THE POCKET GUIDE FOR

NATURAL & NATURE-BASED SOLUTIONS IN SOUTH CAROLINA

Want to know more?

This guide was produced by the Nature-Based Exchange, a collaborative effort by The Nature Conservancy, Clemson University's Resilient Urban Design Program, the City of Charleston, Biohabitats, Inc., Robinson Design Engineers, and Surculus. The Exchange aims to bring together an array of local partners to discuss and develop natural and nature-based solutions for South Carolina. The creation and distribution of this guide is funded by Honda and the City of Charleston. Pamphlet was designed by Amy Nguyen and Julia Weaver.

Cover photo: Constructed stormwater wetlands designed by Robinson Design Engineers (RDE) in a James Island neighborhood, Fox Hollow. Photo provided by RDE.

Scan to visit our website for a more in depth view of the Nature-Based Exchange.

WHAT ARE NNBS?

Natural and nature-based solutions (NNBS) are methods to enhance ecosystem resilience in both natural and human-dominated systems. When implemented correctly, NNBS can protect and restore habitat, prevent wildlife loss, create greener cities, and address issues such as extreme weather, food production, and water management.

CONSTRUCTED ..... **RESTORED/CONSERVED**

GREY	GREEN	NATURAL
Pipes	Rain Gardens	Wetlands
Pumps	Bioswales	Marshes
Storm Barriers	Rain Gardens	Forests
Permeable Paving	Water Parks	Swamps
Collection / Storage Systems	Urban Tree Canopy	Mangroves

NNBS exist on a spectrum from grey to green. Grey infrastructure is traditional hard infrastructure, such as a concrete seawall. Natural infrastructure are healthy, functioning ecosystems, such as a natural wetland or forest. Green infrastructure lies between the two and offers a hybrid approach – typically engineered or constructed systems that include a natural component. Green infrastructure can take many forms and include different ratios of grey to green.

THE COLLECTIVE HISTORY

For millennia, NNBS have been used to protect, manage, restore, and create healthy ecosystems to promote biodiversity and human well-being. From beavers that shaped whole river systems to indigenous people who used sustainable, regenerative methods of harvest to provide for their community, NNBS have been used across landscapes and timescales to promote healthy and thriving ecosystems.

With the growth of industry and technology, less emphasis has been placed on the use of natural solutions, leading many people to lose touch with nature. But not everyone. Nature continues to care for itself, indigenous cultures continue to pass down their stories and methods, and dedicated scientists and conservationists still study and protect nature.

Today, there is growing interest in bringing nature back to the forefront by moving away from using solely traditional hard infrastructure and better utilizing the spectrum of hybrid and nature-based approaches where appropriate. While these methods are not fully accepted or understood by everyone, there is an increasing movement among environmentalists, designers, planners, and community leaders to incorporate these natural solutions into our modern landscapes.

This guide serves as an introduction to NNBS: it explores the types of NNBS, the issues they address, where to find them in the landscape, and how to implement them.

ISSUES ADDRESSED

As their name suggests, NNBS are solutions designed to address one or more issues. Not only can they address the issue at hand, but they can also bring added social, economic, and ecologic benefits to the project site and beyond. Some of the most common issues addressed with NNBS in South Carolina include:

- Inland Flooding (riverine flooding)
- Urban Flooding (stormwater and sewer overflow)
- Coastal Flooding (tidal flooding and storm surge)
- Biodiversity Loss
- Soil and Sediment Loss
- Shoreline Erosion
- Water Quality Impairment
- Drought
- Wildfire
- Air Pollution
- Urban Heat

BENEFITS

Well-designed NNBS can offer multiple benefits, including, but not limited to:

1. Reduced greenhouse gas emissions
2. Enhanced carbon storage
3. Reduction of major climate risks
4. Job opportunities
5. Improved water and air quality
6. Fish, timber, and other natural products
7. Recreational opportunities and access
8. More resilient infrastructure
9. Improved physical and mental health
10. Cultural benefits
11. Wildlife and biodiversity support
12. Community development and economic revitalization

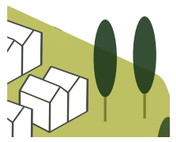
Adapted from: White House Council on Environmental Quality, White House Office of Science and Technology Policy, White House Domestic Climate Policy Office, 2022. Opportunities for Accelerating Nature-Based Solutions: A Roadmap for Climate Progress, Thriving Nature, Equity, and Prosperity Report to the National Climate Task Force. Washington, D.C

SCALE

NNBS should be designed and built at a scale appropriate for the project's goals and purpose.

Watershed Scale
Address issues spanning a large geographic area. Build interconnected systems of natural areas and open space, requiring long-term planning and coordination.
Examples: wetland protection, forest restoration, marsh creation

Neighborhood Scale
Address issues that span multiple properties. Require some planning and coordination among property owners but are less space-intensive than watershed scale projects.
Examples: crop rotation, stream daylighting, tree trenches



Site Scale
Address small-scale, local issues on property that belongs to a single owner.
Examples: living shorelines, rain gardens, green roofs

LANDSCAPE ZONES

Coastal: stabilize the shoreline, reduce erosion and buffer the coast from storm impacts.

