit analysis as well as practical examples of the use of these EbA in urban and peri-urban spaces. Some of these include:
    - Urban Forests
    - Urban Farming
    - Open Green Spaces
    - Building Solutions
    - Green Corridors
    - Natural Inland Wetlands
    - Mangrove Forests among others

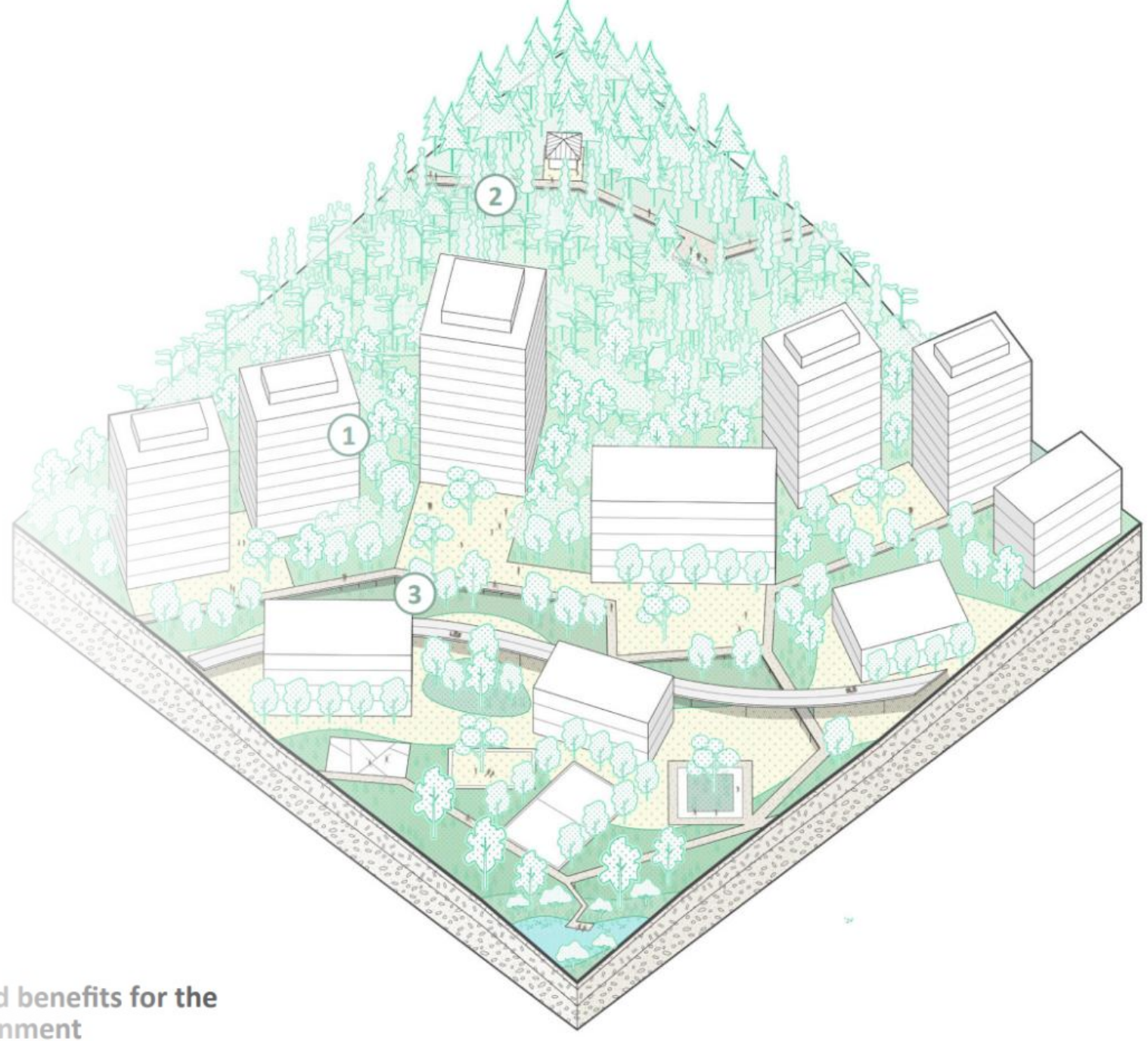


Objectives of Module 4: Practical Applications of EbA in Urban Planning and Design

Know	**The different types of EbA**
Apply	**The different types of EbA to urban and peri-urban areas in Jamaica**
Examine	**The functions of each of the EbA types**
Know	**The natural processes supported by each of the EbA types**
Be	**Able to identify the cost considerations for each EbA type**
Visualize	**Each of the EbA types**

Urban Forests

- An urban forest encompasses the trees and shrubs in an urban area.
- This includes trees in yards, along streets and utility corridors, in protected areas, and in watersheds.
- This includes individual trees, street trees, green spaces with trees, and even the associated vegetation and the soil beneath the trees.
- In many regions, urban forests are the most extensive, functional, and visible form of green infrastructure in cities.



