# Webinar Series: Part 3
# Applications and Case studies

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EWN

# Webinar Series Contents: Part 1, 2 and 3

- **PART 1: INTRODUCTION and DESIGN**
  - Why do we need to pay attention to our native plant communities?
  - Why are native plants communities important to the Corps mission?
  - How to use the plant resources available on Corps' lands nationwide.
  - How to incorporate native plant communities into projects by describing specific tools and techniques to survey, plan, design, construct, maintain, and monitor projects.
  - Design and scientific components are blended together into a holistic approach, so this manual is accessible to many people with varied professional backgrounds.

- **PART 2: SCIENCE and PLANTING TECHNIQUES**
  - National Vegetation Classification
  - Sources to Obtain Native Plant Materials
  - Conservation Methods
  - Planting Techniques, Site preparation, Seed Mixes and Seeds, Seed Treatments, Interseeding, Mosaic seeding and Planting

- **PART 3: CASE STUDIES**
  - List of specific uses incorporating native plant communities
  - Specific case studies that illustrate well-designed, well-built examples of elements using native plant communities.

# Sustainable uses of native plants

- Provide wildlife habitats and migration routes
- Protection of water quality and water supply
- Produce oxygen and protect air quality
- Regulate temperatures
- Nutrient cycling
- Reduction of sedimentation and erosion into waterways
- Commercial uses (food, fiber, medicine, resins, and building supplies)

# CASE STUDIES OF IMPLEMENTED DESIGNS

- Climate Control – Sun, Shade, Windbreaks and Energy Conservation
- Reduction of Stormwater Runoff
- Planting to Stabilize Steep Slopes
- Bioengineering and biotechnical planting
- Geocells and geogrids
- Permeable pavements
- Riparian Corridors, Greenways, and Buffers
- Bioretention features or rain gardens
- Constructed wetlands

# CASE STUDIES OF IMPLEMENTED DESIGNS

(Continued)

- Wetland Treatment Using Native Wetland Plants to Filter Discharge
- Native Plantings for Recreational Features and Aesthetic Enhancement
- Creating Habitat for Pollinators
- Planting with Dredged Materials
- Phytoremediation and Reclamation
- Carbon Sequestration
- Living Shorelines and Nature-Based Protection for Storm Surge
- Establishing Native Aquatic Plants to Improve Aquatic Habitat

# Climate Control – Sun, Shade, Windbreaks and Energy Conservation

- Shade trees can reduce the temperature by up to 10° F.

- iTree Program to calculate heating/ cooling costs, pollution removal and carbon storage from tree, woodland and forest planting (U.S. Forest Service) .

