NSF & USDA NIFA: Food, Energy, and Water

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USDA NIFA – Division of Global Climate Change,

NSF – Division of Chemical, Bioengineering, Environmental, and Transport Systems

U. S. National Science Foundation (NSF)
Alexandria, Virginia USA

- Independent agency created by Congress in 1950 to promote the progress of science; advance national health, prosperity, and welfare; and secure the national defense
- Annual budget of $7.472 billon (FY 2017)
- Fund approximately 24 % of all federally supported basic research conducted by America's colleges and universities
- A major source of federal research support in many fields
- NSF supports ~ 320,900 scientists, engineers, teachers, and students.

NSF's current headquarters: 2415 Eisenhower Avenue, Alexandria, VA, 22314
Credit: *National Science Foundation (www.nsf.gov)*

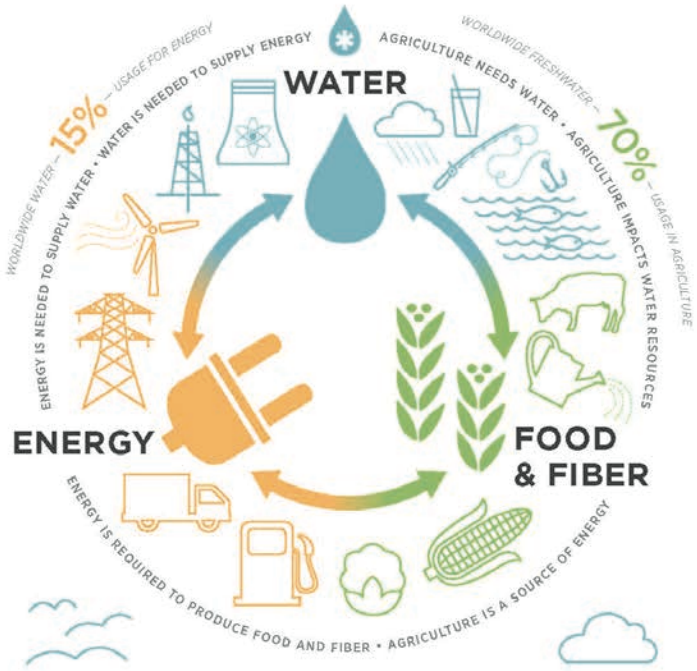
From an announcement of INFEWS program in January 2016 and FY17 explanatory notes:

- Each day, the work of NIFA-funded researchers touches the lives of all Americans, from farm to table, and impacts the air we breathe to the energy that powers our country. Cutting edge USDA science helps to protect, secure, and improve our food, agricultural, and natural resource systems.

USDA United States Department of Agriculture | National Institute of Food and Agriculture | www.nifa.usda.gov @USDA_NIFA | Discover USDA highlights at www.medium.com/usda-results

NIFA Research Addresses The Food-Energy-Water System

USDA's National Institute of Food and Agriculture (NIFA) invests in research, education, and extension that will guide how society can best meet the growing demand for water, food, and energy. NIFA will invest in systems science research that addresses all three elements at the same time because of their dynamic interaction within natural and human environments. NIFA's initial investment is through a collaboration with the National Science Foundation under a joint solicitation for proposals called Innovations at the Nexus of Food, Energy, and Water Systems (INFEWS). A total of $50 million will be awarded to successful applicants in 2016.



EACH DAY, THE WORK OF NIFA-FUNDED RESEARCHERS TOUCHES THE LIVES OF ALL AMERICANS, FROM FARM TO TABLE, AND IMPACTS THE AIR WE BREATHE TO THE ENERGY THAT POWERS OUR COUNTRY. CUTTING EDGE USDA SCIENCE HELPS TO PROTECT, SECURE, AND IMPROVE OUR FOOD, AGRICULTURAL, AND NATURAL RESOURCE SYSTEMS

A DYNAMIC INTERACTION AMONG HUMANS, AGRICULTURE, AND THE ENVIRONMENT

The **FOOD-ENERGY-WATER** system is the combined complexity of food production, energy requirements, and water availability. The system integrates **physical** (such as built infrastructure and new technologies), **natural** (such as biogeochemical and hydrological cycles), **biological** (such as agroecosystem structure and productivity), and **social** and **behavioral** entities (such as decision making and governance). Innovative approaches that study the intersection of these components will promote sustainability within the food-energy-water system.

NIFA FUNDING AT WORK

The **University of Nebraska-Lincoln's** Nebraska Agriculture Water Management Network implements farmland water conservation strategies. Savings to date are more than $50M in fuel and 1M acre-feet of water.