Riverine: creation and restoration of hydrological flow in rivers, streams, and associated habitat.

Inland: adaptable to all landscapes and can include rain gardens, urban gardens, tree trenches, and native plant restoration.

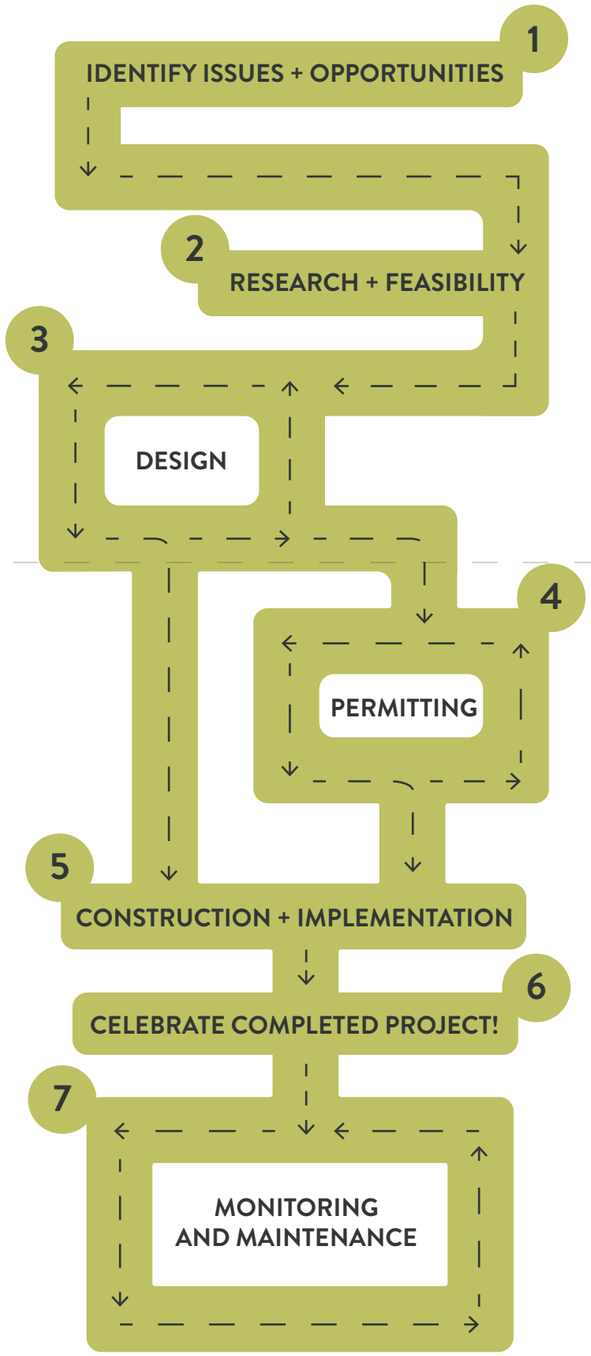
LAND USE

Developed: Land that has been built on or heavily altered for human use. It may have houses, roads, utilities, and other infrastructure.

Undeveloped: Land that has not been built on or heavily altered for human use. It lacks buildings, infrastructure, and utilities and is considered vacant.

PATHWAY TO NNBS

A NNBS project follows the same design and development process as traditional grey infrastructure. While some elements of each step may vary with NNBS, the overall journey to construction for green and grey projects remains the same.



TYPES OF NATURAL & NATURE-BASED SOLUTIONS

Land Conservation
Protecting and conserving priority lands to maintain connected networks of habitat corridors and patches to sustain genetic and species diversity, support climate migration routes, and augment habitat refugia. Examples include freshwater/wetland protection and endangered species habitat protection.

Habitat/Ecosystem Restoration
Assisting the recovery of degraded ecosystems to a natural, functioning state. Examples include barrier removal and river/stream restoration.

Habitat/Ecosystem Creation
Creating a healthy, functioning habitat that provides ecosystem services. Examples include marsh and wetland creation.

Shoreline Stabilization
Shoreline stabilizations methods that utilize native coastal habitats to reduce storm surge and coastal erosion. Examples include living shorelines and revegetation.

Soil Conservation
A combination of agriculture practices used to protect soil from degradation. Examples include riparian buffer strips, crop rotation.

Sediment Management
Dredged material is used as a resource rather than treated as a wastewater product. Examples include thin-layer placement and island creation.

Water Storage & Transportation
Managing stormwater onsite and conveying it slowly. Examples include tree trenches and stormwater ponds.

Water Filtration
Using natural elements and processes to remove pollutants from stormwater. Examples include rain gardens and permeable pavement.

Built Environment Enhancement
Buildings and structures fitted with planting medium and vegetation to reduce runoff and cool the structure and surroundings. Examples include green roofs and green facades.

NNBS can be found across landscapes to provide a suite of benefits to people and nature. Here are just a few of the many opportunities where NNBS can be implemented.

Where could your community benefit from these solutions?