- http://www.iTreeTools.org

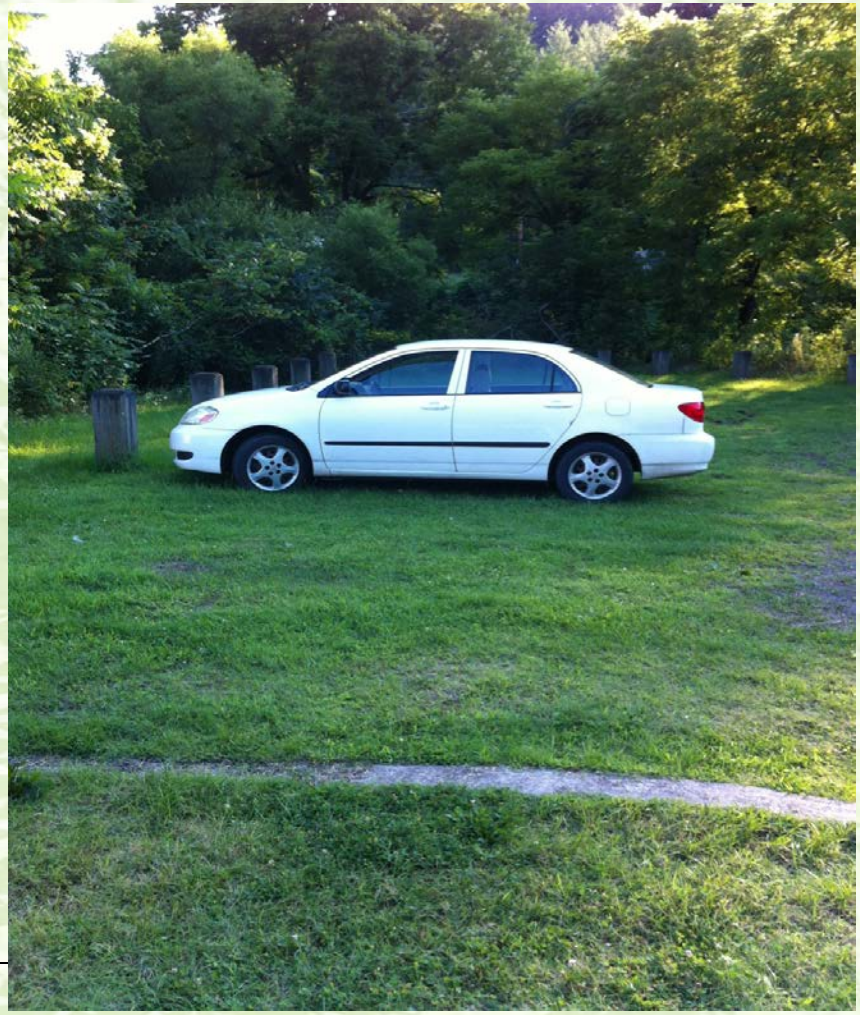
# Reduction of Stormwater Runoff

- CITYgreen Program evaluates stormwater water runoff for land use changes.
- CITYgreen assesses how land cover, soil type and precipitation affect stormwater runoff volume.
- Trees decrease total stormwater volume, and help to decrease detention times.
- TR-55 Model developed by Natural Resource Conservation Service

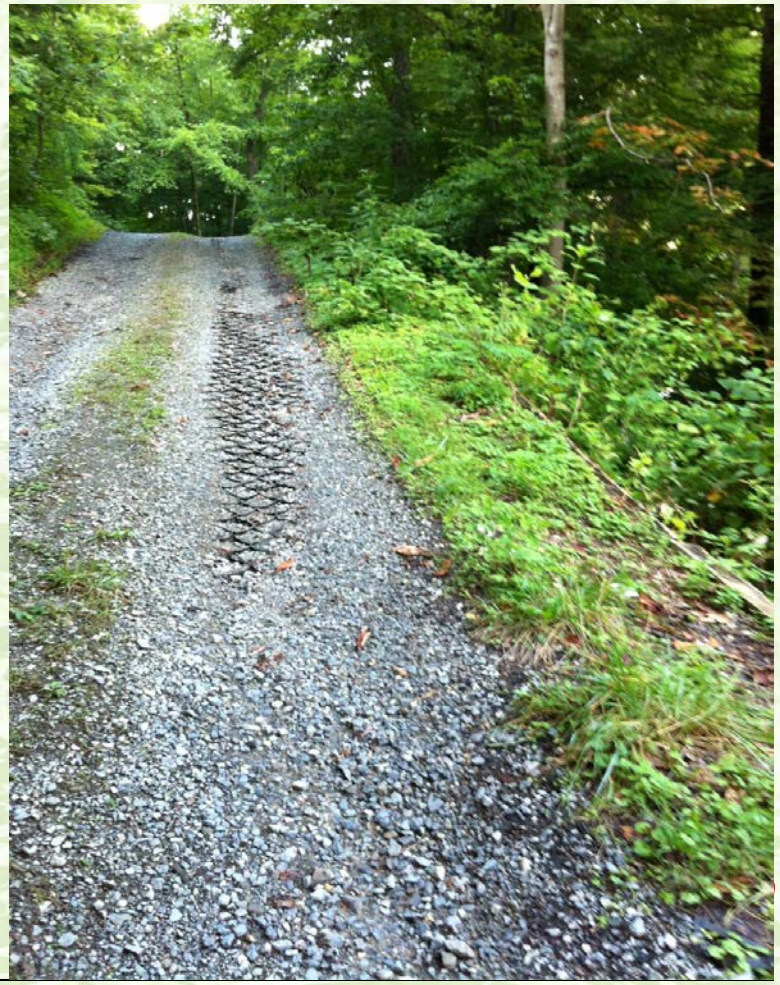
# Native Plantings to Prevent Erosion and stabilize steep slopes