AFRI-funded research is supporting large-scale changes in the management of the Western Great Plains **Ogallala Aquifer Region** and informing aquifer management around the world.

Sources: University of Nebraska-Lincoln News. Retrieved February 2016 from newsroom.unl.edu. Federal Activities Report on the Bioeconomy. Retrieved February 2016 from www.biomassboard.gov
IEA. Retrieved January 2016 from worldenergyoutlook.org | NIFA invests in and advances agricultural research, education, and extension and seeks to make transformative discoveries that solve societal challenges.

Societally relevant issues, hard to solve

USDA NIFA, NSF, and Interagency Programs

- Both NSF and USDA NIFA have a history of joint grant solicitations with other funding agencies (NASA, DOE etc.)
- Past programs with both NSF and USDA NIFA: Water Sustainability and Climate and Earth System Models (Decadal and regional climate predictions)

Other Interagency Programs

- NASA Roses: Carbon Cycle Science
- National Robotics Initiative
- Cyber Physical Systems
- INFEWS
- Several others (including international) in process but not yet approved

INFEWS

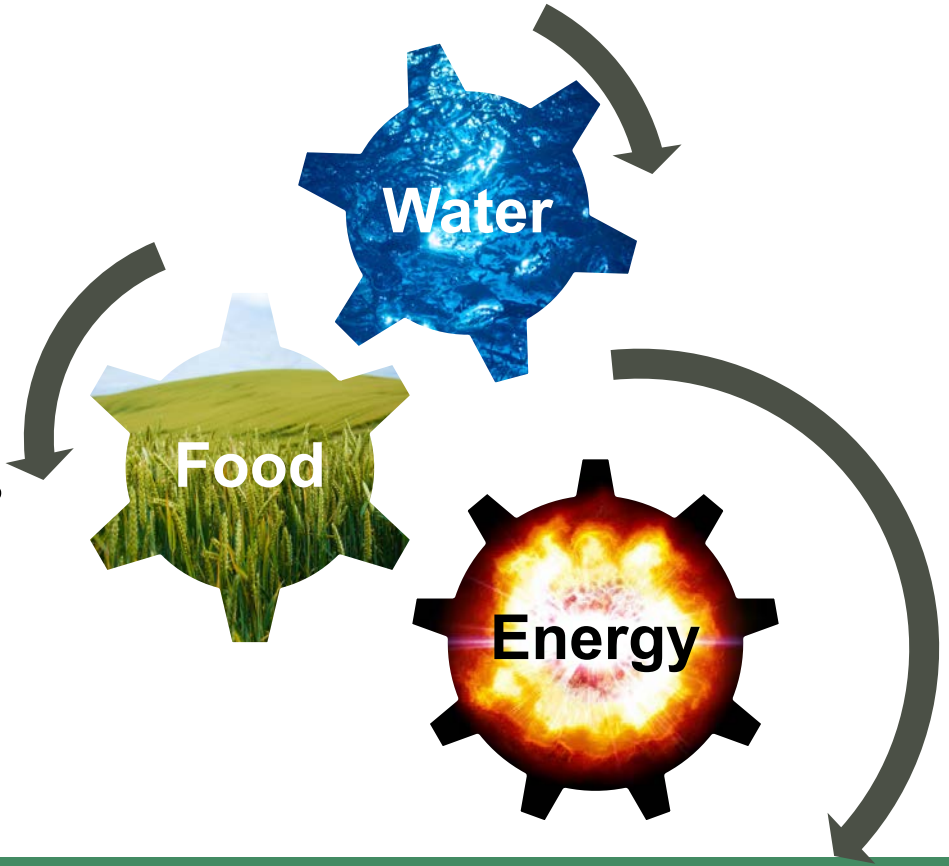
NSF: Basic Science is necessary to inform policy decisions … and synergistic with "core"

The water security, food security and energy security trilemma creates a multidimensional web that is a structurally complex network with dynamic links …

Perrone and Hornberger, 2014

… will require significant action, either through institutional and behavioral paths or technological and infrastructural paths.

