



Engineering With Nature[®] and Beneficial Uses of Dredged Material



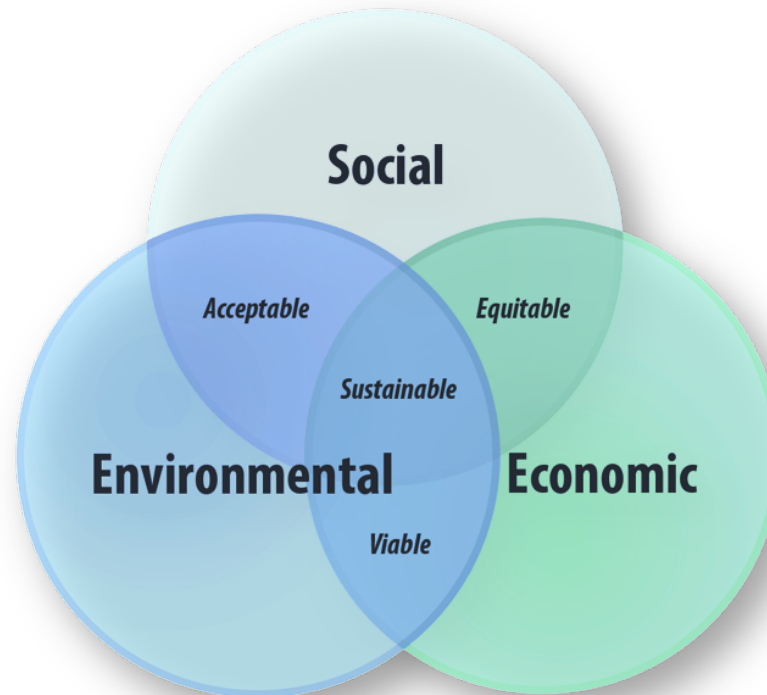
Burton Suedel

US Army Corps of Engineers
Engineer Research and Development Center
Vicksburg, Mississippi

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26 July 2022

Sustainability

Sustainability is achieved by efficiently investing resources to create present and future value



A “Sustainability Ledger” for Sediment Management

Efficiency

- Reducing sedimentation in channels & reservoirs
- Reducing transport distances for dredged material
- Reducing dredging time
- Expanding operational flexibility
- Linking multiple projects

Value Creation

- Restoring natural sediment processes to sustain landscapes
- New nature-based features that reduce flood risks
- New habitat for fish and wildlife
- New features that provide recreational and other social value
- Budget space for additional infrastructure work

Creating Value through Alignment...

- What opportunities are there for achieving better alignment of natural and engineered systems?
 - Can improved alignment reduce risks to life, property and ecosystems?
 - What range of services can be produced through such alignment?
 - What are the science and engineering needs in order to achieve better alignment?



Sustainable Solutions Vision: “Contribute to the strength of the Nation through innovative and environmentally sustainable solutions to the Nation’s water resources challenges.”

Engineering With Nature®

...the intentional alignment of natural and engineering processes to efficiently and sustainably deliver economic, environmental and social benefits through collaboration.

Key Elements:

- Science and engineering that produces operational efficiencies
- Using natural process to maximum benefit
- Broaden and extend the benefits provided by projects
- Science-based collaborative processes to organize and focus interests, stakeholders, and partners