**Installation details for a reinforced vegetated system, showing rolled high performance turf reinforcement mat fixed in place with driven anchors, planted trees and hydroseeding**

# Permeable pavements using geogrid with native grass planted surface



# Geo cells to construct gravel road and to stabilize side wall on steep slope



# Constructed Wetlands and Retention Features

## For Corps mitigation purposes, at the Winfield Lock and Dam, West Virginia

# Bioengineering and biotechnical planting

- Plants that easily root adventitiously are used as live fascines, logs, bundles in biotechnical plantings for many applications.
- These can be combined with other materials, such as stone, geotextiles and geogrids.
- These techniques reduce overall project costs, but often require more labor intensive during installation. Once construction is completed, the benefit is that these treatments are often self repairing and self maintaining.

# Live fascines, bundles and posts combinations as shoreline treatments

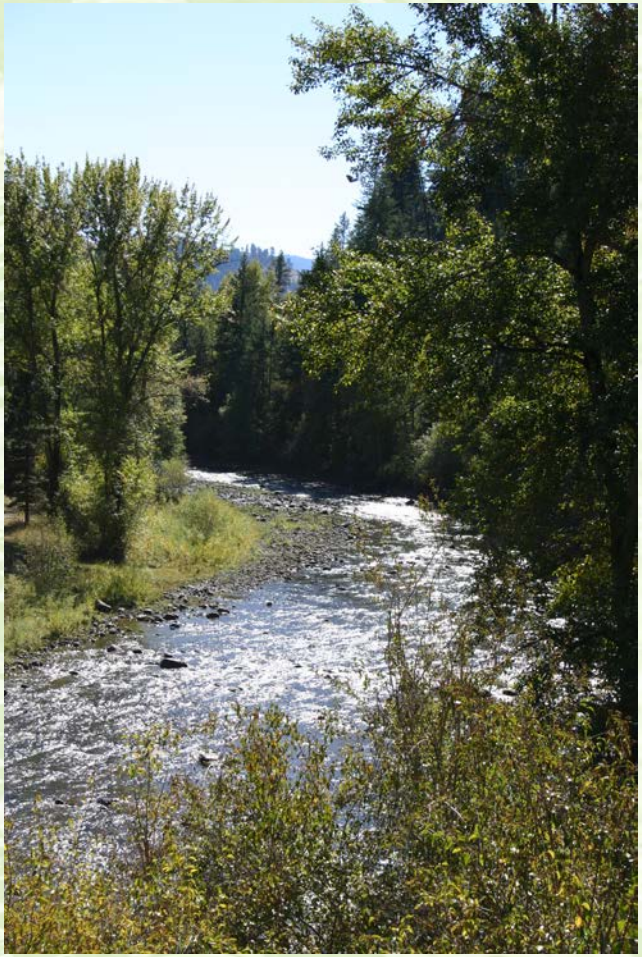
- Use different native species in shoreline treatments found at or near the site.
- Consider zonation in design to replicate plant community in nature.

# Benefits :

- Higher success rate of plantings because these plants are adapted to the local climate and conditions.
- These treatments are often self repairing and self maintaining.

# Riparian Corridors, Greenways, and Buffers

- Restores function
  - Sustainable Landscapes
- Restores connectivity within system
  - Riparian Corridors
  - Greenways
  - Buffer strips



# Buffer strip on man-made channel

Planting at Dyess Air Force Base, Abilene, TX

Buffer strip to trap and filter sediments going into channel, and thereby improve water quality.

Planting of native trees, shrubs and seed mixes to prevent erosion on slopes.

Planted through native grasses and herbaceous plants existing on site.

Site monitoring two years later.

# Wetland Treatment Using Native Wetland Plants to Filter Discharge

## USDA NRCS Plant Material Center, Alderson, West Virginia

Wetlands can absorb nutrients such as nitrogen (N) and phosphorus (P) that runs off farmlands in excessive amounts because of fertilizer, and manure. The amount that a wetland can absorb varies depending on the type, size, plants and soils. This system was designed by a NRCS engineer.