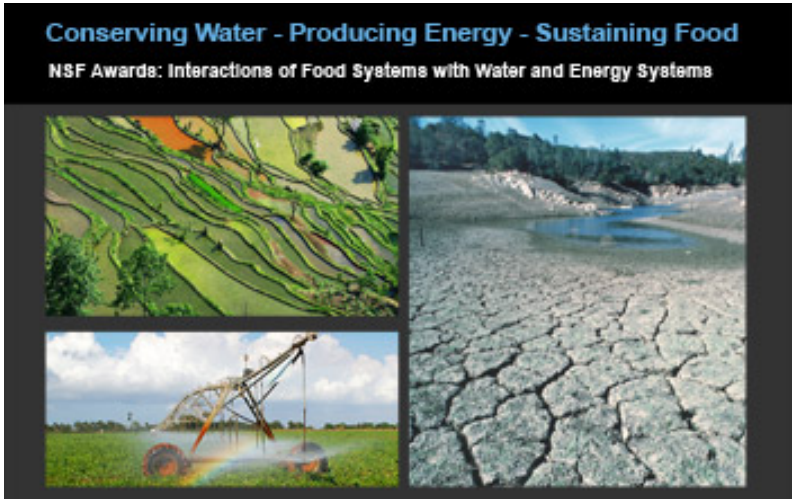
Perrone and Hornberger, 2014



INFEWS History

- DCL issued 2 Feb ‘15: NSF 15-040 *SEES: Interactions of Food Systems with Water and Energy Systems*
- Webinar 25 Feb 2015; due date 30 March
- June 2015, 17 workshops and 27 supplements funded $6.3M
- August 14, 2015, Press Release 15-090

“New grants foster research on food, energy and water: a linked system “



Innovations at the Nexus of Food, Energy, and Water Systems

NSF 16-524

- Significantly advance our understanding of the food-energy-water system through quantitative and computational modeling, including support for relevant cyberinfrastructure;
- Develop real-time, cyber-enabled interfaces that improve understanding of the behavior of FEW systems and increase decision support capability;
- **Enable research that will lead to innovative system and technological solutions to critical FEW problems**
- Grow the scientific workforce capable of studying and managing the FEW system, through education and other professional development opportunities.

INFEWS Solicitation History

- Two rounds of solicitation and awards have been released to date
- 2016: **NSF 16-524**
  - Four Tracks
    1) FEW System Modeling
    2) Visualization and Decision support for Cyber-Human-Physical Systems at the FEW Nexus
    3) Research to Enable Innovative Solutions
    4) Education and Workforce Development.
  - 2 Categories
    - Category 1: $1-3M
    - Category 2: <$1,000,000

INFEWS Solicitation History

- Two rounds of solicitation and awards have been released to date
- 2017/2018: **NSF 17-530**
  - Three Tracks
    1) FEW System Modeling
    2) Visualization and Decision support for Cyber-Human-Physical Systems at the FEW Nexus
    3) Research to Enable Innovative Solutions
  - Eliminated Categories: Awards of up to $2.5 M

INFEWS NSF 18-545

- Solicitation published in February
- September 26, 2018 Due Date
- Three Tracks:
    1) Social-Physical Modelling of FEW Systems
    2) Research to Enable Innovative Solutions
    3) INFEWS Research Coordination Networks (INFEWS-RCN)
- Track 1 & 2 awards up to $2.5 M
- Track 3 awards up to $750 K

INFEWS Past Awards

- In FY 2016 - 17 awards across four tracks
  - 13 from NSF
  - 2 Funded by NIFA
  - 2 Jointly Funded
- In FY 2017/2018 – 20 awards across three tracks
  - 16 funded by NSF
  - 4 funded by NIFA

- List of abstracts can be found at foodenergywater.wordpress.com
  NSF New Release 17-093

INFEWS Partnership

- Applications will all come into NSF
- Panels jointly arranged by NSF and NIFA.
- If funded by NIFA will need to submit a few documents to NIFA (no additional review and no resubmission of the proposals through our system, we can move it ourselves).
- Joint PI meetings.

Tips on applying

- SYSTEMS approach
  - Must address Food AND energy AND water systems
  - Interdisciplinary-Must have at least three distinct disciplines
  - To be eligible to receive NSF funds, you must be from a university or research institution
    - NIFA has broader eligibility, but then you will only compete for the smaller portion of funds we are contributing
    - Anyone can be on a subaward (including international

Tips on applying

- FEW Context Statement
  - should specify disciplines and the system being addressed
  - DO NOT copy and paste the project summary
  - This is the document being reviewed for fit to program

Tips on applying

- This is an NSF proposal
  - **Please write it like an NSF proposal**.
  - Overhead should be the NSF rate for your university
  - If selected by NIFA, the rate will be adjusted then
- Can I state that I prefer NSF or NIFA?
  - NO. These are joint panels

Contact Information

- General questions on INFEWS should be sent to INFEWSquestions@nsf.gov