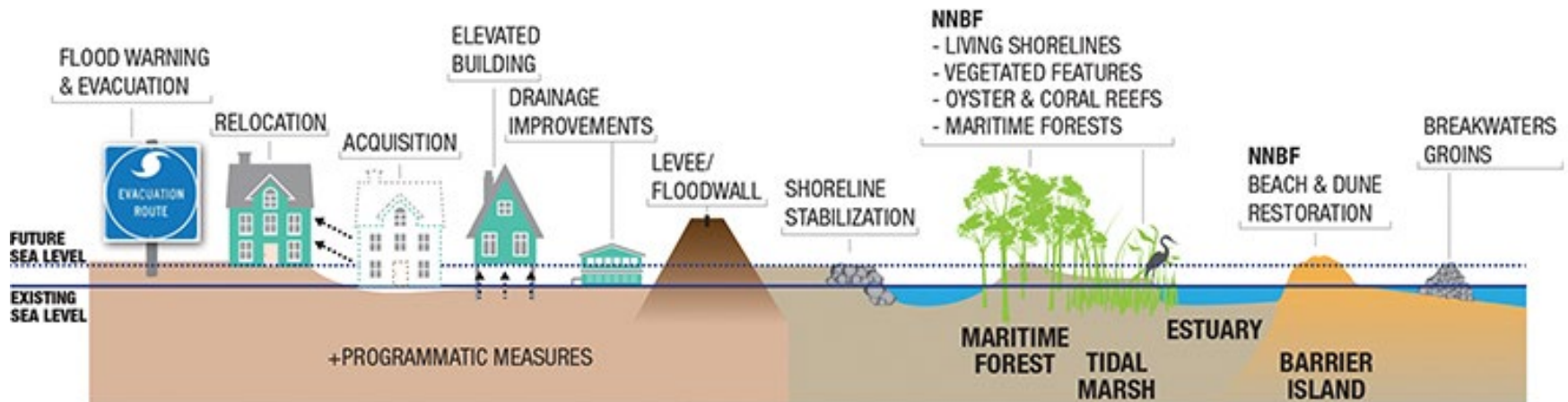


BU Opportunities to Engineer With Nature

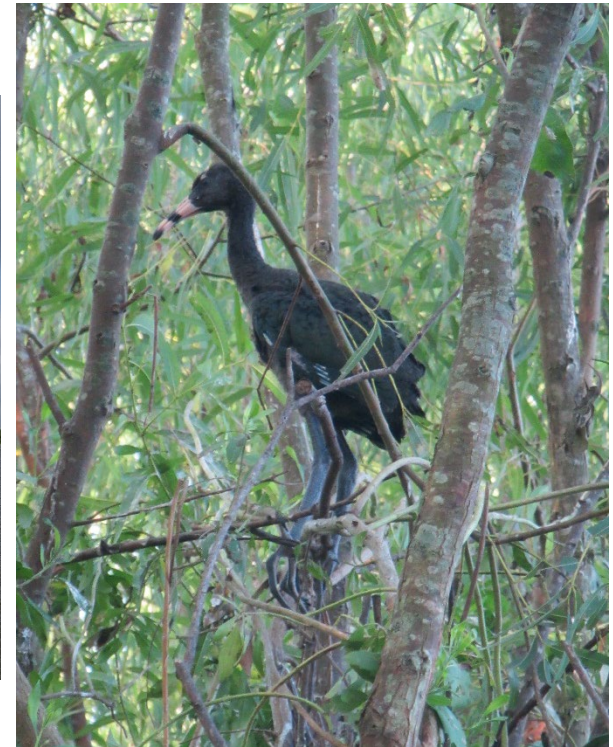


Opportunities

- Integrate Natural and Nature-Based Features (NNBF) with structural and non-structural measures to provide multiple lines of defense against storms and sea level rise
- Generate full array of relevant economic, environmental, and social ecosystem services



