NASEM Workshop on Natural Infrastructure

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ERDC
ENGINEER RESEARCH & DEVELOPMENT CENTER

Challenges – Guidance

- Most of the guidance available is outdated and does not include the flexibility required for successful NI projects.
  - NI project success relies on the fact that each project is unique and designs should work with the site specific conditions.
- NI is constantly evolving, and new strategies are being developed
  - how do you keep guidance relevant and current?
  - How do you keep guidance relevant with the quickly changing science?
- How do we construct projects that don't follow the existing guidance or has no guidance at all?
- How do we get a project through review that doesn't follow current guidance?

CECW-ED Engineer Manual 1110-2-1611	Department of the Army U.S. Army Corps of Engineers Washington, DC 20314-1000	EM 1110-2-1611 31 December 1980
	Engineering and Design LAYOUT AND DESIGN OF SHALLOW-DRAFT WATERWAYS	
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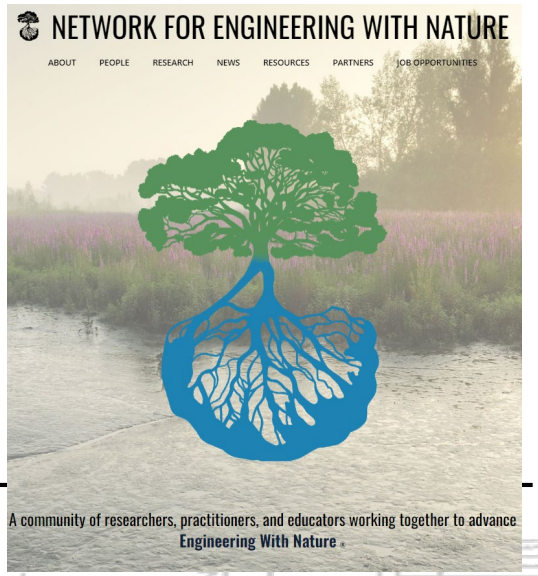
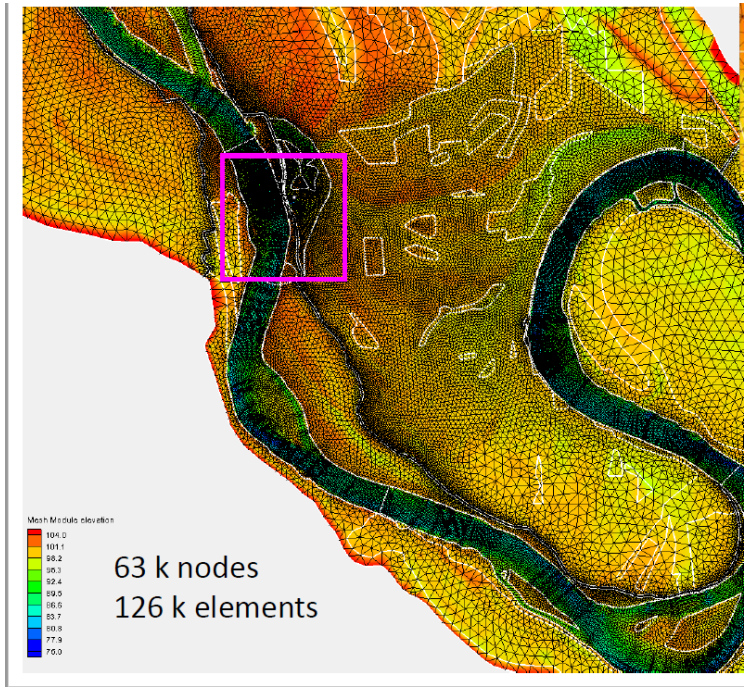
Overcoming Guidance Challenges

- Partnerships
- Community of Practitioners
- Use of other resources to inform design
  - Wide collection and distribution of case studies and lessons learned (N-EWN)
- Experience – engineering judgement
- Pilot Projects
  - Lessons learned from these continued activities informs future anticipated guidance.
  - Technical documentation
- Willingness to take risks/ try new approaches



Challenges – Tools

- Everyone wants a ‘fancy’ model
  - Models are required for permitting
  - Skeptics want to see a model.
- Overreliance on ‘fancy models’ – if a model says so it must be true.
- NI projects are complex and rely on geomorphic processes that can be difficult to model
- Our modeling capabilities are lagging behind
- How do we make our models and Pilot Projects/research assessable to others to reduce challenges in the future?
- How due we better align tool development to reduce redundancy on flood hazard tools and focus more on tools that address consequences and adaption strategies?
- How due we better align research funds and focus with practitioner needs?



