International NNBF Guidelines

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Guidelines on the Use of Natural and Nature-Based Features for Sustainable Coastal and Fluvial Systems

September 17, 2018

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US Army Corps of Engineers

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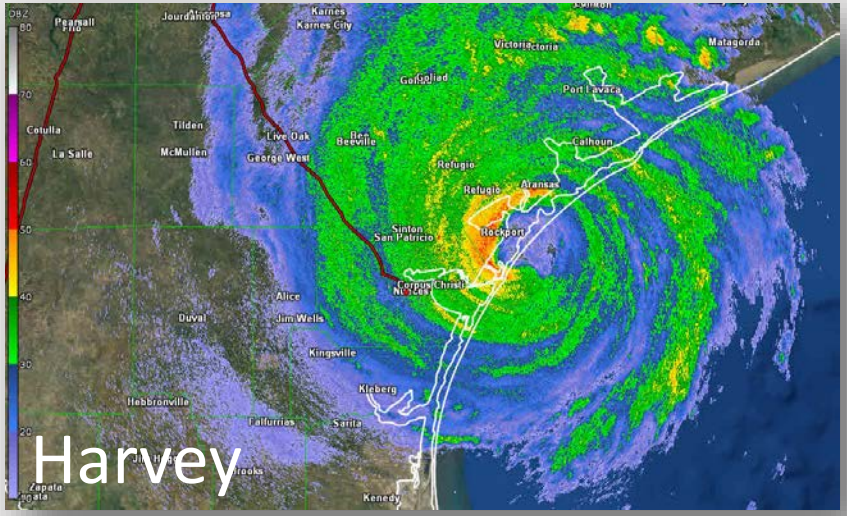
Hurricanes: Surge, Waves, and Rain



A Spectrum of Solutions

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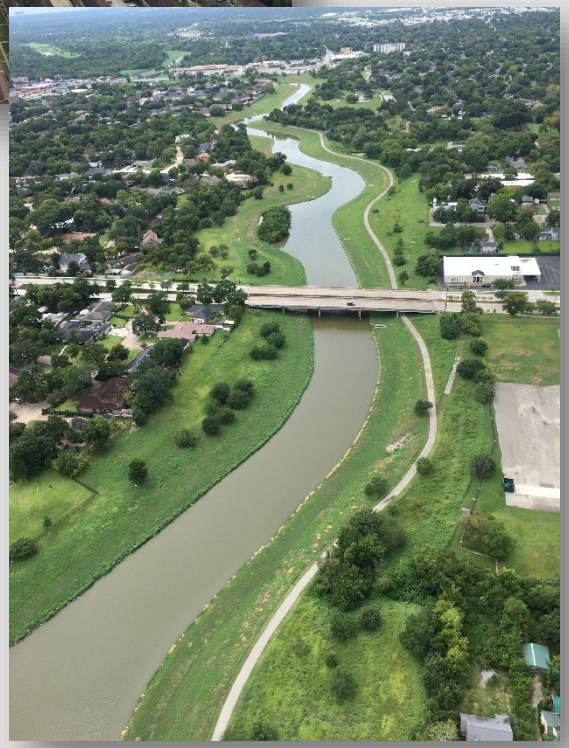
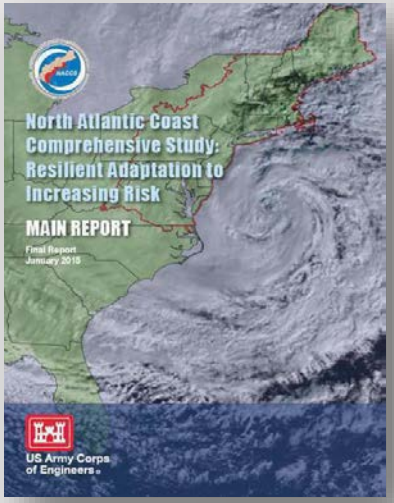
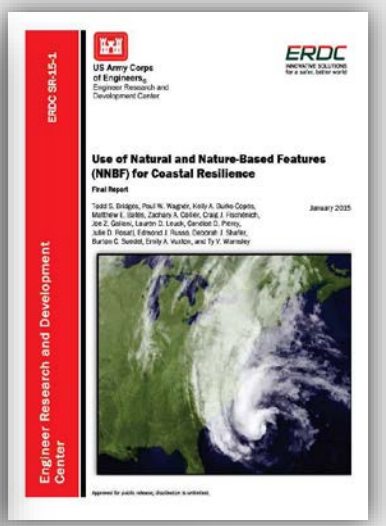
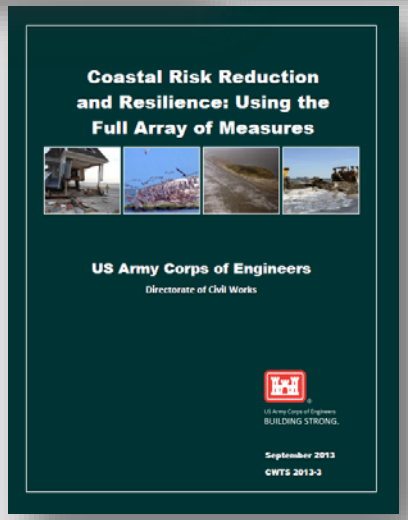


