

Engineering With Nature



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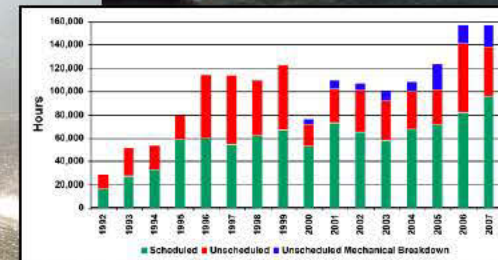
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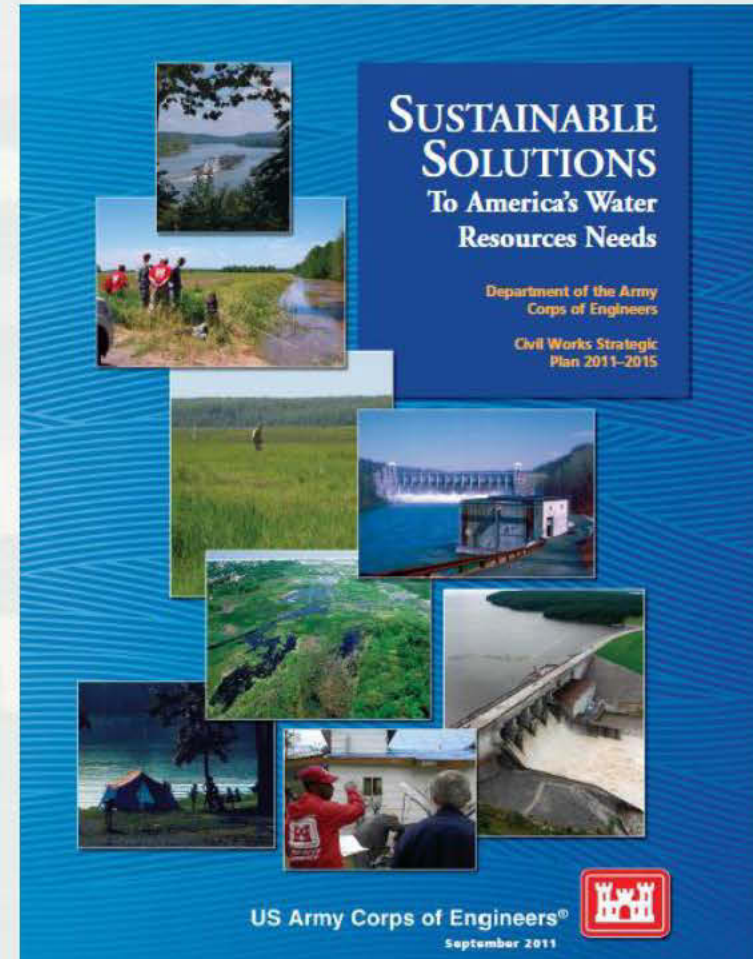
**US Army Corps of Engineers
BUILDING STRONG®**



The USACE Civil Works Strategic Plan

Sustainable Solutions to America's Water Resources Needs

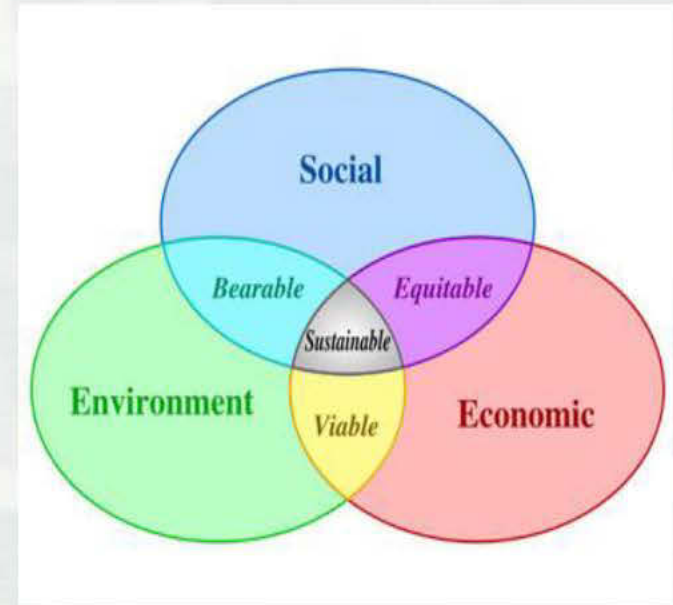
- Vision: “Contribute to the strength of the Nation through innovative and environmentally sustainable solutions to the Nation’s water resources challenges.”
- The goals established by this strategy are to:
 - ▶ Assist in providing for safe and resilient communities and infrastructure.
 - ▶ Help facilitate commercial navigation in an environmentally and economically sustainable fashion.
 - ▶ Restore degraded aquatic ecosystems and prevent future environmental losses.
 - ▶ Implement effective, reliable, and adaptive life-cycle performance management of infrastructure.
 - ▶ Build and sustain a high quality, highly dedicated workforce.



