Engineering With Nature and Natural and Nature-Based Features: A Path to Sustainable Projects and Benefits

Bridges TS, Banks CJ, Burks-Copes KA, Smith J, Gailani JZ, Suedel BC, Fredette TJ

Introduction: Sustainable Development of Water Resources Infrastructure

Engineering With Nature (EWN) is the *intentional alignment of natural and engineering processes to efficiently and sustainably deliver economic, environmental and social benefits through collaborative processes.* The four elements of the EWN approach are:

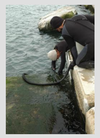
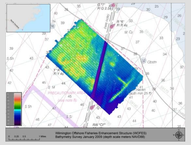
- Science and engineering that produces operational efficiencies
- Using natural process to maximum benefit
- Broaden and extend the benefits provided by projects
- Science-based collaborative processes to organize and focus interests, stakeholders, and partners

"Engineering With Nature allows us to get involved early and have the dialogue that is needed to try some non-traditional approaches that work." -Partner Agency

Environmental Sustainability

EWN provides an opportunity to produce a broader array of benefits from coastal and navigation infrastructure through application of the Environmental Operating Principles. Project benefits are achieved by:

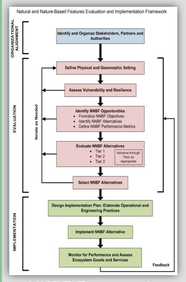


- Considering opportunities to innovate and enhance aquatic and avian ecosystem benefits at existing breakwaters and navigation structures
- Collaborating with partners and stakeholders early in the process
- Documenting and communicating the results

Coastal Resilience

Natural, nature-based, nonstructural, and structural measures can be employed in an integrated manner to reduce flood risks and increase coastal resilience.

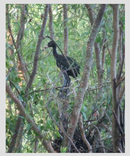
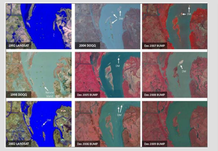


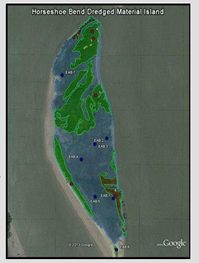
NNBF Framework

- Opportunities to engage key stakeholders & partners
- Transparent vulnerability and risk assessments
- An accounting of the full array of benefits (i.e., ecosystem goods and services)
- An avenue to conduct regional sediment management
- An opportunity to proactively plan and adaptively manage for climate change

Beneficial Use of Dredged Material

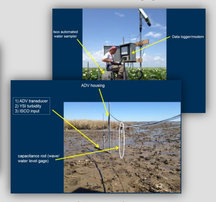
EWN promotes the concept that dredged material is a resource. The Horseshoe Bend Island (Atchafalaya River) project documents how a river island was successfully created using dredged material in a beneficial manner, taking advantage of the natural hydrological processes inherent in the system.



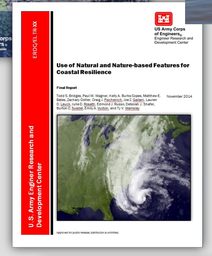
Strategic Sediment Placement

The Sediment Transport Laboratory houses several state-of-the-science devices and methods that enable scientists and engineers to perform quantitative measurements of sediment transport processes in the laboratory and the field. Ongoing research builds appropriate tools to support application of strategic placement in diverse environments. The approach includes:

- Place mixed sediment from channel into nearshore berms
- Allow natural winnowing to remove fine content
- Use longshore transport patterns to move sediment

Technology Transfer



Point of Contact: Todd.S.Bridges@usace.army.mil, 601-634-3626
www.engineeringwithnature.org