Examples of Beneficial Uses of Dredged Material and Engineering With Nature®



Deer Island, Biloxi, MS

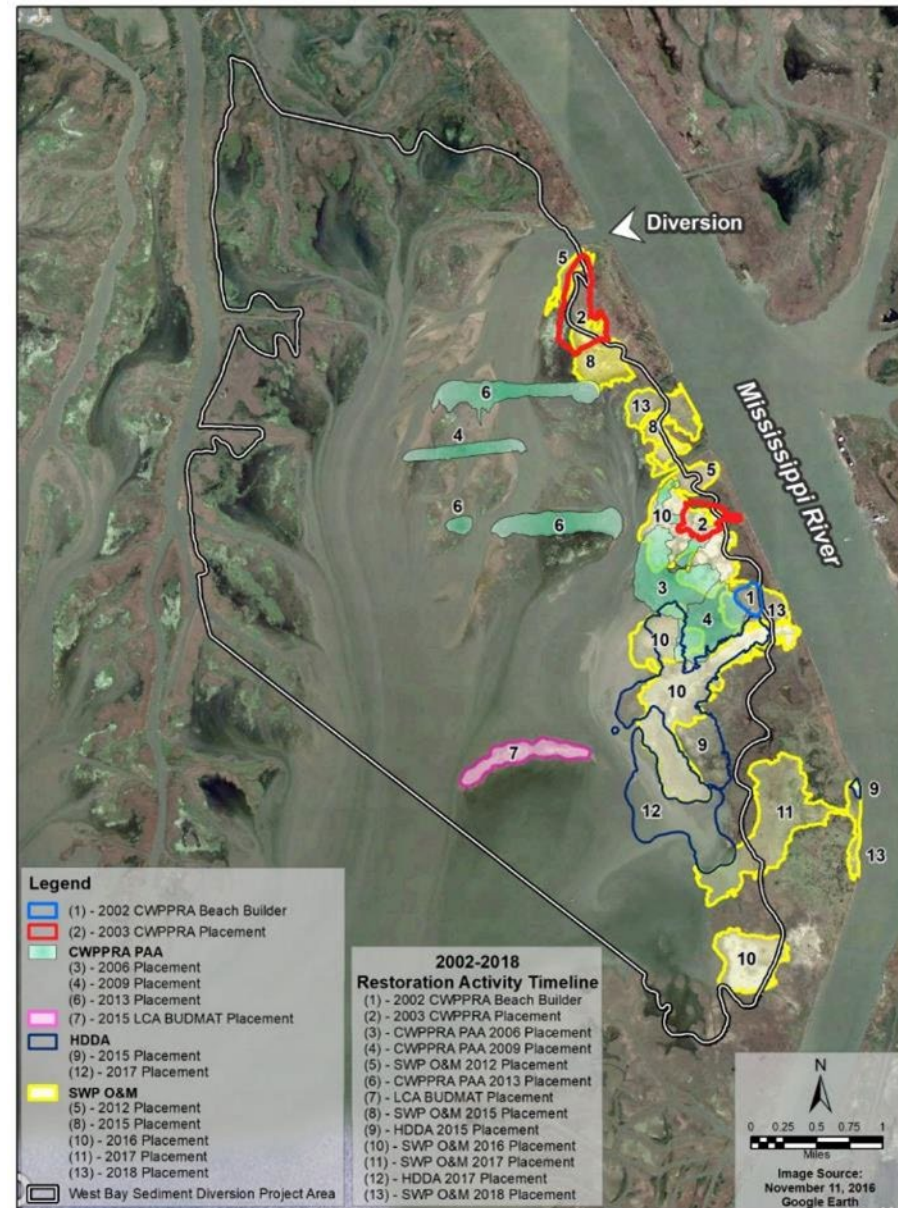
- Biloxi Harbor Navigation Project - 12-ft deep navigation channel
- BU of dredged material to restore marsh, create terrestrial and aquatic habitat, provide a more resilient shoreline for future storm events, create long term disposal capacity
- Hurricanes over time destroyed forests, significantly eroded shoreline, and left elevations too low to support marsh vegetation
- Filled breach in west end of the island
- 1.95 mcy DM to restore southern shoreline using 2.5-mile long wave barrier
- Strategic vegetation plantings (625,000+ plants)
- Construction of a 1 mcy lagoon for BU dredged material from navigation channels
- Providing significant environmental, coastal storm, and recreational benefits



West Bay, Louisiana

- 12,000 acre sub-delta at Head of Passes
- Lost >70% of land since the 1940's
- Stability of Federal navigation bankline was threatened
- Bank notched in 2003 to mimic natural crevasse
- First 5 years evidence of land building minimal
- Dynamic berms (SREDS): to increase sediment deposition
- Multiple direct and strategic placement events (see figure)
- Restored 2,300 acres of land since 2005

Year	SRED	Cubic Yards of Dredged Sediment	Land Created (Acres)
2009	1	386,233	35
2013	2	1,325,614	97
	3	1,308,435	86
	4	328,567	13
2015	5	2,299,295	80

