Establishment & Maintenance of Urban Tree Seedlings

Proper establishment and maintenance of forest trees support efforts to reforest urban, peri-urban denuded landscapes. Trees provide environmental and social benefits and promote cleaner and healthier living spaces. Adherence to specific guidelines for planting, such as the use of silvicultural prescriptions, as well as the development and execution of maintenance schedules, enhances the survival of planted seedlings in urban and peri-urban spaces.

Integration with international agreements

Sendai: Goal 3 – strengthening inclusive policy implementation through community engagement to improve livelihoods.

Beneficiaries

Direct beneficiaries include local communities around the planted area that will benefit from decreased temperatures and floodings, thanks to the tree cover and its infiltration capacity. Community participation in the maintenance of these areas can be considered for engagement and long-term sustainability of these natural resources.

Duration

Results of planting tree seedlings can be seen in 3 to 5 years. In tropical countries such as Jamaica, planting is best done during the rainy seasons of April to June, and September to December.

Place of implementation

In urban areas, tree planting should be identified in conjunction with the urban planning regulation of each city: it can occur in side-walks, roundabouts, parks, etc., depending on the long-term impact on nearby infrastructure. Urban forest can also be established: phytoremediation forest in landfills and abandoned urban areas, ecological forest corridor along drainage lines, etc.

In peri-urban areas within the city's watershed, territories which have been subject to forest degradation or deforestation could be selected to address hydrological challenges in the upper watershed. The intervention could also avert destruction of ecosystems, increase biodiversity, improve environmental conditions, promote sustainable forest use, and foster community-based urban forest conservation.

Threats Addressed

- Increased temperatures
- Drought
- Changes in weather patterns

Main Climate Impacts & Threats Addressed

Flooding

Establishment of forest tree seedlings over time stabilizes the soil, thereby preventing runoff and reducing flooding.

Erosion

Soil stabilization mitigates the erosion effect of floods during heavy rains.

Landslides

With less water flow and flooding, the risk of landslides is reduced.

Undermining Urban Food Security

Planting tree seedlings helps to increase food security especially in socially vulnerable, low-income urban areas, providing a cost effective source of healthy, nutritious food.

Decrease in water availability and quality

Planting trees helps to improve water quality in urban and periurban areas. Trees prevent runoff and erosion, resulting in better water quality and availability.

Social, eco-systemic and economic co-benefits

Increased environmental awareness and community education

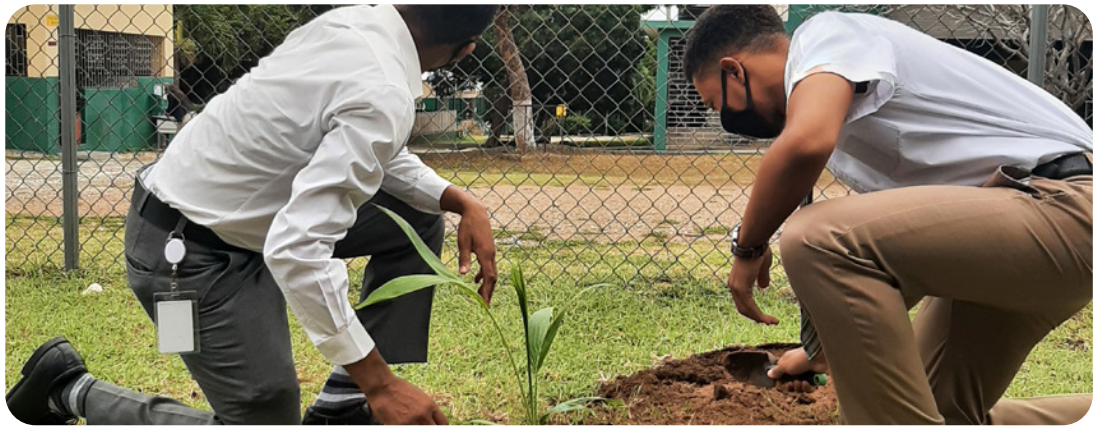
The process of planting trees and rehabilitating forest areas fosters greater environmental awareness in communities, as well as sensitivity to climate change.