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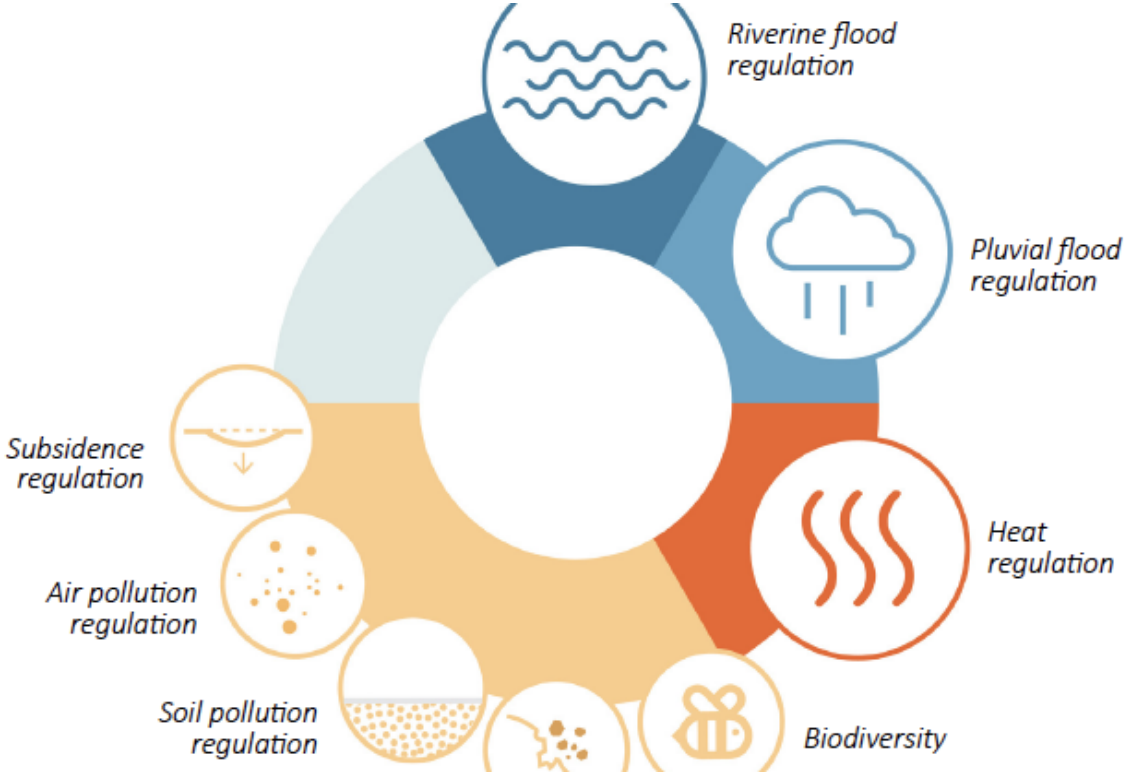
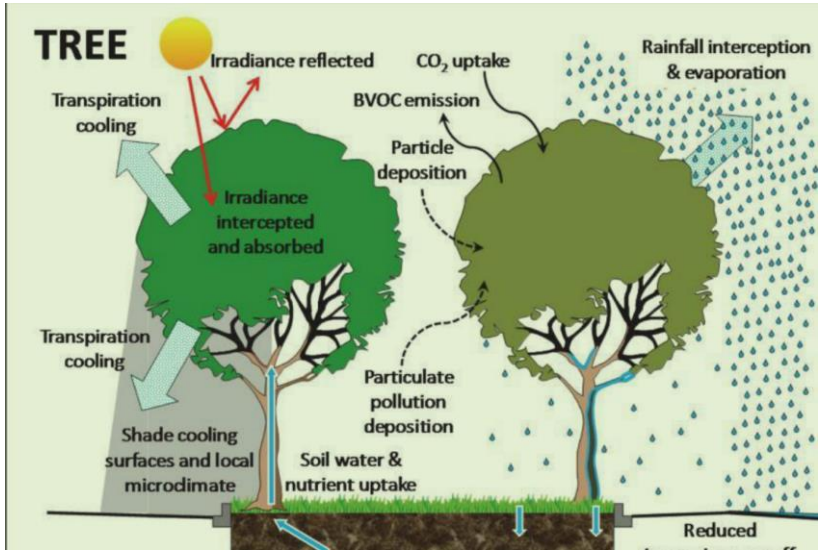
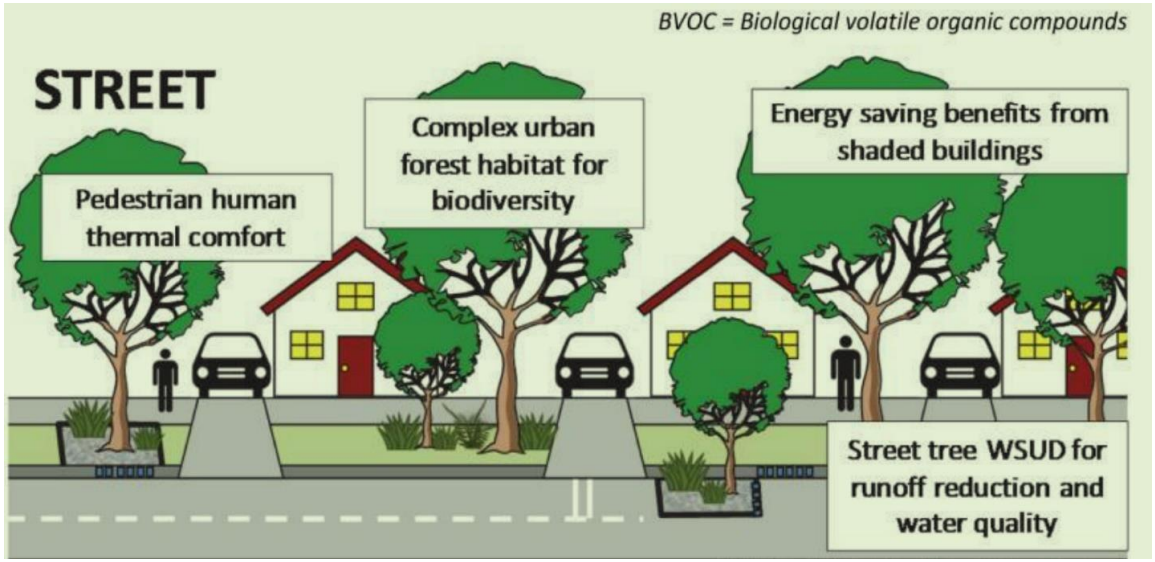
Functions of Urban Forests

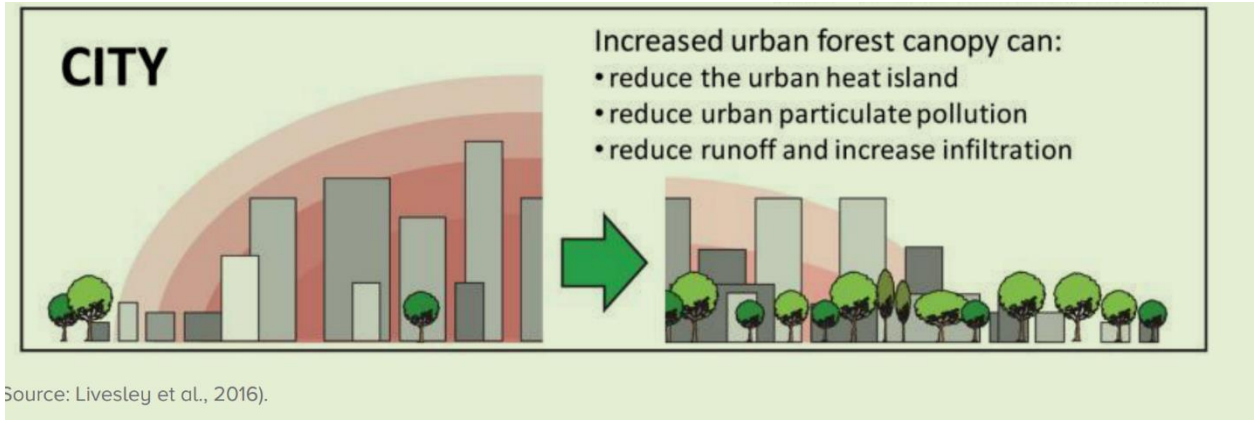


- Slows run-off and stabilize soil, thus protecting infrastructure and buildings from flooding
- Have a great potential to mitigate the urban heat island effect and air pollution, and to retain stormwater.
- Protect rivers by intercepting rainfall, increasing infiltration, and reducing flooding.
- Clean soils, sequester carbon, and regulate water cycles through retention, infiltration and evapotranspiration; improve air and water quality; provide critical habitat for a variety of species

