EPA United States Environmental Protection Agency

Nutrient Visioneering

EPA Tools and Resources Webinar

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Visioneering Partners: Challenging Nutrients Coalition

USGS science for a changing world

IOOS INTEGRATED OCEAN OBSERVING SYSTEM

USDA

NOAA

NIST

United States Environmental Protection Agency

ALLIANCE FOR COASTAL TECHNOLOGIES

Tulane University

EVERGLADES FOUNDATION

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Nutrient Visioneering

- **General Approach**
  - Barriers/needs/gaps
  - Focus areas
  - Opportunities for challenges and prizes

- **Nutrient Visioneering I (2013) Focus Areas:**
  - Improve monitoring and data
  - Nutrient reduction technologies
  - Community-based strategies

Nutrient Visioneering I Accomplishments (Completed)

Nutrient Sensor Challenge (Dec. 2014 - Feb 2017)
Market stimulation challenge for low-cost, continuous nutrient sensors and analyzers

Tulane University Nitrogen Reduction Challenge (Feb. 2014 - Dec. 2017)
Challenge to identify in-field solutions to reduce crop fertilizer use and runoff

Visualizing Nutrients Challenge (April - Aug. 2015)
Challenged solvers to use open government data to create visualizations that inform communities about nutrient pollution

Visualize Your Water Challenge (Jan. - April 2016)

High school students competed to create data visualizations to illustrate local nutrient pollution issues

Nutrient Visioneering I Accomplishments (Ongoing)

Nutrient Recycling Challenge (Launched Nov. 2015)
Challenge to accelerate development of affordable technologies to capture and reuse nutrients from pork and dairy waste

George Barley Water Prize (Launched June 2016)
Identify cost-effective, scalable process for recovering phosphorus from natural water bodies

Advanced Septic Nitrogen Sensor Challenge (Launched Jan. 2017)
Challenge for a nitrogen sensor to monitor performance of advanced septic systems

Nutrient Sensor Action Challenge (Launched July 2017)
Competition to demonstrate the use of nutrient sensor data to inform decisions

Evaluating Nutrient Sensor Operational Status
Assessing the operational status of commercially available nutrient sensors deployed in the Gulf of Mexico and Long Island Sound

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Challenge.gov
Government Challenges, Your Solutions

Spectrum Collaboration Challenge

$3,750,000 in prizes

A first-of-its kind collaborative machine-learning competition to overcome scarcity in the radio frequency spectrum.

Open Until Apr 30, 2018

Posted by:
Defense Advanced Research Projects Agency

Detecting Leaks and Flaws in Water Pipelines – Stage 1

$75,000 in prizes

Can you help us detect leaks and flaws in water pipelines?

Open Until May 07, 2018

Posted by:
Bureau of Reclamation

Nutrient Sensor Action Challenge Stage II

partnership

NUTRIENT SENSOR ACTION CHALLENGE

$100,000 in prizes

Empower real-time nutrient data to transform decision-making.

Open Until Jan 31, 2019

Posted by:
Environmental Protection Agency

Challenging Nutrients Coalition

NUTRIENT SENSOR CHALLENGE

- **Accurate, dependable, and affordable sensors for Nitrogen (N) and Phosphorous (P)**
- **Market Stimulation Challenge**
- **Results: Significantly lower price sensors available on the market ($35K → 15K)**

http://www.act-us.info/nutrients-challenge/

Advanced Septic System Nitrogen Sensor Challenge

- Develop a cost-effective septic system nitrogen sensor
- Partners: Cape Cod Commission (MA) & Suffolk County (NY)
- Prize: Purchase order for 200 sensors by The Nature Conservancy, Spring 2020
- Status
  - Phase I (complete): Design proposals
  - Phase II (ongoing): Sensor testing and verification at MA Alternative Septic System Test Center (MASSTC)
    - ISO ETV Standard 14034; first ISO ETV verification conducted in the U.S.
    - ISO ETV 14034 verification internationally accepted

Nutrient Sensor Action Challenge
Open Now!

- **Goal**: Teams compete to implement approaches that use nutrient sensors and resulting data to improve decisions and actions for more effective nutrient management. (*Prize: up to two winning teams may share a prize of $100,000*)

Opportunity

Open to states, communities and organizations in the U.S. Teams should be currently engaged in water monitoring and have experience with sensors and data management.

- 3 month data collection
- Closes January 31, 2019

https://www.challenge.gov/challenge/nutrient-sensor-action-challenge-stage-ii/

Nutrient Sensor Action Challenge

"compete to implement approaches that use nutrient sensors and ***resulting*** ***data to improve decisions and actions for more effective nutrient management"***

The Nutrient Sensor Action Challenge is ***looking for examples*** of how data from nutrient sensors can be collected and used by states/others to inform specific decisions pertaining to nutrient management.

https://www.challenge.gov/challenge/nutrient-sensor-action-challenge-stage-ii/

Nutrient Sensor Action Challenge Teams

HABS and Hypoxia Measurement in Western Lake Erie (University of Michigan)

Impact of dam removals on nitrate retention (University of New Hampshire)

Direct Data for Farm Nutrient Management (League of Women Voters of Illinois)

Whatcom County nitrate sensor network (Western Washington University)

Smart Nitrogen Management (South Platte Water Renewal Partners)

https://www.challenge.gov/challenge/nutrient-sensor-action-challenge-stage-ii/

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Nutrient Visioneering II

- 28 creative thinkers, innovators, social scientists, technology experts, and investors (states/academia/industry/nonprofit/philanthropies) gathered in Woods Hole, MA on June 18, 2018

Nutrient Visioneering II - Identified Barriers

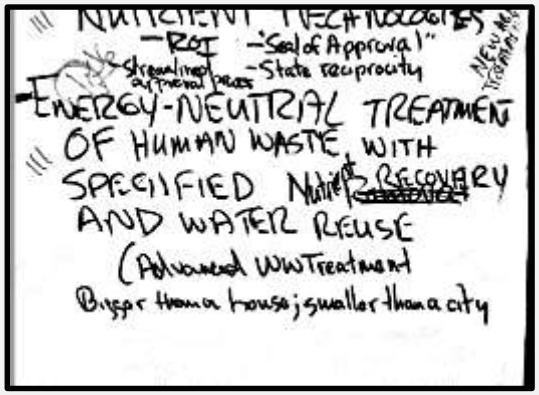
- Scaling solutions
- Communicating cost/benefits
- Understanding impact of legacy nutrients
- Linking infrastructure and ambient nutrient strategies
- Contribution of atmospheric deposition
- Financial viability of solutions

Nutrient Visioneering II Recommended Focus Areas

- Nutrient reduction technologies*
- Improved detection and monitoring*
- Nutrient management models/frameworks
- Community-based solutions*

**Similar to Visioneering I*

Nutrient Visioneering II Example Nutrient Reduction Technologies: *Challenge Concepts*



- Energy-neutral treatment process for domestic waste with specified nutrient reduction goals and water reuse abilities for small applications
- Legacy nutrient recovery (e.g., phosphate) that generates a valuable byproduct(s)
- Enhanced denitrification in groundwater
- Cost-effective retrofit for stormwater ponds/basins that reduces the nutrient load
- Bioreactors in line within tiles to keep nutrients in the field

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Nutrient Visioneering II Next Steps

- Share and discuss recommendations with coalition, agency leadership and interested partners
- Finalize and share Visioneering II Report (November 2018)
- Work with partners (including ECOS/ERIS) to develop and launch challenges
  - Problem formulation with extensive input from users and stakeholders
  - Design challenges
  - Launch challenges (2019)

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