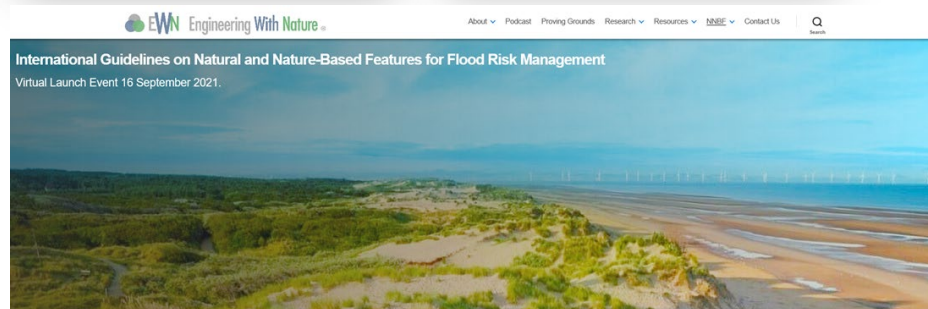
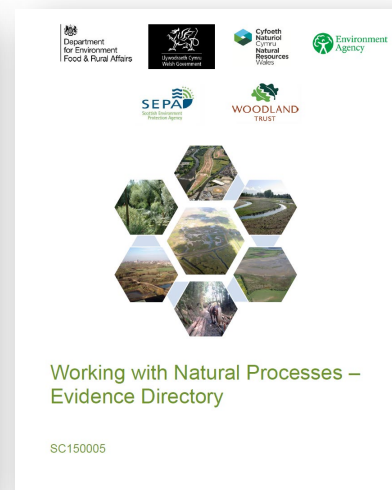
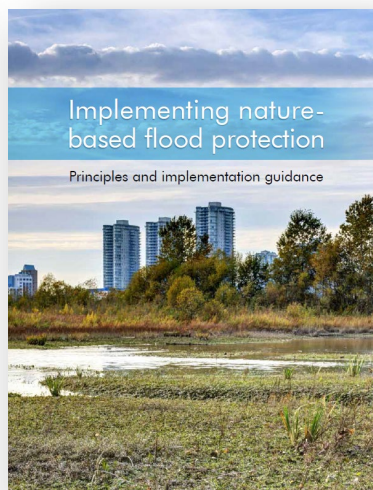
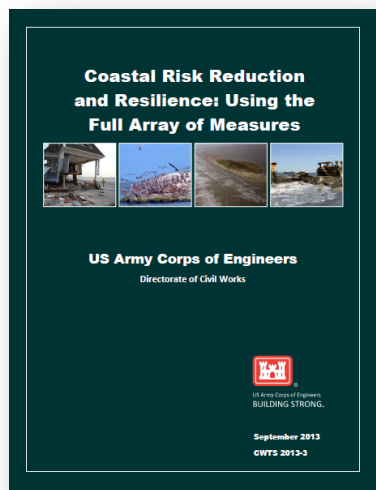
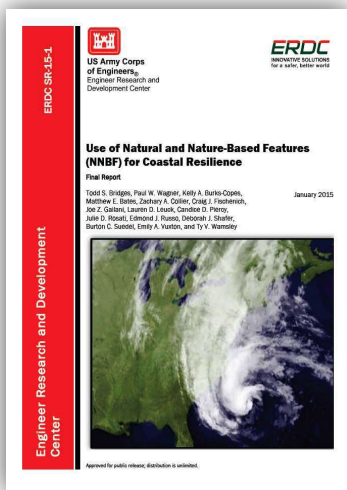




SUSTAINABLE DEVELOPMENT GOALS

1 NO POVERTY 	2 ZERO HUNGER 	3 GOOD HEALTH AND WELL-BEING 	4 QUALITY EDUCATION 	5 GENDER EQUALITY 	6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY 	8 DECENT WORK AND ECONOMIC GROWTH 	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE 	10 REDUCED INEQUALITIES 	11 SUSTAINABLE CITIES AND COMMUNITIES 	12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION 	14 LIFE BELOW WATER 	15 LIFE ON LAND 	16 PEACE, JUSTICE AND STRONG INSTITUTIONS 	17 PARTNERSHIPS FOR THE GOALS 	 SUSTAINABLE DEVELOPMENT GOALS