Importance of Trees – Street and City Levels

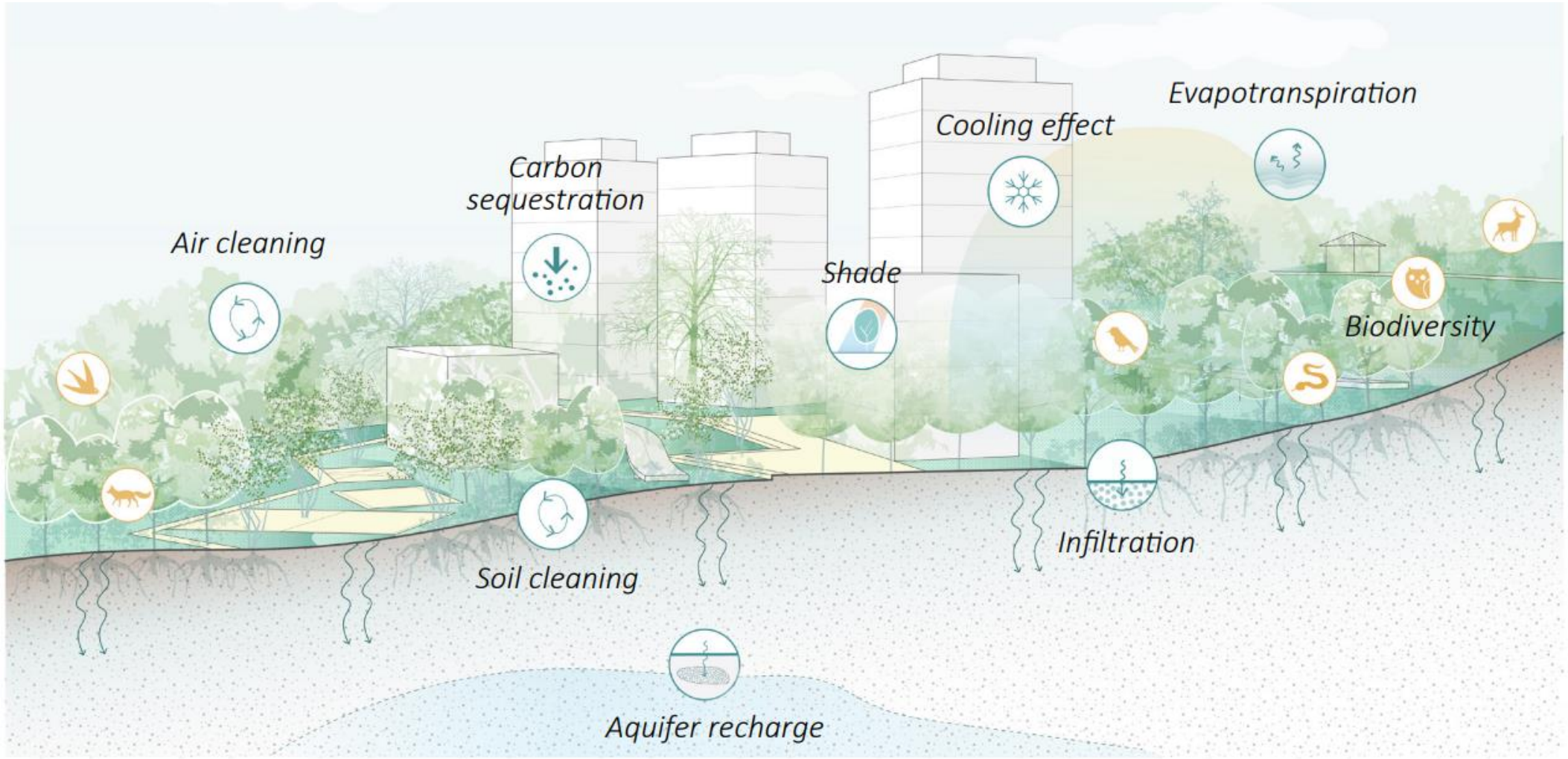






Source: Livesley et al., 2016).

Processes supported by Urban Forests



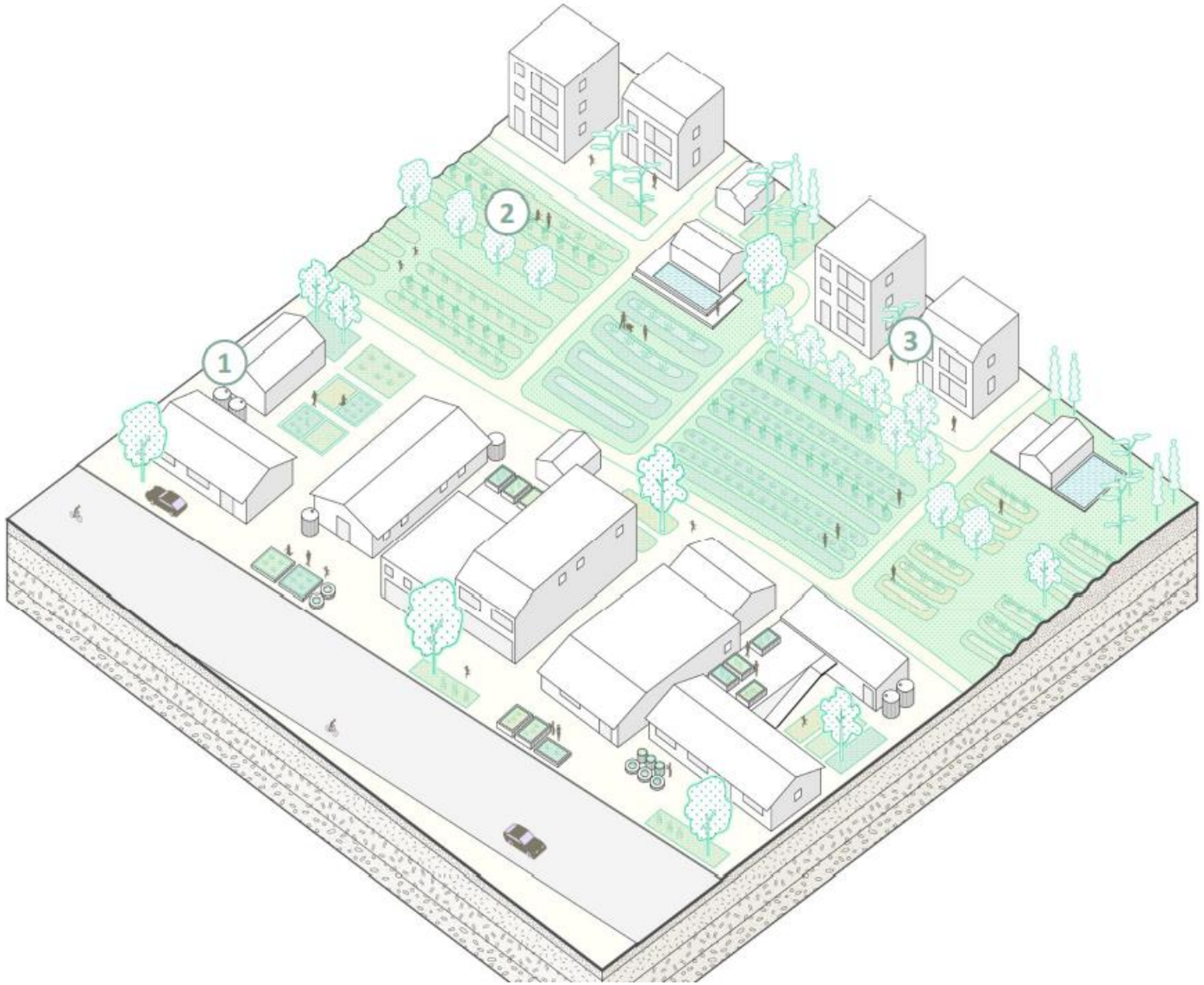
Application of Urban Forests in the Jamaica Context

- How and where can urban forests be applied to urban and peri-urban areas in the Jamaican context?