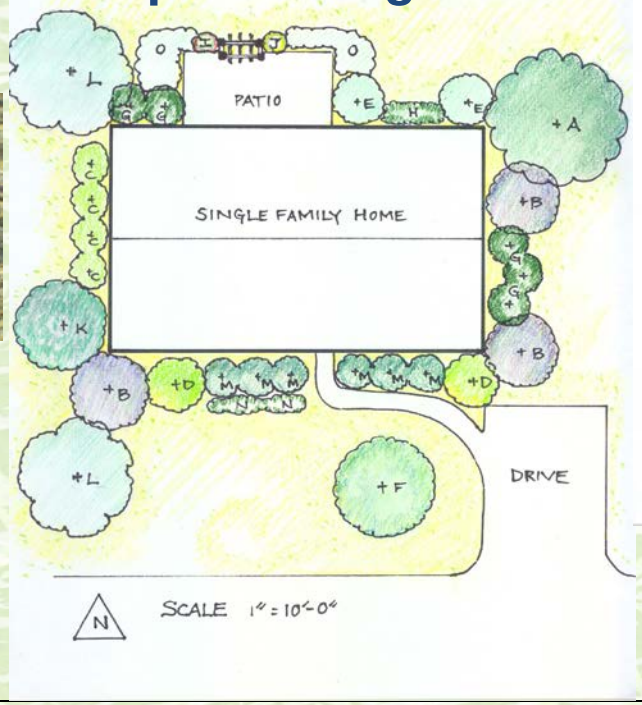
# Site design leaving native plant communities intact to keep area natural for recreation purposes

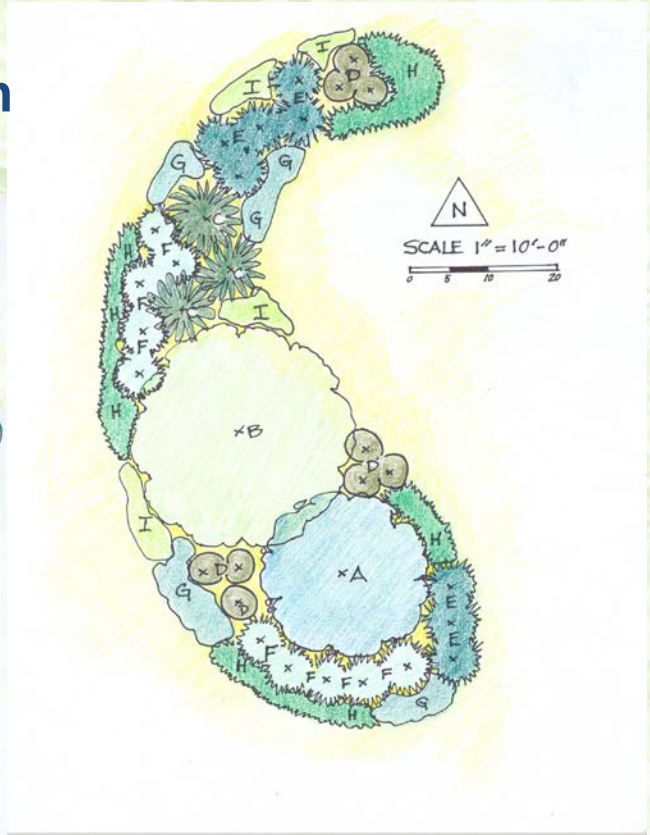
# Pollination is a critical issue for National Security

- One third of our food supply is Bee pollinated dependent
- > 80% of native plant species are dependent on pollination
- Protection of Pollinator/ Plant interactions is critical for national food security and for the sustainable use of plant communities and agricultural crops

# Sustainable Landscape Designs Utilizing Native Species to Increase Pollinator Habitats

**Landscape plantings of native plant communities in developed areas and open green spaces include using native seed mixes, and herbaceous plants, shrubs and trees will increase pollinating insect communities**

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# Planting Dredged materials
# West Newton Chute Placement Site,
## St. Paul District

- Sand prairie constructed from dredge material. Dredge material pumped and placed directly on site from adjacent waterway.
- Topsoil was stockpiled and maintained to protect the seed source and prevent it from drying out.
- Landforms were created to mimic the rolling topography of adjacent sand prairie owned by The Nature Conservancy.
- Volunteers harvested and planted seed from the adjacent sand prairie.

