



Evaluating Risk and Resilience in Engineering with Nature Projects

ERDC Dredging Operations Technical Support Program (DOTS)

U.S. ARMY CORPS OF ENGINEERS

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Response Summary:

In 2010 the USACE Engineer Research and Development Center initiated “Engineering with Nature” (EWN), an initiative to investigate, demonstrate, and support the design of projects that meet engineering and mission objectives but also seek to provide environmental benefits and enhance long-term sustainability. EWN efforts can take a variety of forms but, in general, the projects either take a traditional engineered structure and integrate environmental co-benefits or use novel approaches to leverage natural flow and sediment transport processes to achieve engineering objectives. A third category of EWN projects are natural and nature-based features (NNBF); these utilize the enhancement or recreation of natural features (e.g. wetlands, oyster reefs, dunes) to achieve goals previously obtained through hard engineered structures (e.g. seawalls, levees). For these projects it is recognized that project may not operate in the same way as an engineered structure but can still have acceptable outcomes without furthering environmental degradation. Benefits can be environmental, economic, or societal. In more and more cases, projects are being designed not just to meet immediate needs but to continue to perform through gradual changes in environmental conditions, such as expected sea-level rise.

At the same time as the development of EWN ideas, the water resources field has seen a rise in the interest in resilience, including both resilience of natural ecosystems associated with water resources as well as resilience of communities that live near or rely on critical water resources infrastructure. Resilience at its most simplistic can be considered as the ability to rebound or recover to a previous state. In a broader sense, it can acknowledge the changes imposed by a disruptive event and include adaptation during recovery in order to achieve an improve state of performance.

The EWN philosophy certainly intersects with the idea of resilience through the consideration of integrated social, environmental, and economic impacts and in the design for performance through long-term progressive changes. However utilizing EWN does not ensure resilience nor do resilience projects necessarily utilize EWN approaches. This effort will evaluate past EWN projects to identify and describe the properties associated with resilience. The process will require teasing out and delineating the resilience “of what, to what.” The results methods will be to apply a simple rubric to investigate how the projects prepare/defend, resist/withstand, recover, and/or adapt in the face of acute and chronic disruptions. The performance will also be consider with respect to the intended functions of the project, the timescale of expected effects, the need for continued human intervention, and the extent of natural growth or degradation, and the explicit social, economic, and environmental benefits.

Period of Performance:

June 1, 2018 to July 30, 2018

Benefits of the Response to the USACE Dredging/Navigation Program:

This work will include a discussion of the relationship between EWN goals and resilience goals over the short term and the long term and provide insights into characteristics of projects that generate the least conflict between the goals.

Deliverable:

The product of this effort will be an ERDC technical note and peer-reviewed journal article.



Providing environmental and engineering technical support to the U.S. Army Corps of Engineers
Operations and Maintenance navigation and dredging missions

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