Nature-Based Guidance, Standards, Evidence to Foster Innovation



Great Lakes Regional Guidance Revision

- Purpose
 - Provide guidance for determining suitability of dredged material for beneficial uses
 - Risks may change depending on site selection
 - Aquatic, wetland, upland
 - Risks affected by type of site use, potential receptors
 - Habitat, agronomic, recreational, Industrial
- Incorporate EWN principles

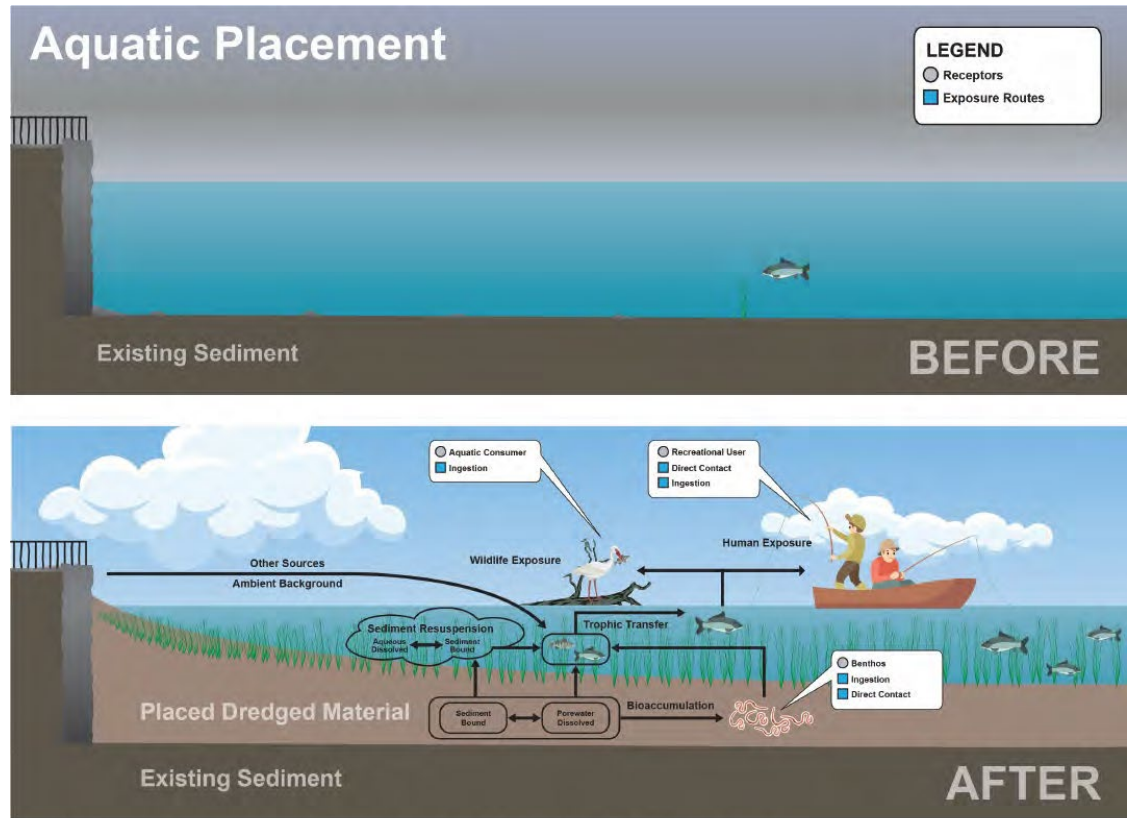
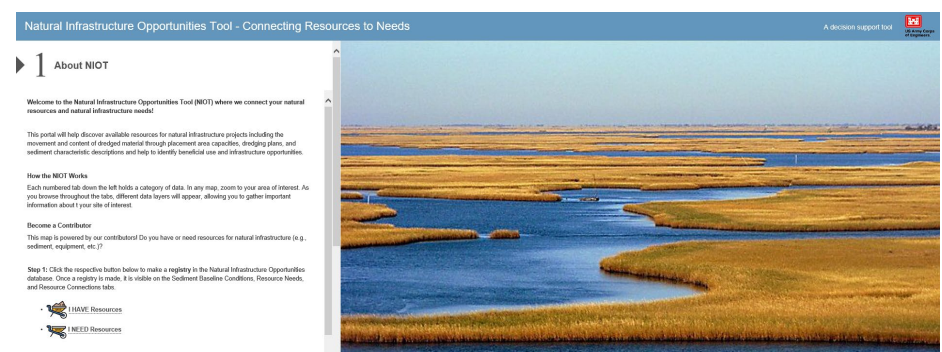