# Planting Dredged materials
# West Newton Chute Placement Site
(Continued)

- This project has been successful; it now supports a native sand prairie community with over 50 species of herbaceous plants and native grasses.
- After the sand prairie was established for 7 growing seasons, a prescribed burn was conducted, restoring the natural fire cycle to the sand prairie which is a fire dependant ecosystem.
- Prescribed fire will continue to be used as a maintenance tool in the future to further control the undesirable species while increasing the diversity within the native plant community.


Sand Hill Prairie Community

# Phytoremediation and Reclamation

## Geddes Brook at Ninemile Creek, New York

- Remedial efforts to remove mercury-impacted sediments and restore the site by creating a diverse wetland complex.
- Collaborative project by SUNY researchers; Exponent; Terrestrial Environmental Specialists, Inc; Anchor QEA; and Parsons.

During construction
Photos by Ray Hollander

After construction

# Carbon Sequestration

- Globally combined, salt marshes and mangroves store at least 44.6 million tonnes of carbon per year, and this is reportedly an underestimate because detailed data is not available for some regions.

- The overall carbon sequestration rate on an annual basis is 210 grams of carbon dioxide per square metre per year.

- Source: Chmura, G.L., Anisfeld, S.C., Cahoon, D.R., and Lynch, J.C. (2003). "Global carbon sequestration in tidal, saline wetland soils." *Global Biogeochemical Cycles*.

# Living Shorelines and Nature-Based Protection for Storm Surge

- Biological structures such as salt marshes, sea grass beds, and coral reefs attenuate waves and as a result provide coastal protection from the damages caused by flooding and storm events.

- This is becoming a critical service in many regions because of the increased risk of flooding and storm events – both in terms of frequency and severity.

- Salt marshes play a leading role in intertidal areas, dissipating wave and tidal energy, thereby reducing the cost of flood defense measures, and they absorb huge amounts of water when inundated and then slowly release it afterwards, which can also prevent flooding.

- References : Koch et al. 2009. "Non-linearity in ecosystem services: temporal and spatial variability in coastal protection." *Frontiers in Ecology and the Environment*. 7:29-37.

