

- **Award Title:** 2017 FEW Nexus Summit: Integrated Science, Engineering, and Policy: a Multi Stakeholder Dialogue
- **Federal Award ID:** 1707019
- **Report Submission Period:** 02/01/2017 to 01/31/2018

Additional information about the activities of emerging Nexus community is available at [www.wefnexusinitiative.tamu.edu](http://www.wefnexusinitiative.tamu.edu).

**Merit:** A Nexus Road Map of science, policy, technology, and education issues critical to the FEW discipline to aid planning and developing the tradeoffs dialogue between FEW stakeholders, particularly as relates to *the explicit identification of the specific types of research and data collection approaches* for enhancing longitudinal research capable of *modeling and monitoring the processes associated with changes in resilience, vulnerability, and risk perceptions* is the foundation of further investigation and will provide insight towards new knowledge generated as an outcome of its implementation.

**Impacts:** The FEW Nexus community of science and practice will be the platform from which ideas will be shared and exchanged among global, regional/national, and local FEW nexus experiences. It will consolidate the community, facilitate partnerships for data exchange and information sharing, and lay the foundation of future Nexus research, empowering stakeholders to participate in informed decision making.

**Targets and Priorities** *identify the next steps* to define and expand the national FEW Nexus agenda. Work with NSF, NIFA, and other agencies toward establishing the FEW Nexus community of science and practice. Engage the national and global Nexus community (currently over 500 individuals, worldwide).

**Current Status:** The NSF INFEWS program has promoted numerous national activities across various disciplines to promote research, education, and engagement activities. While the community of scientists and practitioners is growing, there is not yet access to an inclusive, open platform for sharing knowledge, good practices, and establishing the common goals, standards and opportunities needed to chart the short- and long-term goals of the community and to define the way in which it can/should interface with others.

**White Papers:** The papers generated from the workshop are published online as Volume 4, Issue 3, September 2017, *Current Sustainable/Renewable Energy Reports* ISSN: 2196-3010. 52 authors, including 9 advanced graduate students, and 18 institutions in the USA and abroad were involved. The Issue is available at <https://link.springer.com/journal/40518/4/3/page/1>.

**Next Steps:** An inclusive, thematically balanced FEW Nexus community of science and practice is critical to support researchers in understanding, identifying, studying, and improving FEW systems. A delegation comprised of the organizer and several attendees traveled to NSF, met with relevant program managers and discussed an NSF RCN proposal, which is currently under preparation.

**Engagement** through professional societies of the broader Nexus community will bring diverse areas, especially those of energy and food (identified as weakly represented at the workshop), into the discussion. Such engagement is being pursued, meetings across the spectrum of professional societies continue to be conducted to build wide support for the Community of Science and include: ACS, AGU, ASABE, AIChE, and IEEE, among others. We recommend the establishment of a single **FEW Nexus Community of Science and Practice (NCoSP)**, a transdisciplinary community of scientists to address the security issues of the Nexus by identifying common threads and inherent attributes, developing potential solutions for addressing these challenges.

**Funding** is needed to enable the establishment of this community and of a physical and a virtual platform to enable further deliberation of the issues raised, including:

- **Energy Efficiency:** the interactions between energy, water, and industrial systems
- **Water for Agriculture:** increasing availability and delivery

- **Productive leveraging:** of the connections between **natural and engineered water systems**
- **Renewable energy:** wind and solar and its role in water, energy and food security
- **Water for Energy:** must be better understood
- **Water Reuse:** potentials for agricultural and non-agricultural uses
- **Food Waste Reduction:** protocols, adoption, impact on FEW resource savings
- **Food Production Requirements/Demands:**
  - **plant genetics**
  - **irrigation technology/practices**
  - **urban agriculture** (to empower locally optimized outputs and demands)
  - **prevention and recovery** to alleviate waste from farm, processing, and consumer
  - **optimization** for resource use efficiency through the food chain
- **Tools** that enable:
  - **Interdisciplinary research** to promote/enable sustainable water management for energy/food production.
  - **Improved analytical systems frameworks** for data integration and analyses to accelerate planning/decision-making.
  - **Cross disciplinary data** that integrates spatial, temporal, and thematic dimensions, outlines challenges in Nexus data acquisition, helping to address the research gap.
  - **Modeling and Analysis** an integrated modelling framework for Nexus analysis that represents geographic regions yet encompasses relevant FEW activities
  - **FEWS Nexus (Food-Energy-Water-Soil)** Soil is a basic Nexus Tool with a critical role in protecting global food, water, energy securities: it must be integrated and acknowledged
  - **Trade-offs and Decision Support Tools** that enable integrated assessment of FEW systems and trade-offs and evaluates the trade-offs to enable identification and design of a set of robust strategies for addressing future conditions.
- **Governance:** the Tools must support **improved understanding** of the Nexus in a manner that allows governing bodies to address the needs of all stakeholders equitably and sustainably.

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 Modified by: Rabi H Mohtar