The Challenge

The Status Quo is Not An Option

- USACE needs an efficient, cost effective way to achieve its missions, while simultaneously producing economic, social and environmental benefits.
 - ▶ USACE infrastructure and operations are often viewed as being in conflict with environmental and social interests
- We need to conduct our “business” in a way that fosters collaboration and cooperation with our partners and stakeholders – Ports, commercial interests, EPA, NOAA, FWS, NGOs and others...
 - ▶ ... While building respect and credibility for our program.

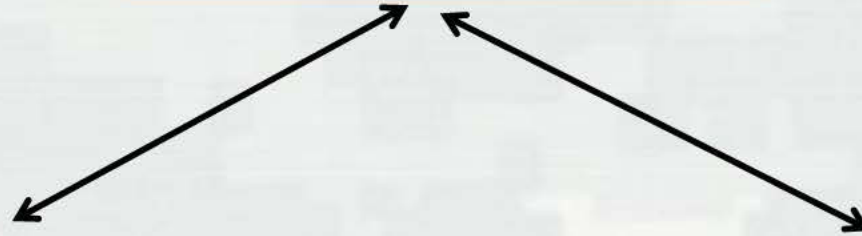


Definition

- *Engineering With Nature* is the intentional alignment of natural and engineering processes to efficiently and sustainably deliver economic, environmental and social benefits through collaborative processes.



***Working
with Nature***



***Building
with Nature***



***Engineering
With Nature***



Guiding Principles

Engineering With Nature is:

- ▶ **Holistic** – an ecosystem approach for planning, designing, constructing and operating projects where social, economic and environmental factors are equitably weighed in the decision making process.
- ▶ **A systems approach** – reflecting the reality that USACE projects exist in complex physical and social/cultural systems, and that a single action influences many other parts of the system.
- ▶ **Sustainable** – focused on the long-term sustainability and resilience of project solutions and the benefits streams provided by the system over time.
- ▶ **Science-based** – built on first understanding, then working deliberately with natural forces and processes to accomplish engineering goals.
- ▶ **Collaborative** – based on effective partner and stakeholder communication, engagement and collaboration through the entire life cycle of a project, beginning at the earliest conceptual stages.
- ▶ **Efficient and cost effective** – reducing time and rework, while minimizing social friction.
- ▶ **Socially responsive** – aligned with the values, objectives, interests and priorities of USACE, partners, stakeholders and society at large.
- ▶ **Innovative** – embracing new and emerging technologies and incorporating continuous learning and technology transfer and adoption of new and leading practices.
- ▶ **Adaptive** – demonstrating adaptive attitudes, structures and processes that enable a living, evolving and sustainable practice.

Engineering With Nature: *The Progression*

Inputs and Outputs
'Degree of'

System Resilience

Efficiency

Benefits Related to the Project

Outcomes

Inputs

Communications and Technology Transfer

Technical Understanding

Innovation and Creativity

Diversity of Skills and Expertise

Stakeholder Engagement



Business
as Usual

Understanding
Natural
Processes

Aligning
Processes

Expanding
Benefits

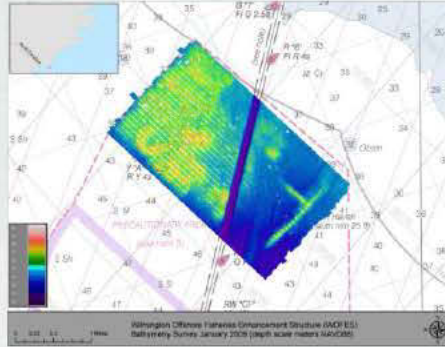
Enabling
Self-Sustaining
Benefits

STAGES

EWN and BU



Poplar Island



Wilmington Offshore Fisheries Enhancement Structure



Evia Island, Galveston Bay



Photograph 2.12. A Series of Chevrons on the Mississippi River



Photograph 2.13. A Series of Chevrons Aligned To Split Flow Between the Main Channel and a Side Channel, While Protecting the Existing Shoreline

Upper Mississippi River Training Structures



Mobile In-Bay Placement

The Essential Ingredients of *Engineering With Nature*

- Use science and engineering to produce operational efficiencies
 - ▶ Contributing to sustainable delivery of project benefits
- Use natural processes to maximum benefit
 - ▶ To reduce demands on limited resources, minimize the environmental footprint of the project, and enhance the quality of benefits produced
- Broaden and extend the base of benefits provided by projects
 - ▶ To include substantiated economic, social, and environmental benefits
- Use science-based collaborative processes to organize and focus interests, stakeholders, and partners
 - ▶ To reduce social friction, resistance, and project delays while producing more broadly acceptable projects

Engineering With Nature

Path Forward

We will implement *Engineering With Nature* through a series of actions:

1. Establish the foundation of EWN using examples of “best-practice” projects from across USACE
2. Develop and execute a “Strategic Plan for EWN” to expand application within USACE and with our external partners and stakeholders
3. Demonstrate the EWN progression in future project case studies, communicating lessons learned and successes broadly
4. Focus R&D investments to expand technical and communication science needed to advance EWN
5. Establish leadership and partnerships on EWN through effective engagement and application