Photo by Matthew Henry on Unsplash

Project #3: *Toronto Strategic Forest Management Plan, 2012–22*
Location: *Toronto, Canada*
Description: *The City of Toronto recognizes the value of urban forests and aims to increase its tree canopy cover to 40 percent. The City's focus is on maximizing the potential ecological, social, and economic benefits of urban trees. The Urban Forestry branch of the Parks, Forestry and Recreation division maintains over four million trees on public property and works with local groups and residents to expand and improve the urban forest throughout the city. Since 2013, the city has been planting approximately 100,000 trees on public lands—parks, streets, ravines—per year, with ambitions to increase that to 300,000 trees per year through new private–public partnerships with private landowners.*

Benefits
Governance, Health, Biodiversity.
Source
City of Toronto, Urban Forestry
https://www.toronto.ca/data/parks/pdf/trees/sustaining-expanding-urban-forest-management-plan.pdf



Urban Farming

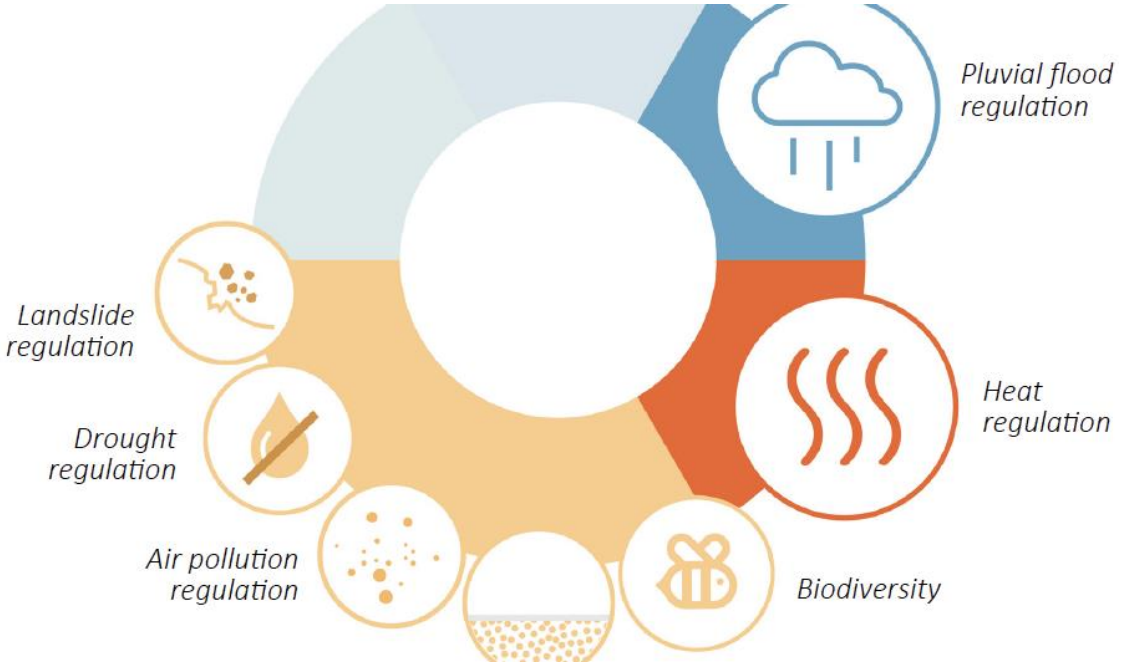
- Urban farming is a way for people to grow crops for personal consumption or to sell locally and beyond. Urban agriculture can be defined as the growing of plants or animals within and around cities and associated activities such as producing and delivering inputs as well as processing and marketing of agricultural products
- The most important incentive for urban farming is to increase food security for urban livelihoods.

Types of Urban Farming

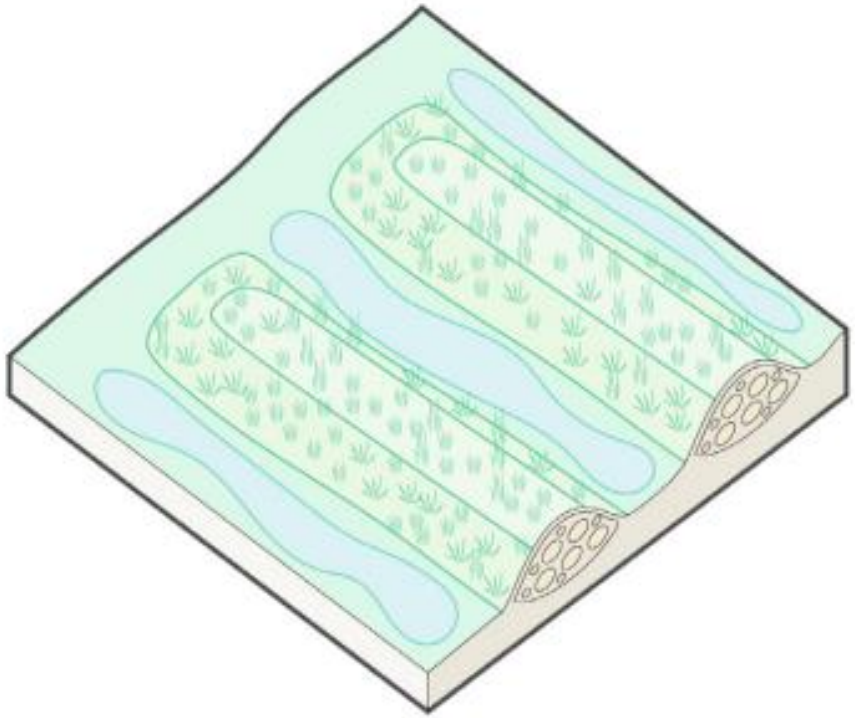
Raised beds	Raised beds can be built to any size, using any noncorrosive material, as long as the structure provides good drainage.
Shipping container farms	Useful in colder climates with higher temperature amplitudes. Containers can fit everywhere, even just in an unused corner of a parking lot and can be powered by RE.
Backyard gardens	Involves growing food on one's property. Backyard gardens are a great example of community building practice
Rooftop gardens	Some densely populated cities already have an extremely limited space. This is where rooftop space comes in. Their advantage is that this form of farming can help in reducing urban heat island and improving the air quality. Rooftop gardens can also be used to beautify common urban spaces.
Vertical Farming	Vertical farming involves growing plants in layers that are deployed vertically i.e. on shelving, or on specially modified pallets against fences or walls. Vertical farms can be housed in abandoned constructions, inside buildings still used, or in shipping containers. They are usually combined with other innovative techniques like aquaponics or hydroponics.
Hydroponics	A system for cultivating plants without soil. Instead, nutrients are added to water in which plants are immersed with materials used to support plants' growth. Since water in hydroponics systems is recycled and reused, it can save on water usage.
Amphibious farming	Inspired by the ancient Aztec way of farming called chinampas, amphibious farming uses artificial islands built in water. The islands are secured in place by driving wooden stakes into a lakebed and establishing a perimeter with woven reed fences. Amphibious farming areas create a grid, with large enough canals between the island crop beds for a small boat to move through. Planting beds use compost produced in situ as the growing medium
Aquaponics	A practice of bringing up aquaculture and animals like fish or shrimp with vegetables or herbs. It involves the use of a system that captures rain and stormwater from within the city which can then create a self-sustaining, recirculating system. Aquaponics is a highly elaborated technique, but it can be one of the most efficient ways for vegetables, crops, and a protein alternatives cultivation.