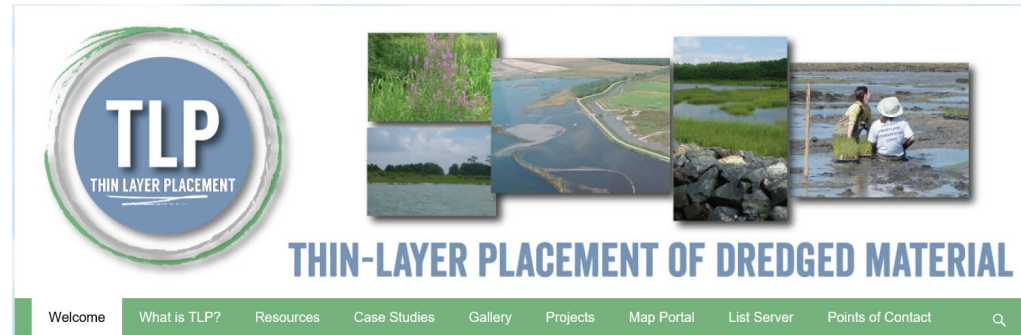
Figure 4-2. Generalized Conceptual Model for Dredging Operations at Beneficial Use Aquatic Placement Sites.

Other Resources

- Natural Infrastructure Opportunities Tool
- USACE Thin-Layer Placement website
- USACE Beneficial Use website



https://ewn.erdc.dren.mil/?page_id=601



<https://tlp.el.erdc.dren.mil/>

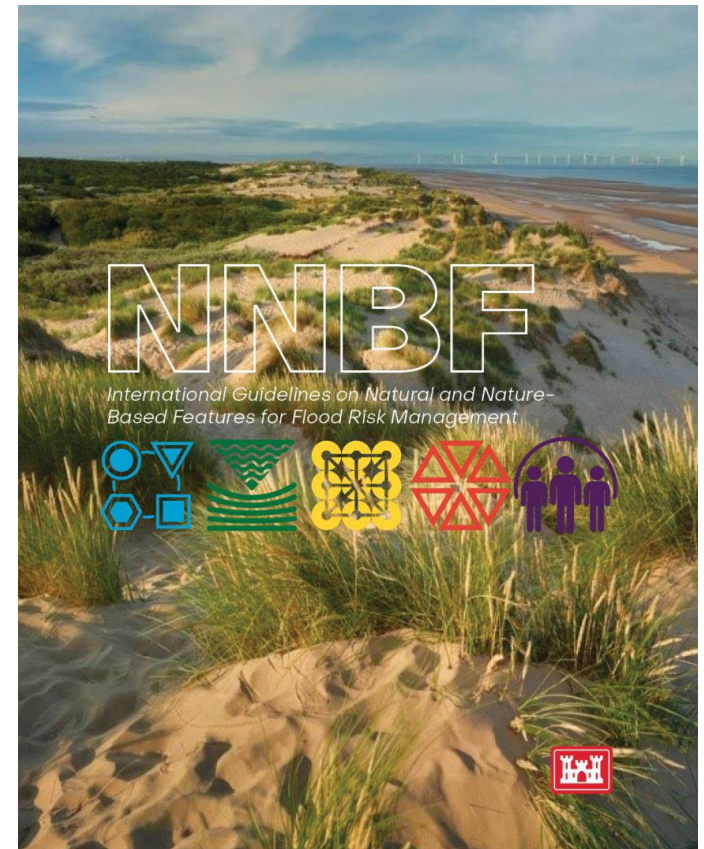


<https://budm.el.erdc.dren.mil/>

International Guidelines on the Use of Natural and Nature-Based Features for Flood Risk Management