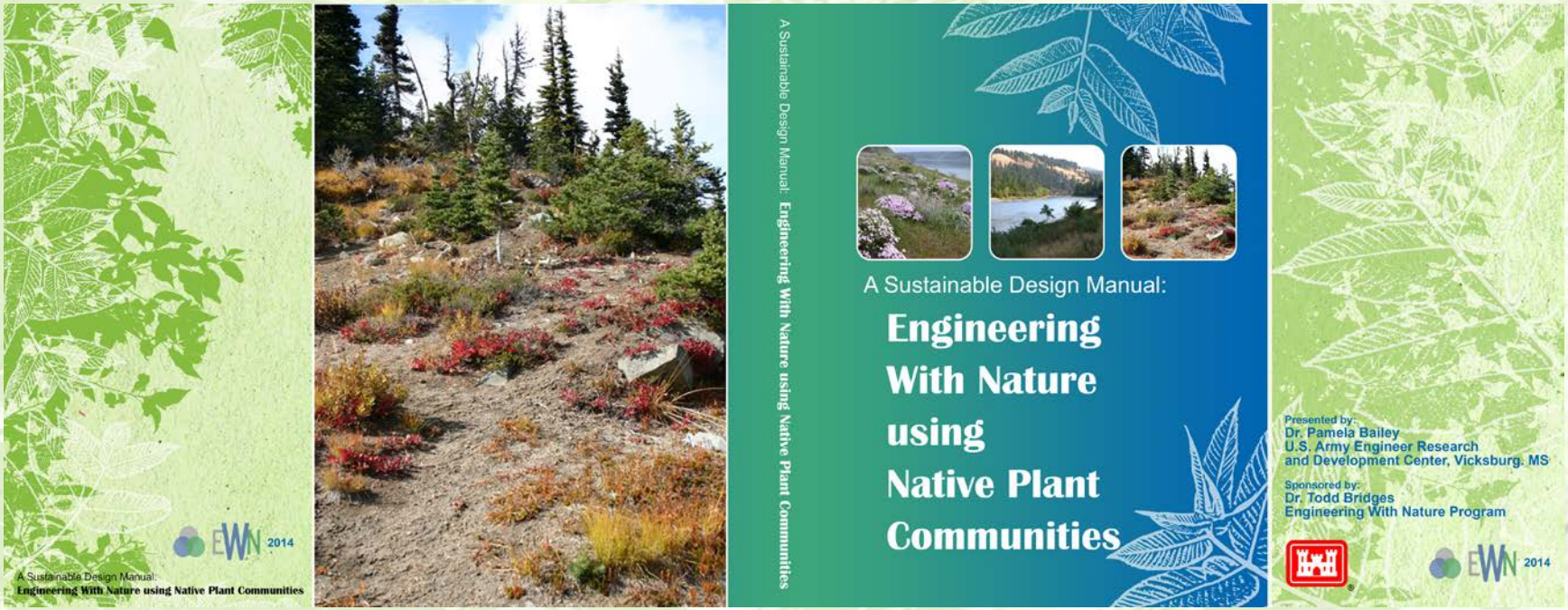
# Establishing Native Aquatic Plants to Improve Aquatic Habitat

Aquatic plants are often overlooked as critical components of healthy aquatic ecosystems. Aquatic and riparian plants provide valuable habitat (food and cover for invertebrates, fish, and other wildlife), improve water clarity and quality, reduce shoreline erosion and sediment resuspension, and help prevent spread of nuisance exotic plants (James and Barko 1990; Killgore et al. 1991; Doyle and Smart 1993; Thorp et al. 1997; Barko and James 1998; Dick et al. 2004).

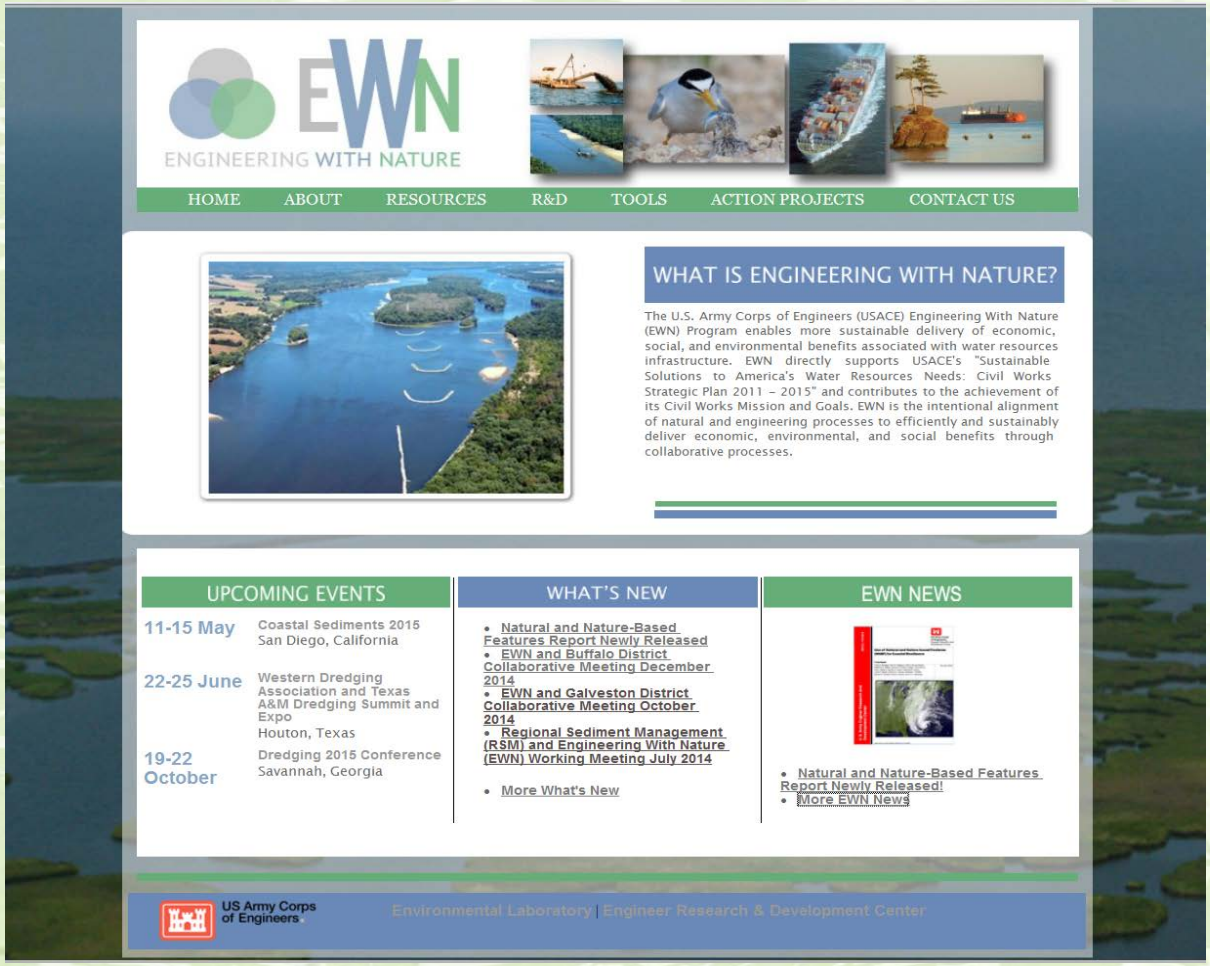
These qualities contribute significantly to ecosystem health and function, which in turn improves the value of the waterbody as a natural resource.

