Prepared by Gaea Seychelles with input from the Ministry of Environment, Climate, Energy and Natural Resources, the Planning Authority and the National Disaster Risk Management Division.

POLICY BRIEF 4

# Building climate-resilient infrastructure: Mainstreaming ecosystem-based adaptation in river management



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## Executive Summary

Rapid construction and development in the Seychelles often cause disruptive changes to rivers, such as trapping them in concrete walls, artificial channels, or underground pipes. While these traditional 'grey' engineering methods are built to control floods, they actually make downstream flooding worse over time, destroy biodiversity, and cost a lot of money to maintain.

This document provides a way forward using Ecosystem-based Adaptation (EbA) and Nature-based Solutions (NbS). By blending natural green designs with practical building rules, the Seychelles can protect its unique environment, save valuable land, and keep homes and businesses safe from climate change and heavy storms.

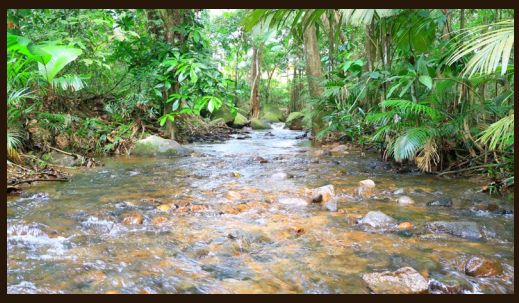
## Legal & Spatial Zoning Framework

> *Legal Fact: Every natural waterway in Seychelles is state property, but the physical riverbanks and immediate surrounding land are frequently held under private property titles. This split limits the government's ability to easily manage flood zones or plan public spaces.*

To fix this issue without violating private property rights, river management rules will adapt based on the type and age of the area:

- **Existing Dense Urban Zones:** Because space is already highly restricted, building footprint rules will not be forced backward onto established private properties. Instead, the government will offer incentives for eco-friendly retrofits, like vertical green walls and pavements that let rainwater soak through into the ground.
- **New Urban Developments:** Eco-friendly green-blue design is now mandatory. All brand-new commercial expansions must include natural river buffers, urban wetlands, or public waterfront eco-parks right from the initial master plan to manage heavy rains naturally.
- **Residential Zones:** To stop heavy buildings from crowding the water, a strict structural construction setback from riverbanks as prescribed by the law, will be enforced.

## Pure green solutions



*'The Ridge-to-Reef shield: Maintaining a healthy riparian buffer zone is the single most effective way to prevent siltation from reaching our coral reefs, safeguarding both our freshwater biodiversity and our tourism economy.'*

## The cost of hard engineering



*'Concrete walls (grey infrastructure) provide immediate but rigid protection at the cost of biodiversity.'*

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## Strategic Implementation: The Green Transition

The strategy moves infrastructure from rigid, old-fashioned concrete toward high-resilience 'Green-Grey Hybrids' that cooperate with nature:

| Old 'Grey' Approach | Integrated 'Green' Alternative & Design Criteria |
|---|---|
| Concrete Embankments | Rock Armouring & Bio-banks: Prioritise sloped rock walls over upright concrete. Bio-banks use living plant roots to bind and hold soil. By combining the two: placing heavy rock protections at the bottom waterline and growing native plants inside the gaps, we create a durable, attractive system that lets water pass through safely and stops erosion. |
| Channel Straightening | Monitored Re-meandering: Allow rivers to curve and bend naturally to slow down rushing water safely. These curves must be watched, and riverbeds should be reinforced with natural boulders so the changing water path never accidentally cuts under nearby structures. |
| River Culverts | Open Naturalised Channels: Keep stream channels open to the air and sky. This maintains the river's natural ability to clean water and provides a safe habitat for local freshwater wildlife. |
| Unmanaged Runoff | Commercial Cisterns: All large commercial buildings must build buried, reinforced concrete storage tanks (cisterns). These tanks trap heavy surface rain runoff and release it very slowly back into the ground or local streams, preventing flash floods downstream. |

## Data-Driven River Management

Policy decisions cannot be based on guesswork. The government must mandate formal hydrological river surveys for all main rivers and primary streams. This gathered data is absolutely essential to:

- **Design Optimised Channels:** Map out exact river shapes and curves that can handle high water capacity without overflowing.
- **Size Storage Cisterns:** Calculate how much extra rainwater commercial buildings generate, ensuring their underground tanks are built to the correct size.
- **Prevent Landslides:** Measure soil wetness and saturation patterns to accurately find, map, and warn communities about landslide risks.

## Priority Action Recommendations

### IMMEDIATE ACTIONS (YEAR 1)

- **Mandatory EbA Checklist:** Use a simple screening EBA-checklist for any new river-altering proposals submitted through the Planning Authority's Class 1 approvals.
- **EIA Reform:** Update Environmental Impact Assessment regulations to require developers to show an 'Analysis of Nature-Based Alternatives' before any concrete structure is allowed.
- **Survey Rollout**: Provide funding and clear directives to the Infrastructure Department to begin the primary river hydrological mapping surveys.

### MEDIUM-TERM ACTIONS (YEARS 1–3)

- **National Building Codes:** Embed rock armouring instructions, meander safety distances, and mandatory cistern rules directly into the official Seychelles design code for river engineering.
- **Green-Track Approvals:** Offer a fast-track building approval system to developers who willingly include appropriate river setback or choose 100% natural green designs.
- **Cross-Agency Training:** Host joint technical workshops to ensure the Planning Authority, Environment Ministry, and Infrastructure Department are perfectly coordinated.

## EbA & NbS 'Green' alternative



*''The New standard: Nature-based engineering, such as the gabion rock barrage at Dan Sours, Mahé, creates vital freshwater reserves while preserving the natural 'sponge' capacity of the landscape''*

About Gaea Seychelles
Gaea Seychelles is a research and citizen science-based organisation launched in 2018. Its mission is to empower and mobilise actions by local actors to undertake impactful environmental community-based projects which creates significant and sustained change for the betterment of people's lives and their environment.

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