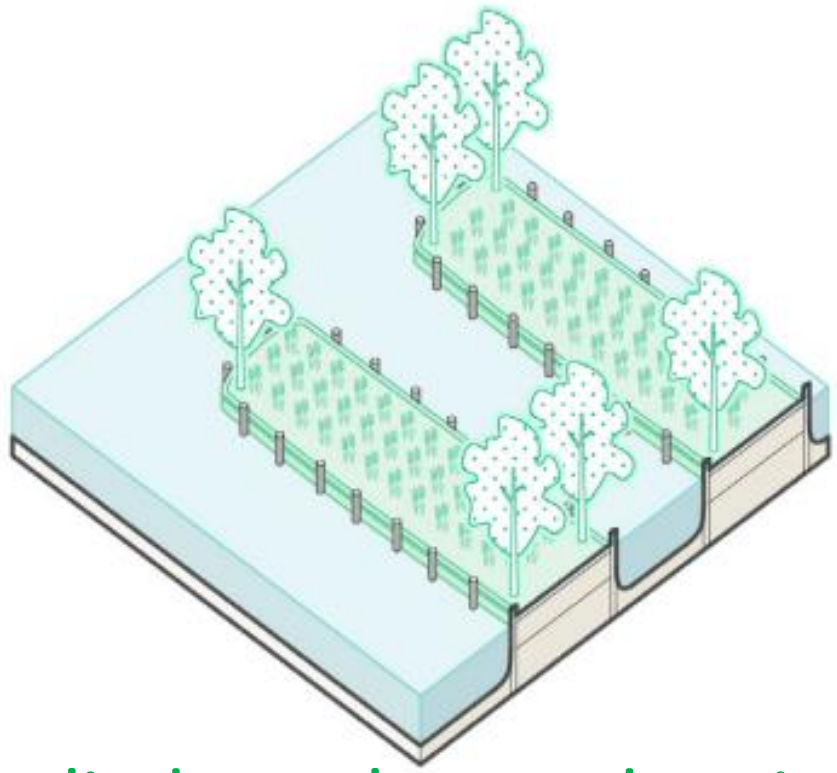
Benefits of Urban Framing

- Changes the ratio between paved and unpaved surface in the city reducing the amount of stormwater runoff that ends up in storm drains. During heavy storms, that means protecting urban rivers from untreated runoff.
- Producing and providing food, in particular vegetable crops, fruit, spices, and poultry
- Carbon sequestration
- Stimulation of local economies and job creation and new job opportunities such as the participation of hotels and restaurants in urban farming and the creation of niche markets such as farm-to-table concepts
- Contribute to food security
- Urban agriculture creates a better understanding of the value and the meaning of food, which provides opportunities to educate children



Visualizations – Raised Beds and Amphibious Farming





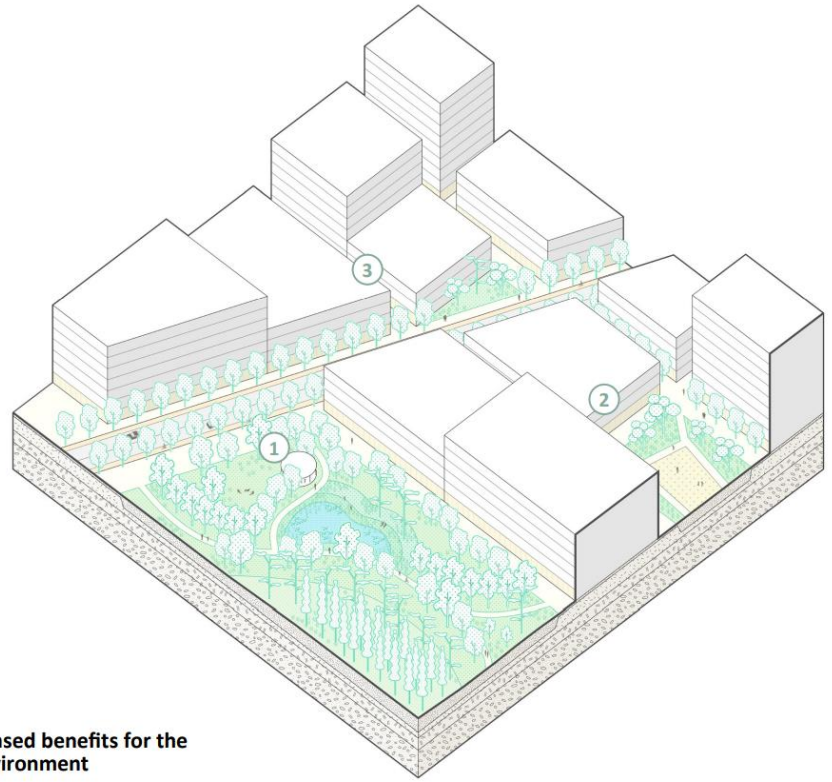
How and where can urban farming be applied to urban and peri-urban areas in the Jamaican context?

Open Green Spaces

- The creation of green areas and corridors can be applicable in most urban areas. There is a wide array of available techniques which allows for the application of green spaces in areas with various characteristics and even where space is limited. Some of the techniques include green roofs and walls which use vegetation on the roofs and facades of buildings to provide cooling in summer and thermal insulation in winter.

- Open green spaces cool cities and counter their ‘heat island’ effect.

- Tree canopy cover and well-irrigated grassed areas can lower surface temperature by around 15°C, green walls and roofs cool adjacent rooms by about 2°C, and green areas lower the urban heat island effect by 1°C, on average. This phenomenon is known as the ‘park cool island effect’.