# For a free download of the Design Manual; go to

http://el.erdc.usace.army.mil/ewn/pdfs/EWN%20Design%20Manual.pdf



# EWN Website


EWN
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HOME
ABOUT
RESOURCES
R&D
TOOLS
ACTION PROJECTS
CONTACT US
WHAT IS ENGINEERING WITH NATURE?
The U.S. Army Corps of Engineers (USACE) Engineering With Nature (EWN) Program enables more sustainable delivery of economic, social, and environmental benefits associated with water resources infrastructure. EWN directly supports USACE's "Sustainable Solutions to America's Water Resources Needs: Civil Works Strategic Plan 2011 – 2015" and contributes to the achievement of its Civil Works Mission and Goals. EWN is the intentional alignment of natural and engineering processes to efficiently and sustainably deliver economic, environmental, and social benefits through collaborative processes.
UPCOMING EVENTS
11-15 May
Coastal Sediments 2015
San Diego, California
22-25 June
Western Dredging Association and Texas A&M Dredging Summit and Expo
Houton, Texas
19-22 October
Dredging 2015 Conference
Savannah, Georgia
WHAT'S NEW
Natural and Nature-Based Features Report Newly Released
EWN and Buffalo District Collaborative Meeting December 2014
EWN and Galveston District Collaborative Meeting October 2014
Regional Sediment Management (RSM) and Engineering With Nature (EWN) Working Meeting July 2014
More What's New
EWN NEWS
Natural and Nature-Based Features Report Newly Released!
More EWN News
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# Engineering With Nature

*The U.S. Army Corps of Engineers (USACE) initiative known as 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 (Figure 1). EWN seeks to apply science to our engineering to improve the decision-making process and expand the range of benefits that can be achieved through our projects. The projects and tool development through EWN directly supports a number of USACE plans and directives including the USACE Civil Works Strategic Plan, the USACE Campaign Plan, and USACE Environmental Operating Principles. As a leading practice, EWN is being pursued through innovative research, field demonstrations, communicating lessons learned, and active engagement with field practitioners and USACE partners and stakeholders.*

**Utilizing plant communitites within the built environment to create sustainable landscapes**


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# Questions???

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