Health benefits

Trees in urban spaces provide shade, supports climate regulation, captures CO_2 emissions and therefore improves air quality. Several studies have demonstrated direct benefits in mental health of surrounding urban populations.

Improved biodiversity

Planting trees supports improved urban and biodiversity a healthy ecosystem. Trees attract birds, bees, and other wildlife that have important ecosystem functions which support quality of life for communities.



Implementation Stages

1. **Planning how much and where to plant**. Identify the areas for intervention and establish access and the current use of the space among affected communities.
2. **Conduct on the ground assessments and surveys using Global Positioning System (GPS) technology.** Measure the direction of the slope and soil type to assess the level of humidity, velocity of stormwater, etc., and thus establish the best planting techniques and stages of maintenance.
3. **Develop silviculture plan.** Generate silvicultural prescriptions for planting sites, detailing the type of seedlings, how many are needed, and how seedlings should be planted and maintained. Consider the combination of seedlings to mimic endemic natural forest habitat.
4. **Establish a procurement plan.** Define the equipment and material needed for the intervention, including the requirements for the seedlings and the labour force to carry out the work.
5. **Prepare the land and carry out the planting according to the most relevant methodology.** Site preparation can include removal of waste or weeds, as well as the decision to nurse some crops prior to planting to facilitate their growth.
6. **Design an urban tree cover rehabilitation and maintenance plan** which takes into account the conditions of planting sites, species of seedlings, water availability and requirement, the needs of surrounding communities, and aesthetic considerations.

Important factors to consider

- **Suitable species:** Planting seedlings without appropriate silviculture guidelines can lead to loss of seedlings due to introduction of species which are not suitable for a specific area or ecosystem.
- **Community engagement:** Engaging and involving the community are critical to the success and sustainability of forest establishment and maintenance, especially in the case of heavily used and urbanized areas.
- **In case of urban forest planting, preventing forest fires**: Fire lines or breaks should be established at strategic points during the dry seasons to reduce the effect and impact of fire occurrences post-planting. Fire lines should reflect an area void of all vegetative fuel biomass to slow the progress of fires, and the width of these lines should be between 2.5 and 3 metres. Fire lines should be continuously maintained to ensure protection during the dry months.
- **In areas where there is less rainfall or areas which experience prolonged dry conditions,** consideration could be given to hiring personnel to water seedlings.

Costs and inputs

Activity for 1 ha	Total (USD)
Land Preparation (bushing & clearing, lining, cutting & supplying pegs, digging holes)	$872.69
Planting cost	$34.81
Seedling cost	$1,977.85
Replanting seedlings loss to mortality	**$580.08**
Weeding	**$2,557.59**
Protective firelines & boundaries established	**$2,199.45**
Road/Trail Maintenance (Once per year for 3 Yr)	**$539.49**
Sub-Total	**$8,761.96**

Indicators

Implementation	• Number of (seedlings) trees planted. • Number of seedlings produced and cost per seedling. • Area (hectares) reforested • Area (ha) of forest under sustainable forest management plans. • Number of guidelines developed for the establishment and maintenance of trees in urban settings and for use in culture, aesthetics and shade purposes. • Number of public education/awareness sessions and school awareness programmes delivered (by type and stakeholder
Quantitative impact	• Percent Change in status of forest cover (ha) • Survival rate of newly planted trees (%) • Percent renewables in electricity generation • Percent change in Soil Quality
Qualitative impact	• (Yes/No) Guidelines developed for the establishment and maintenance of trees in urban settings and for use in culture, aesthetics and shade purposes.

References

Forestry Department (Jamaica), April 2014. Standard Operating Procedure: "Field Establishment and Maintenance for Forest Tree Seedlings."

Forestry Department (Jamaica), June 2018. "Guidelines for roads and trails and firelines."

Forestry Department (Jamaica), 2014. "Guidelines for Pest and Disease Management.