Integrating Across the Spectrum

"The USACE planning approach supports an integrated strategy for reducing coastal risks and increasing human and ecosystem community resilience through a combination of the full array of measures: natural, nature-based, nonstructural, and structural. This approach considers the engineering attributes of the component features and the dependencies and interactions among these features over both the short and long term. It also considers the full range of environmental and social benefits produced by the component features."







Coastal Risk Reduction and Resilience. Todd Bridges, Roselle Henn, Shawn Komlos, Debby Scerno, Ty Wamsley, and Kate White. CWTS 2013-3. Washington, DC: Directorate of Civil Works, US Army Corps of Engineers.

GAO Audit

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GAO U.S. GOVERNMENT ACCOUNTABILITY OFFICE

441 G St. N.W.
Washington, DC 20548

August 28, 2017

The Honorable James Mattis
The Secretary of Defense
Attention: Mr. Ed Burbo
Executive Services Directorate
Washington Headquarters Services c/o GAO Affairs
4800 Mark Center Drive, Ste O3F09
Alexandria, VA 22350-1500

Dear Mr. Secretary:

This letter is to inform you of a new U.S. Government Accountability Office engagement on Natural Coastal Infrastructure—code 102172. The enclosure provides information on the engagement. If we determine it is necessary to visit locations other than those specified in the enclosure, we will advise you.

We would appreciate your notifying the appropriate officials of this work. The next step will be to set up an entrance conference. At that meeting, we will request that your agency identify a point of contact for this engagement.

Sincerely yours,

Anne-Marie Fennell

Anne-Marie Fennell
Director
Natural Resources and Environment

Enclosure

cc: Kenya Jones, DCM, (joneskr@gao.gov)
Bryan Kitchens, WHS, (bryan.k.kitchens.civ@mail.mil)

Issues under review/Objectives/Key questions:

1. What is known about the types of benefits and costs of using natural coastal infrastructure?
2. In what ways have states incorporated natural coastal infrastructure, including information on its economic value, into their coastal management programs, and what challenges, if any, have they faced in doing so?
3. To what extent have federal agencies such as NOAA taken steps to address any challenges faced by states in incorporating natural coastal infrastructure into their coastal management programs?

International Guidelines on the Use of Natural and Nature-Based Features for Sustainable Coastal and Fluvial Systems

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Purpose: Develop guidelines for using NNBF to provide engineering functions relevant to flood risk management while producing additional economic, environmental and social benefits.