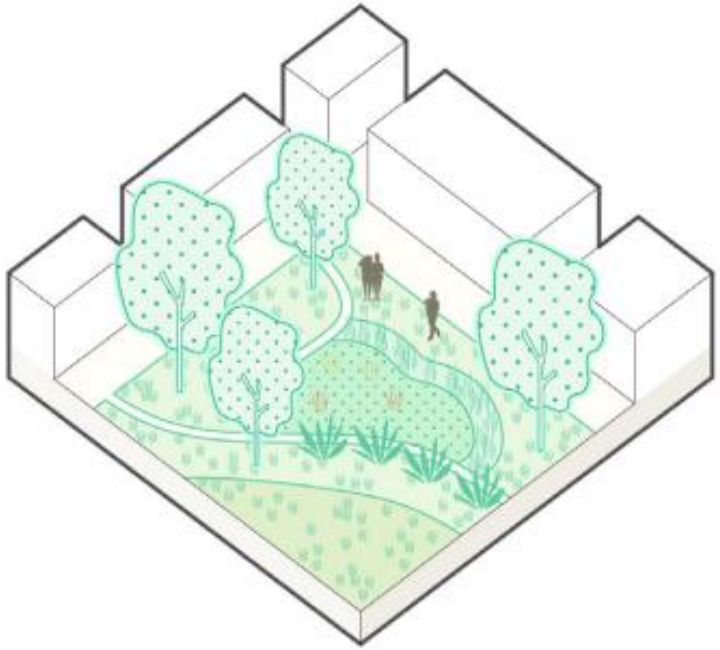


Details of increased benefits for the urban living environment

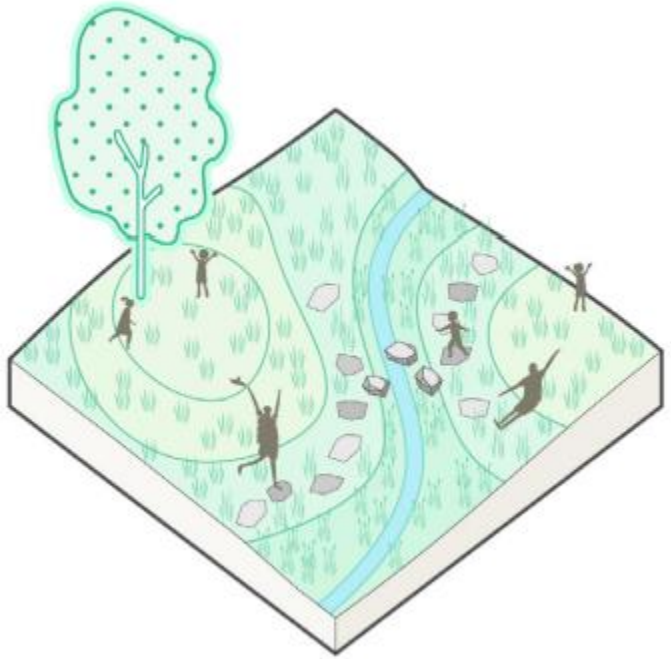
Types of Open Green Spaces

- **Pocket parks** – these are relatively small open spaces distributed throughout the urban fabric. Pocket parks serve the immediate population of a neighbourhood and provide a wide variety of small-scale recreation possibilities, such as playgrounds, dog parks, workout stations, water fountains, vegetable and flower planters, and other props for neighbourhood recreation. Pocket parks can also appear on vacant lots throughout communities
- **Natural playgrounds**
- **Climate-proof Residential Gardens** – These gardens can help with stormwater reduction. Where there are several residential gardens in urban areas, they can have a large cumulative impact in stormwater reduction if they are integrated into larger green infrastructure networks.

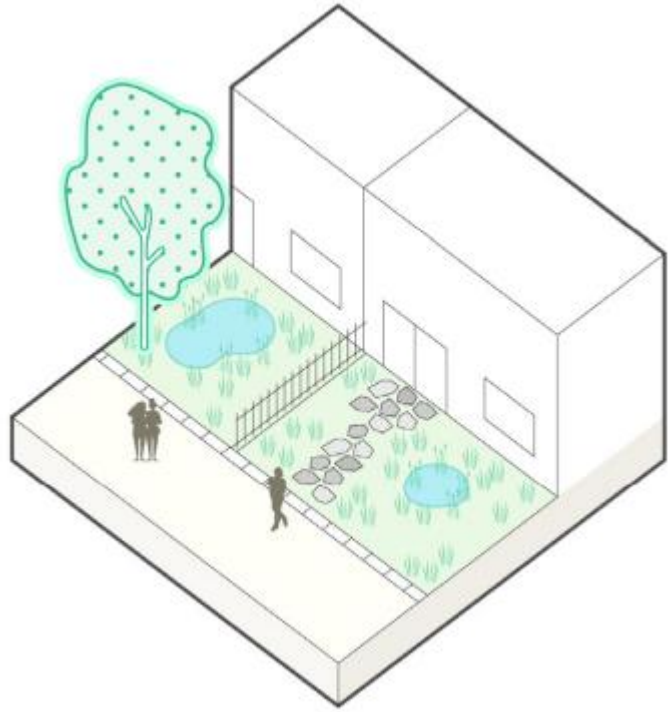
Types of Open Green Spaces –Pocket Parks, Natural Playgrounds, Residential Gardens



Visualization of a pocket park



Visualization of a natural playground

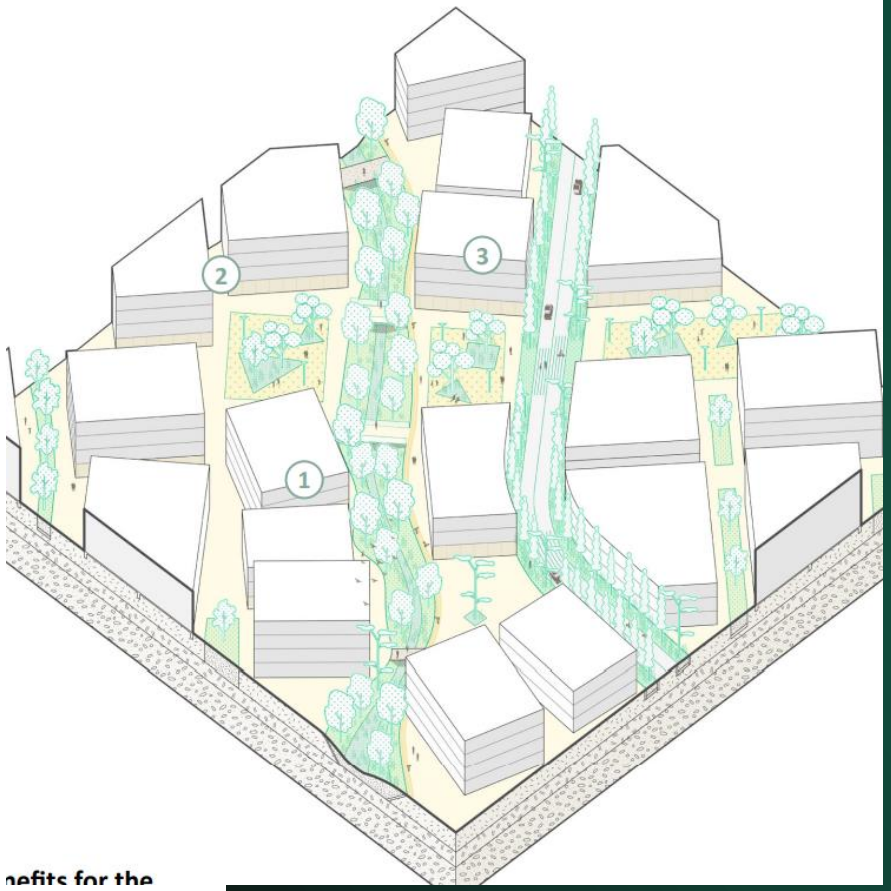


Visualization of a residential garden

How and where can open green spaces be applied to urban and peri-urban areas in the Jamaican context?

Green Corridors or Linear Natural Infrastructure

- Green corridors are strips of trees, plants, or vegetation can be found at a range of scales, and typically connect green spaces in a city, creating a green urban infrastructure network.
- Green corridors complement green spaces in a city, protect natural habitat, and typically contain the most valuable animal species urban habitat.
- The corridors allow biota to move, survive, and propagate
- Adequately designed green corridors can improve urban ventilation, allowing for cooler air from outside to penetrate the more densely built areas, and reducing the urban heat island effect.
- Together with architecture, street trees and green corridors enhance urban identity and raise the prestige of different areas