WB 2021 A Catalogue of Nature based Solutions for Urban Resilience

Restauration of critical areas

The restoration of critical areas plays a fundamental role in conservation y recovery of our valuable natural ecosystems. You will discover the key steps involved in the restoration process, the benefist that could be achieved and the potential limitation that could will be arise. This comprehensive approach seeks to strengthen adaptation and mitigation in the face of climate challenges, promoting restoration of critical areas as a key task to protect that biodiversity, maintain ecosystem services and guarantee long-term sustainability.

Integration with international agreements

Sendai: Goal 3 – strengthen inclusive policy implementation through community engagement to improve livelihoods.

Description

The restoration of critical areas with native species is based on Ecosystem-based adaptation (EbA) approach, which combine the restoration of degraded ecosystem with the promotion of ecosystem services to face climate change. Through the strategic plantation of native species, the aim is improve the resilience of ecosystems, soil conservation, regulate water flow and increase carbon sequestration.

Place of implementation

It is advisable to prioritize degraded areas that have experienced a significant loss of native vegetation. In addition, it is important to consider accessibility and logistics, such as the existence of nearby roads and water sources. Agroforestry zones can also be integrated, such as the distribution of native trees within coffee crops as shade and live fences to delimit the areas.

Beneficiaries (~#)

Local communities by improving their quality of life and strengthening their resilience. Farmers and ranchers receive economic benefits and society in general benefits from conserving biodiversity and protecting the environment for future generations.

Social and economic co-benefits

Indirect economic benefits

- Improves ecosystem services such as water resources or protection against disasters.
- Ecosystem services benefit communities by reducing costs associated with floods, droughts, and crop failure.

Creation of educational spaces

Restoration of critical areas provides opportunities for environmental education and ecological awareness.

Employment generation

The restoration of critical areas entails the creation of employment in activities such as plant nurseries, sowing, maintenance and monitoring of the projects.

Carbon capture and storage

Trees absorb carbon dioxide from the atmosphere as they grow, helping to mitigate climate change by acting as carbon sinks.

For more information visit
www.cityadapt.com

Threats Addressed

- Extreme heat
- Intense rainfall
- Sudden temperature changes
- Landslides

Main climate impacts addressed

Soil degradation

Hotspot restoration focuses on addressing soil degradation caused by intensive agricultural activities and deforestation, looking for restore soil health and quality.

Loss of biodiversity

The restoration of critical areas has as its main objective the reintroduction of native species and the restoration of habitats, which helps to stop the loss of biodiversity and promote the recovery of natural ecosystems.

Water Scarcity

Promotes water infiltration into soils, recharging aquifers and addressing long-term water scarcity.

Implementation methodology

Phase 1. Site evaluation

1 Evaluation and planning

Conducts a comprehensive assessment of the degraded area to understand its current condition and determine restoration objectives. Considers factors such as soil type, climate, hydrological conditions and resource availability.

Phase 2. Implementation

2 Selection of native species

For effective restoration, native species suitable for the local ecosystem must be identified and selected, considering their adaptability to changing conditions and their contribution to biodiversity. In addition, it is important to establish a plant nursery with species extracted from local seed trees, keeping in mind the specific objective of the restoration. For example, evergreen species are established in coffee plantations to avoid problems with the crop, deciduous ones can be located in fences or landscapes. Careful selection will ensure effective tree integration.

3 Selection of native species

To adequately prepare the ground, it is necessary to carry out a series of fundamental actions. These actions include removal of invasive species, removal of debris, and correction of drainage problems.

These measures are essential to ensure an environment conducive to the restoration of critical areas. In addition, correcting drainage problems helps ensure that water flows properly and prevents pooling that can harm the growth of native species.

4 Planting hole

The process of hollowing out the ground of 30 x 30 centimeters. The density varies according to the situation of the area where the selected species will be established. In open or degraded areas, a distance of 10 to 18 meters betweenntrees is recommended. On the other hand, in borders or fences of paddocks, the optimal distance is 5 to 10 meters.

These spacing parameters ensure proper species distribution and allow each tree enough space to grow and develop optimally.