- Publish NNBF technical guidelines by 2020:
  - Multi-author: government, academia, NGOs, engineering firms, construction companies, etc.
  - Addressing the full project life cycle
  - Guidelines in 4 Parts
    - Overarching
    - Coastal Applications
    - Fluvial Applications
    - Conclusions

ATM
The Nature Conservancy — Protecting nature. Preserving life.
US Army Corps of Engineers
NOAA — National Oceanic and Atmospheric Administration, U.S. Department of Commerce
Deltares — Enabling Delta Life
Biohabitats
LimnoTech
Rijkswaterstaat — Ministry of Infrastructure and Water Management
Great Lakes Commission
Stanford University
CAT
EDF — Environmental Defense Fund — Finding the ways that work
WWF
KIOST — Korea Institute of Ocean Science & Technology
RAMBOLL
HR Wallingford
ecology and environment, inc. — Global Environmental Specialists
Tonkin+Taylor
JACOBS
Environment Agency
ANCHOR QEA
NIST
THE WORLD BANK

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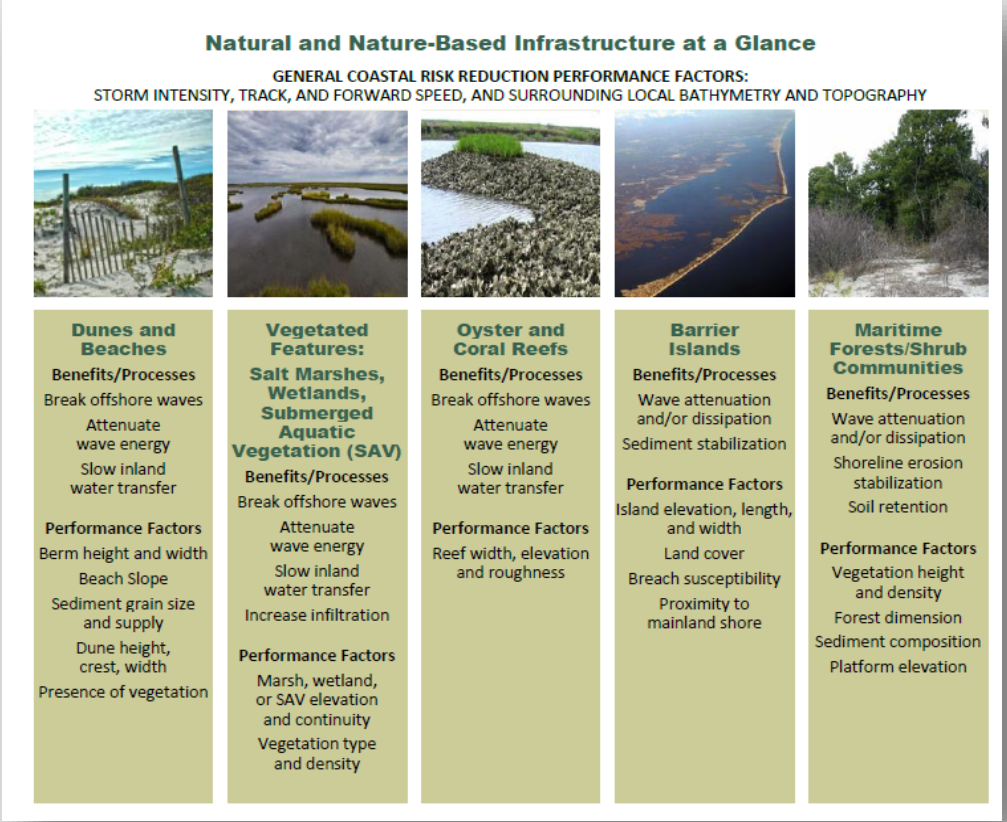
Natural and Nature-Based Features

NNBF are landscape features that are developed to provide engineering functions relevant to flood risk management while producing additional economic, environmental and social benefits.



Natural and Nature-Based Infrastructure at a Glance

GENERAL COASTAL RISK REDUCTION PERFORMANCE FACTORS:
STORM INTENSITY, TRACK, AND FORWARD SPEED, AND SURROUNDING LOCAL BATHYMETRY AND TOPOGRAPHY