Overcoming Challenges – Tools

- Research – Model improvement
  - Understanding the research needs from the field
  - Understanding technical aspects of projects that are being proposed and modeling needs
- Understanding and communication of model limitations
- Pilot Projects - Using case studies to help inform designs
- Engineering Judgement
- Communication
  - Sharing tools and information across USACE/other agencies/NGOs
  - Sharing research/tool needs

Engineering With Nature® Implementation

- In 2021 EWN added an emphasis on project implementation
  - **Practice Leads** – diverse team of inland and coastal engineers and planners responsible for maintaining the strategy for EWN implementation within USACE.
    - Connection between the field and EWN
  - **EWN Cadre** – Communication tool to connect practitioners and tap into expertise throughout USACE
    - Crowdsource information
    - Share experiences
    - Request technical assistance
    - Distribute information

- Through the Practice leads and Cadre motivated practitioners across the Corps are creating this capability by talking, sharing and supporting each other in the enterprise to advance practice.

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Case Study: Innovative River Training

Modifications to the shape and size of traditional river training to induce geomorphic processes to create habitat features that have been lost.

- Innovative modeling techniques developed to overcome existing modeling limitations.
- Pilot projects designed in conjunction with partner feedback.
- Monitoring and lessons learned applied to future projects.

Case Study: Dogtooth Bend

11/15/2016

2/13/2020

Case Study: Dogtooth Bend

Collaboration with partners (TNC, NRCS, NWF) to develop strategies to minimize navigation impacts, maximize restoration efforts and promote diverse land uses.

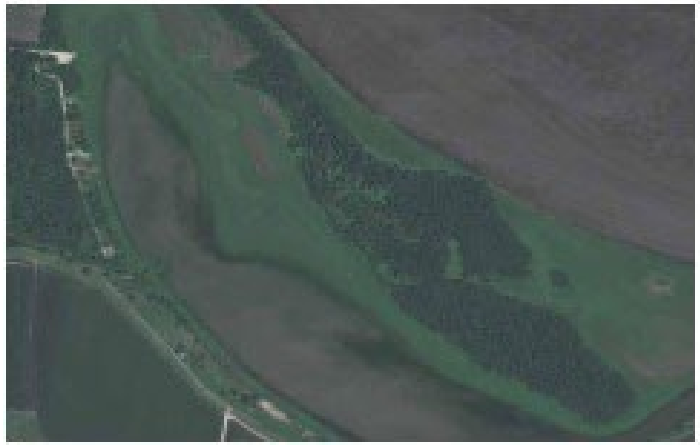
- Unique project with no applicable guidance
- Optimal solution requires support from multiple Agencies/NGOs
- Reliance on complex modeling and engineering judgement to inform design risks
- Emphasis on developing lessons learned to apply to future projects

Case Study: Environmental Pool Management

Modification to dam operations to improve ecological conditions and restore natural processes in the pools and reduce large and rapid fluctuations in pool level

- Hold water levels 1-3 ft lower than maximum regulated pool elevation over 30-40 days and raise gradually
- Reduced water level during grown season mimics natural cycle
- Produced over 400 hectares of vegetation per year

May 2017 - Normal Pool



July 2018 - Lowered for EPM – Vegetation Growth

May 2020 – Lowered for EPM – Before Vegetation Growth

Case Study: Environmental Pool Management

- Required a deviation from standard practice
- Communication with Industry and project partners
- Pilot Project – now EPM is used at many other locations
- Monitoring and documentation