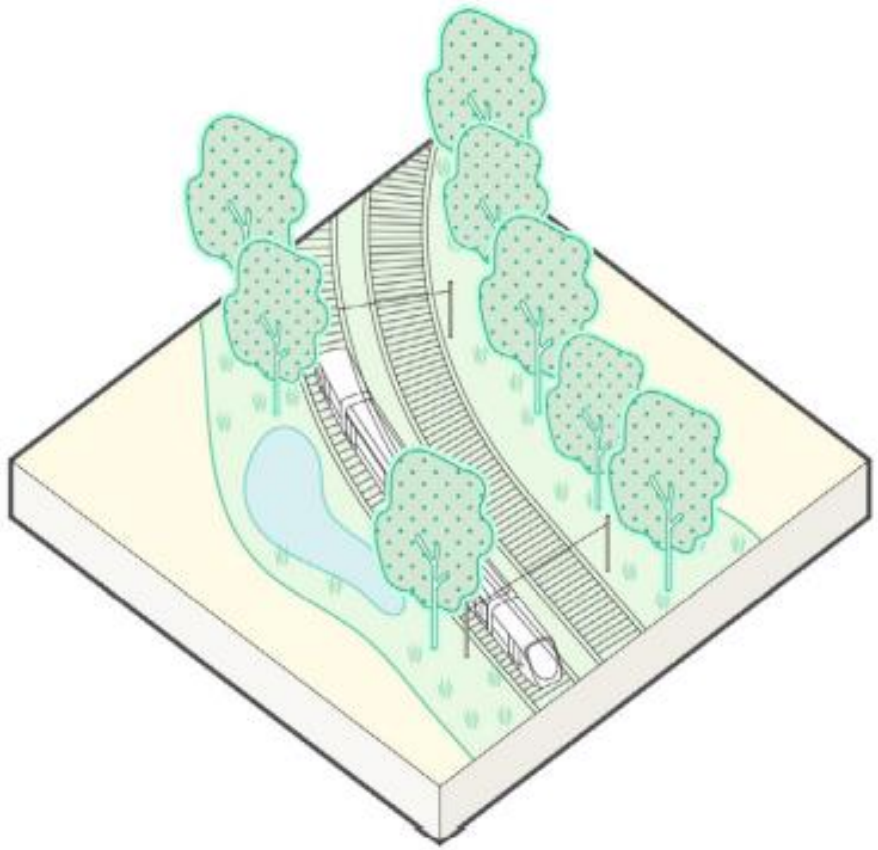


Green Corridors or Linear Natural Infrastructure

- Urban green corridors involve placing trees along streets, open train tracks, and other transportation and infrastructure corridors, in open and derelict spaces.

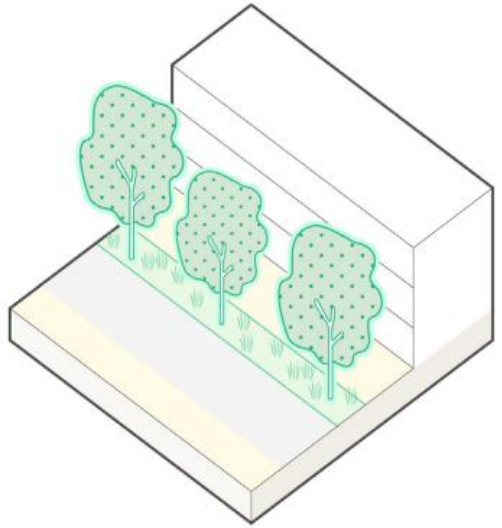
- Green corridors should be designed for multiple functions such as new bike paths, walking, and jogging routes, in addition to water management areas.

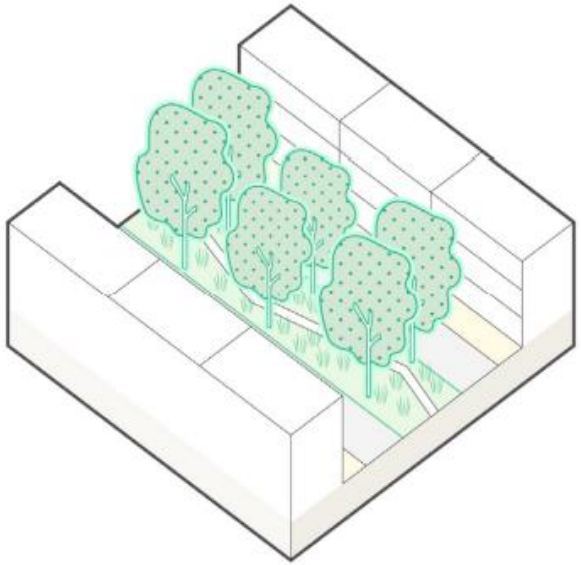
- Green corridors can help establish better landscape connectivity across the city and improve ecosystem functions. the most efficient way to create a green corridor is to plant deciduous trees as large canopies.



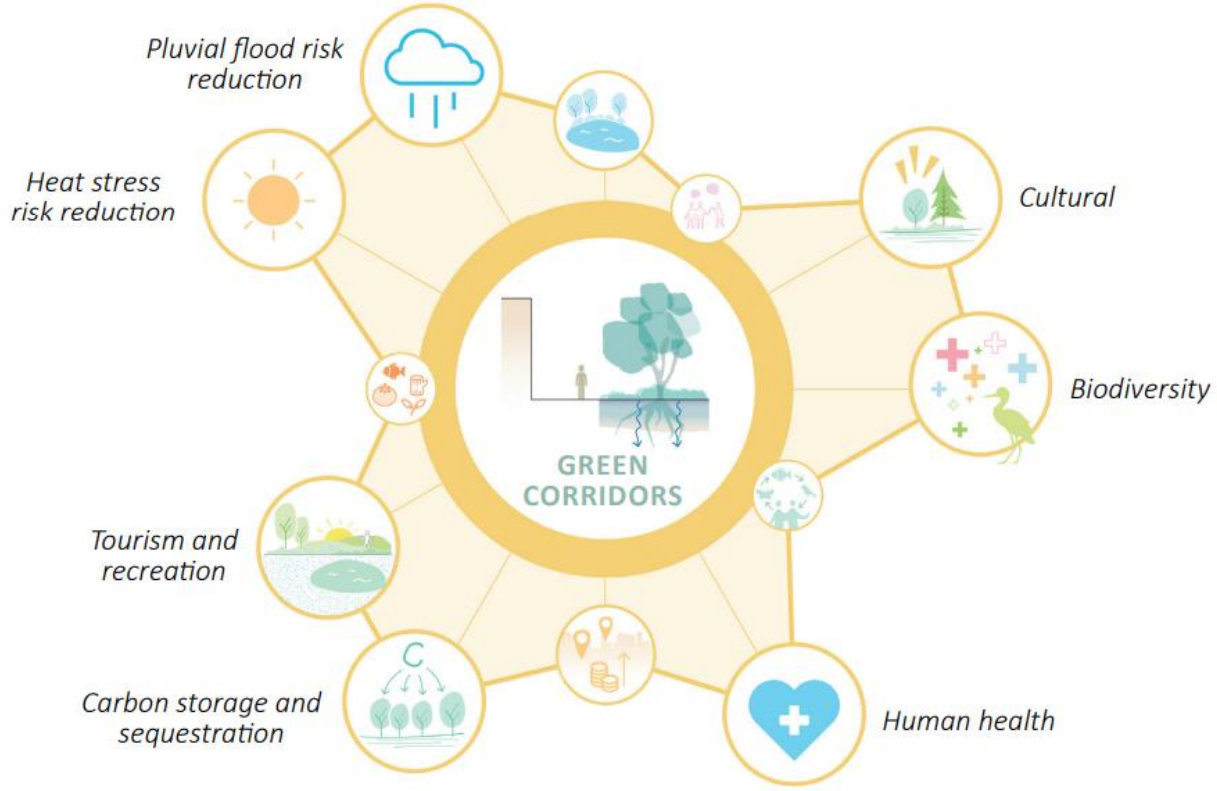
Techniques for Incorporating Green Corridors in Urban Areas

- **Street tree canopies** are streets lined with large tree canopies which on one hand enhance the image of a city, increase its competitiveness, deliver economic and environmental benefits. Some cities are famous for a particular type of tree and attract seasonal tourism based on the tree-blooming schedule
- **Green avenues and boulevards** are among the most attractive urban typologies, historically proven to improve business, increase property taxes and enhance the prestige and desirability cities





Benefits of Green Corridors



- Reducing temperatures and heat in urban areas
- Reducing the incidence of flooding in urban areas
- Enhancing the tourism product and increasing opportunities for recreation
- Carbon storage and sequestration
- Sustain biodiversity by connecting different patches of green within the city

How and where can green corridors be applied to urban and peri-urban areas in the Jamaican context?

