

# WHAT DOES SOCIAL SCIENCE HAVE TO DO WITH ECOLOGICAL ENGINEERING?

Dr. Judith Vendrzyk, Research Sociologist  
Engineering Research & Development Center  
(ERDC) – Construction Engineering Lab (CERL)

NNBF Workshop 7 & 8 May 2025



U.S. ARMY



US Army Corps  
of Engineers®



ERDC  
ENGINEER RESEARCH & DEVELOPMENT CENTER



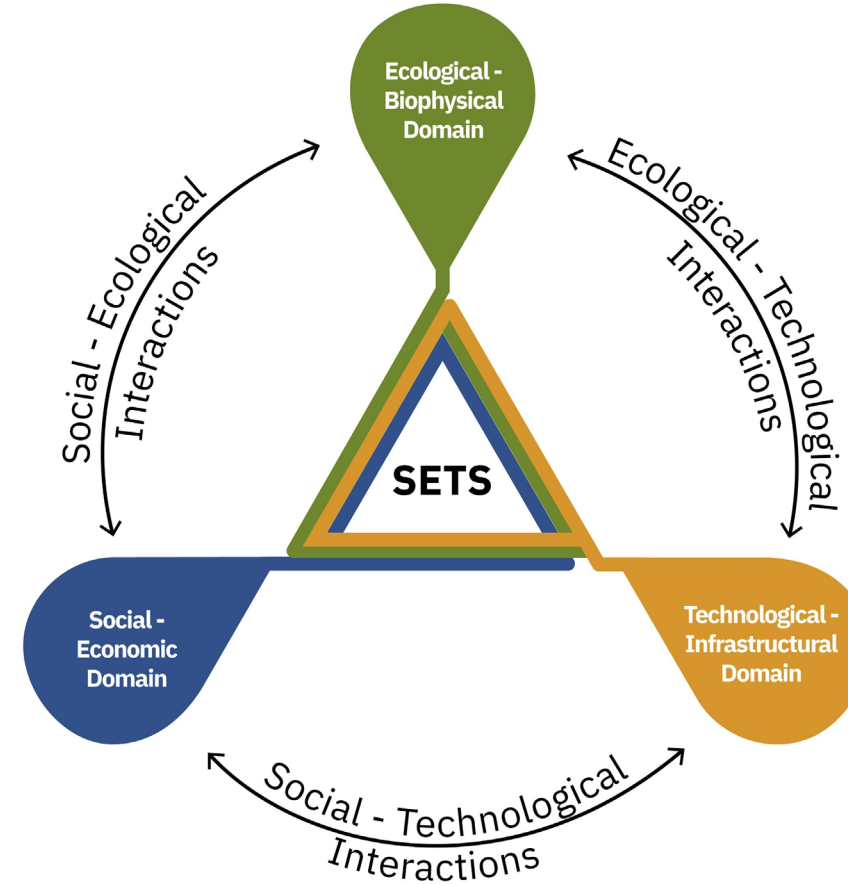




UNCLASSIFIED



# WHAT DOES SOCIAL SCIENCE HAVE TO DO WITH ECOLOGICAL ENGINEERING?



<https://doi.org/10.1016/j.oneear.2022.04.007>

UNCLASSIFIED





# WHAT DOES SOCIAL SCIENCE HAVE TO DO WITH ECOLOGICAL ENGINEERING?

## ■ The Social, Ecological, Technological Nexus (SETs)

**Fig. 1: Control and entangled urban systems perspectives.**

From: [Sensemaking for entangled urban social, ecological, and technological systems in the Anthropocene](#)

CONTROL PERSPECTIVE		ENTANGLED SETS PERSPECTIVE
THE WORLD IS STABLE		THE WORLD IS RAPIDLY CHANGING
SYSTEMS ARE COMPLICATED		SYSTEMS ARE COMPLEX
EVENTS ARE PREDICTABLE		EVENTS ARE UNCERTAIN
HUMANS ARE SEPARATE FROM NATURE		HUMANS AND NATURE ARE INEXTRICABLY LINKED
VALUE EMPHASIS ON UTILITY AND EFFICIENCY		VALUE EMPHASIS ON PLURALISM AND DIVERSITY
S, E AND T SYSTEMS ARE ISOLATED AND DECOUPLED		S, E AND T SYSTEMS ARE INTEGRATED

These perspectives represent spectra of control and entangled SETs — urban systems typically fall somewhere between the two contrasting ends of these spectra.

Chester, M.V., Miller, T.R., Muñoz-Erickson, T.A. *et al.* Sensemaking for entangled urban social, ecological, and technological systems in the Anthropocene. *npj Urban Sustain* **3**, 39 (2023). <https://doi.org/10.1038/s42949-023-00120-1>





# WHAT DOES SOCIAL SCIENCE HAVE TO DO WITH ECOLOGICAL ENGINEERING?

- The Social, Ecological, Technological Nexus (SETs)