Dunes and Beaches	Vegetated Features: Salt Marshes, Wetlands, Submerged Aquatic Vegetation (SAV)	Oyster and Coral Reefs	Barrier Islands	Maritime Forests/Shrub Communities
Benefits/Processes Break offshore waves Attenuate wave energy Slow inland water transfer	**Benefits/Processes** Break offshore waves Attenuate wave energy Slow inland water transfer Increase infiltration	**Benefits/Processes** Break offshore waves Attenuate wave energy Slow inland water transfer	**Benefits/Processes** Wave attenuation and/or dissipation Sediment stabilization	**Benefits/Processes** Wave attenuation and/or dissipation Shoreline erosion stabilization Soil retention
Performance Factors Berm height and width Beach Slope Sediment grain size and supply Dune height, crest, width Presence of vegetation	**Performance Factors** Marsh, wetland, or SAV elevation and continuity Vegetation type and density	**Performance Factors** Reef width, elevation and roughness	**Performance Factors** Island elevation, length, and width Land cover Breach susceptibility Proximity to mainland shore	**Performance Factors** Vegetation height and density Forest dimension Sediment composition Platform elevation

Guidelines Table of Contents

International NNBF Guidelines

Part 1: Informing the Use of NNBF

- Preface/Definitions
- Introduction
- Principles for Use of NNBF in Coastal and Fluvial Systems
- Community Engagement
- General NNBF Framework
- System Considerations and Combining Elements
- Performance Measures and Metrics
- Analysis of NNBF Benefits
- Monitoring, Maintenance, and Adaptive Management

Part 2: Coastal Systems

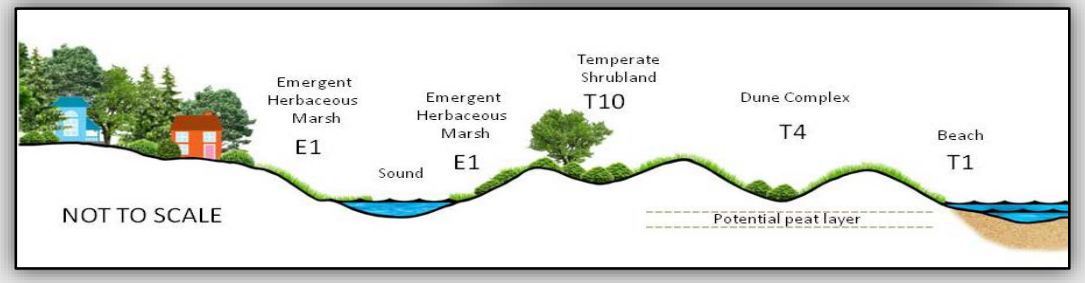
- Introduction
- Beaches and Dunes
- Wetlands and Intertidal Areas
- Islands
- Reefs
- Sub-Aquatic Vegetation
- Upland Plant Communities
- Enhancing Environmental Value of Conventional Infrastructure

Part 3: Fluvial Systems

- Introduction
- Applying NNBF at Watershed Scale
- Applying NNBF at Sub-Watershed Scale
- Naturalizing Techniques

Part 4: Conclusion

- Summation and Future Directions



Development Approach

- Voluntary project team
- Editorial Board (Bridges, Simm, Beck, Mohan, Collins Lodder)
- Individual Chapter Teams, with Co-Leads
- Peer review of final product
- Periodic, in-person working meetings combined with virtual engagement and drafting

International NNBF Guidelines: Team Meeting #1; United States; Vicksburg, MS; 25-26 October, 2016

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International NNBF Guidelines: Team Meeting #2; United Kingdom; 10-13 July, 2017

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Environment Agency

International NNBF Guidelines: Team Meeting #3; Silver Spring, MD; 30 Oct- 3 Nov, 2017

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International NNBF Guidelines: Team Meeting #4; Delft, Netherlands; 17-22 Sept, 2017

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Schedule

- 5th in-person meeting Santa Cruz, CA 17-22 Sept., 2018.
- Dec 2018 second draft of chapters submitted to EB.
- Dec 2018-Feb 2019 EB review.
- 6th in-person meeting, Mar/Apr 2019, Location ???
- Draft chapters completed June 2019.
- Full document sent to peer review July-Aug 2019.
- Document finalized Sept 2019-Feb 2020.
- Guidelines published Mar-April 2020.
- Guidelines Launch Event Mar/Apr 2020 ???
- Training events 2-3 formal events in 2020-2021 ???

Priorities (By Chapter)

- Refining 3-5 key chapter messages
- Refining case studies
- Refining key graphics
- Identifying gaps/needs for second draft by Dec. 2018