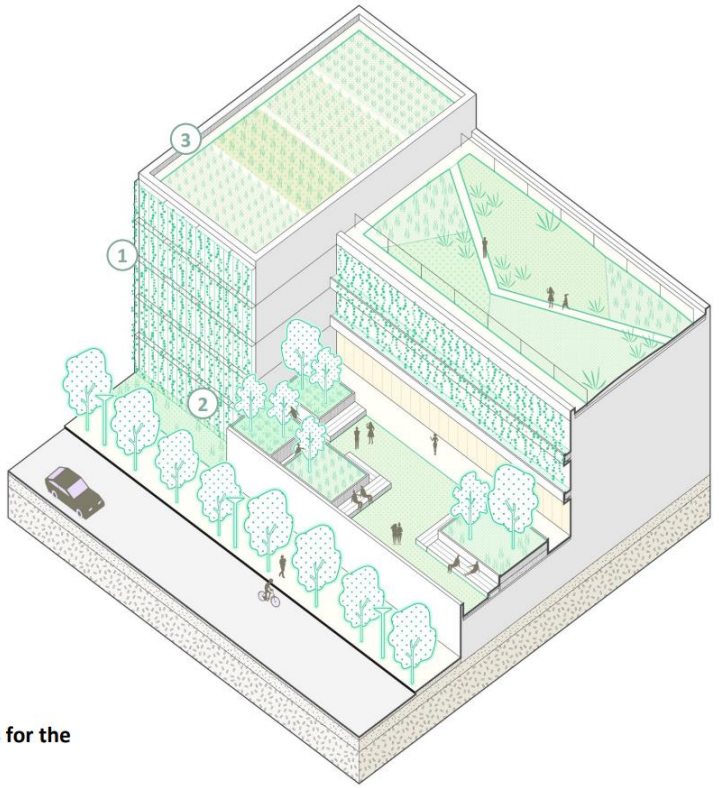
Building Solutions

- Include adding green surfaces to building roofs and facades, creating opportunities to capture, store, and reuse stormwater, improve air quality, and reduce temperatures.
- It involves construction of new green roofs and green facades on new buildings or existing buildings (through renovation).

- Provide urban flooding and heat reduction benefits, and at the same time can reduce costs by enhancing efficiency of climate control systems in buildings.

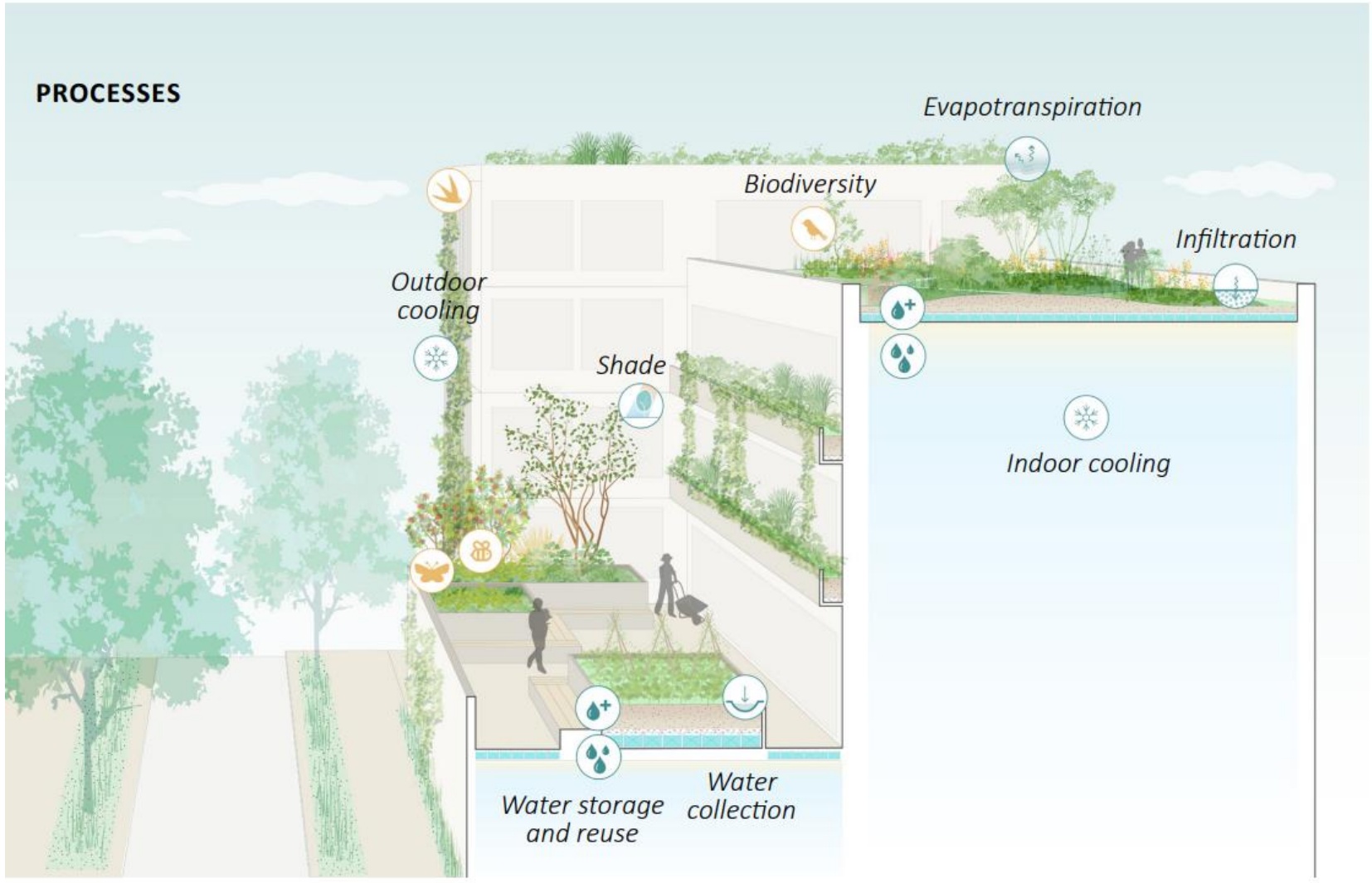
- Green roofs and facades are examples of building solutions and may also improve property values and marketability of a building, especially in urban areas with little green space, and accommodate additional space for human use and urban functions associated with food production.

VISUALIZATION OF BUILDING SOLUTIONS IN THE URBAN CONTEXT



Details of increased benefits for the urban living environment

Benefits of Building Solutions



How and where can building solutions be applied to urban and peri-urban areas in the Jamaican context?