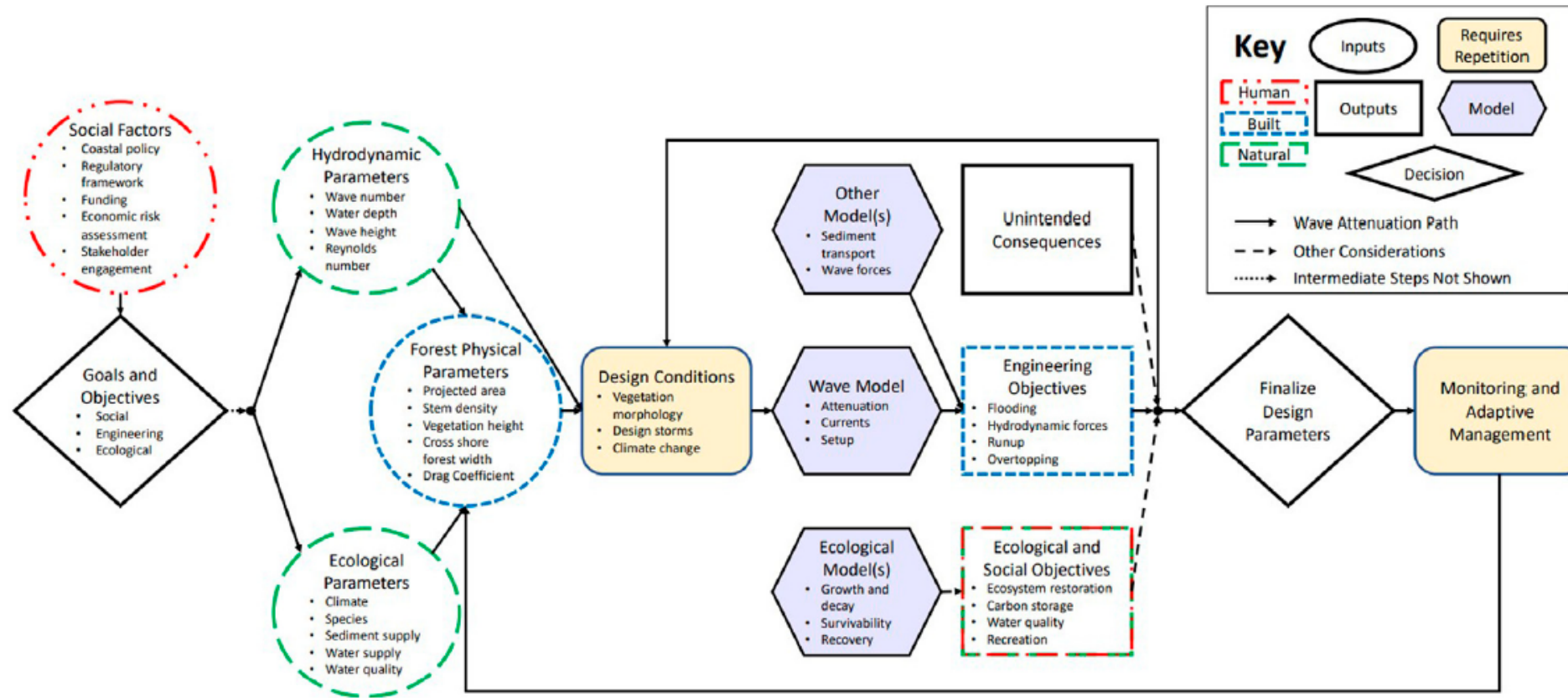


Chester, M.V., Miller, T.R., Muñoz-Erickson, T.A. *et al.* Sensemaking for entangled urban social, ecological, and technological systems in the Anthropocene. *npj Urban Sustain* **3**, 39 (2023). <https://doi.org/10.1038/s42949-023-00120-1>





# WHAT DOES SOCIAL SCIENCE HAVE TO DO WITH ECOLOGICAL ENGINEERING?



**FIGURE 4**

Expanded framework for NNBF describing objectives, variables affecting system performance, models for assessing performance, and engineering, ecological, social, and unintended outcomes.

Ostrow K, Guannel G, Biondi EL, Cox DT and Tomiczek T (2022), State of the practice and engineering framework for using emergent vegetation in coastal infrastructure. *Front. Built Environ.* 8:923965. doi: 10.3389/fbuil.2022.923965





# WHAT DOES SOCIAL SCIENCE HAVE TO DO WITH ECOLOGICAL ENGINEERING?

## Social Factors

- Coastal policy
- Regulatory framework
- Funding
- Economic risk assessment
- Stakeholder engagement

## Ecological and Social Objectives

- Ecosystem restoration
- Carbon storage
- Water quality
- Recreation





# WHAT DOES SOCIAL SCIENCE HAVE TO DO WITH ECOLOGICAL ENGINEERING?



**But what about the actual engineers and the engineering organizations they inhabit?**

**1. Self-Selection into the profession**

**2. Organizational Processes**

**3. Organizational Culture**

**a. Formal**

**b. Informal**



# CONNECT WITH US

**Judith M. Vondrzyk**

Research Sociologist

Construction Engineering Research Lab (CERL)

U.S. Army Engineer Research and Development Center (ERDC)

U.S. Army Corps of Engineers (USACE)

[Judith.M.Vondrzyk@usace.army.mil](mailto:Judith.M.Vondrzyk@usace.army.mil)

217-373-3483



LinkedIn



Scan this QR code with your phone for instant access



U.S. ARMY



US Army Corps  
of Engineers



ERDC  
ENGINEER RESEARCH & DEVELOPMENT CENTER