

Resilient Urbanization & Nature-Based Solutions in Rwanda

- Implementing agency: Enabel (Belgian Agency for International Cooperation)
- Focus areas: urban resilience, flood management, Nature-Based Solutions (NBS), green building
- Target regions: Musanze City (Secondary City)
- Project duration: 2 years (2023 – 2025)
- Budget: €2,000,000
- Strategic financing: this initiative integrates a vital climate adaptation dimension into the Urban Economic Development initiative (UEDi). The "Top-Up" fund specifically targets the mitigation of flood risks and the promotion of green infrastructure in Musanze, utilizing Nature-Based Solutions to create a model for climate-resilient secondary cities.

1. Context & strategic overview

Rwanda faces the dual challenge of rapid urbanization and high vulnerability to climate change. Musanze City, a central tourism and business hub, is characterized by steep topography and intense rainfall, making it highly susceptible to flooding, erosion, and landslides. These climate risks threaten biodiversity, infrastructure, and the livelihoods of its projected 380,000 inhabitants (by 2050).

Response: The project shifts from traditional "grey" infrastructure to a holistic "green and blue" approach, aiming to:

Mitigate floods: implementing the "retain, store, drain" principle to manage stormwater.

Enhance resilience: using Nature-Based Solutions (NBS) to restore ecosystems and reduce heat islands.

Promote circularity: utilizing local, low-carbon building materials ("Made in Rwanda").

Empower citizens: placing the community at the heart of decision-making through participatory planning.

2. Key pillars of intervention

Stormwater Management & Green Infrastructure

To tackle chronic flooding, the project implements hybrid infrastructure based on a comprehensive stormwater management plan:

- Stone-arch bridges: Replacement of inadequate crossings with stone-arch bridges. This technology is cost-effective, durable, and uses locally sourced volcanic stone, significantly reducing the carbon footprint compared to reinforced concrete.
- Nature-Based Solutions (NBS): Development of detention basins (vegetated depressions to store peak flow) and bioswales (trapezoidal vegetated channels) to filter runoff and encourage groundwater recharge.
- Drainage: Rehabilitation and resizing of existing drainage networks to prevent overflows during the rainy season.

Green Building: The eco-tourism food park

A flagship initiative to promote green building practices and urban tourism:

- Wetland restoration: The project revises the design of a planned food court located in a wetland buffer. Instead of filling the land, the structure will be built on a platform, restoring the wetland underneath to perform its natural water storage and biodiversity functions.
- Sustainable materials: Construction prioritizes bamboo (for roofing/structure) and volcanic stone. These local materials have low embodied energy and high mechanical properties.
- Function: Serving as a vibrant public space that showcases local agricultural products while acting as a retention pond during heavy rains.

Citizen participation & sensitization

Recognizing that resilience requires behavioral change, the project employs a "social engineering" approach:

- Co-creation: Establishing dialogue spaces (workshops, round tables) where citizens, entrepreneurs, and planners jointly identify challenges and design solutions.
- Participatory tools: Utilization of urban dynamic maps and "climate fresks" to visualize risks and plan neighborhood interventions (e.g., rainwater harvesting, pervious parking, urban farming).
- Capacity building: Training district staff and the private sector on flood risk management and green construction techniques.

3. Impact & Results

The intervention aims to secure the city center while creating green jobs and promoting biodiversity.

- Flood reduction: Significant decrease in flood events in critical locations of Musanze through improved conveyance and retention capacity.
- Infrastructure: Construction/rehabilitation of drainage structures and implementation of the stone-arch bridge technology.
- Ecosystem services: Restoration of wetlands and creation of multipurpose green spaces that filter water and sequester carbon.
- Community engagement: Mobilization of citizens in collaborative design workshops, fostering a sense of ownership over public infrastructure.

4. Sustainability & Future Strategy

The project aligns with Rwanda's Green Growth and Climate Resilience Strategy and Vision 2050.

- Institutional strengthening: Building the capacity of the District of Musanze and the Rwanda Transport Development Agency (RTDA) to maintain green infrastructure and replicate the stone-arch technology.
- Private sector capability: Training local contractors and engineers in sustainable construction methods (bamboo, stone) to reduce reliance on imported, high-carbon materials.
- Scalability: The successful integration of NBS in Musanze serves as a pilot for other secondary cities in Rwanda facing similar topographical and climatic challenges.

Partners: Ministry of Infrastructure (MININFRA), Local Administrative Entities Development Agency (LODA), Musanze District, Rwanda Transport Development Agency (RTDA), and Civil Society Organizations.