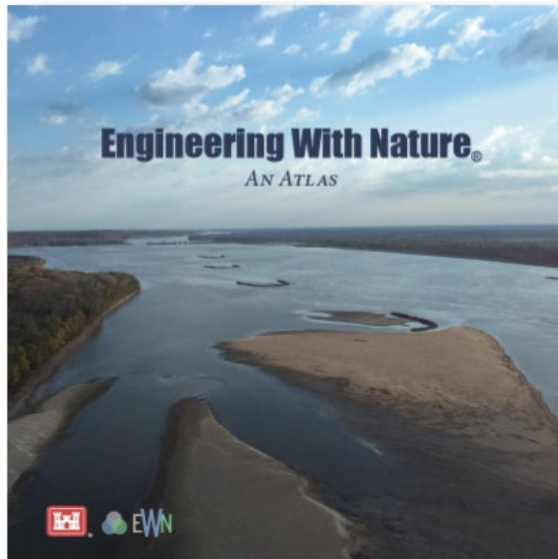
Goal: Draw together collection international expertise, across sectors, to develop guidelines for using NNBF for flood risk management while expanding and diversifying project value through economic, environmental and social benefits.

- **Published guidelines 16 September 2021:**
 - ▶ **Multi-author: government, academia, NGOs, engineering firms, construction companies, etc.**
 - ▶ **Addressing the full project life cycle**
 - ▶ **Guidelines in 4 Parts**
 - **Overarching Topics**
 - **Coastal Applications**
 - **Fluvial Applications**
 - **Conclusions**



https://ewn.erdc.dren.mil/?page_id=4351

Engineering With Nature® Atlases



Volume 1
56 Projects
27 USACE

Volume 2
62 Projects
23 USACE

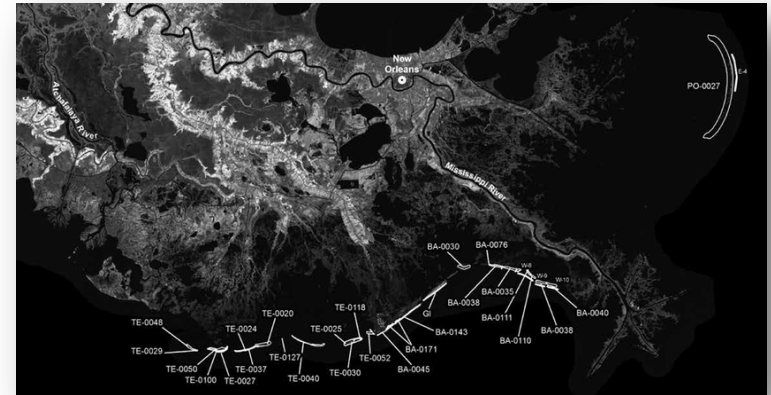


“The mission of US Army Corps of Engineers is to deliver vital public and military engineering services; partnering in peace and war to strengthen our nation’s security, energize the economy and reduce risks from disasters. **Engineering With Nature supports this mission which is why it will always be an important initiative for the Corps.**”

LTG Scott A. Spellman, 55th Chief of Engineers, Commanding General, USACE

Building Progress

- Commit to innovation
 - **What would it take to get to 70% beneficial use by 2030?**
- Expand the “vision” to diversify project benefits
 - **Where will landscape features create the most value *in the future*?**
- Increase collaboration and cross-sector partnerships
 - **How can EWN approaches be used to incentivize progress with regulatory and resource agencies?**
- Pursue realistic and affordable projects
 - **How can demonstration projects be used to promote innovation in engineering and design AND reduce BU project costs?**
- Document and communicate the value created
 - **How can developing a library of published regional EWN case studies be used to build momentum?**



Questions?

Burton C. Suedel

**US Army Engineer Research and
Development Center**

3909 Halls Ferry Road

Vicksburg, MS 39180

Burton.Suedel@usace.army.mil

