



EN2017

INNOVATIONS FOR IMPROVING NUTRIENT MONITORING

Denice Shaw, *U.S. EPA Office of Research and Development*

2017 Exchange Network National Meeting

Innovation and Partnership

May 15-18, 2017
Sheraton Philadelphia Society Hill Hotel
Philadelphia, Pennsylvania

#EN2017
<http://www.exchangenetwork.net/en2017>

ABSTRACT

2

Our limited ability to monitor nutrients in water is a major impedance to better understanding the impacts of pollution reduction strategies. This presentation will describe efforts by EPA, USGS, NOAA and NIST to collaborate with numerous public and private partners to take an interdisciplinary approach to improve nutrient monitoring through development of sensors and enabling technologies.

Challenging Nutrients Coalition





Challenging Nutrients Coalition

4

Inviting the public's help to solve perplexing problems



Challenge.gov
Government Challenges, Your Solutions



APPROACH

USER NEEDS

MARKET

EVAL/TESTING

DATA

QA/QC

COMMUNICATION



USER NEEDS

- Users, decision makers, stakeholders
- Workshops, listening sessions, website, email
 - Sensor Requirements
 - Uses/Applications
 - Purchase Options
 - Training and Service Needs



MARKET

Potential size of markets and the timing of market development

Key market drivers:

- Changes in water-related research priorities

- Federal and state water quality regulations

- Competing research and monitoring funding

- Public awareness and sense of urgency regarding national and regional

- Cost and availability of competing methods of providing in-water nutrient



EVALUATION AND TESTING

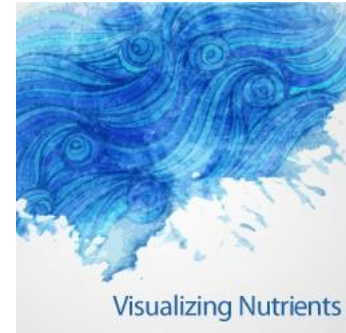




COMMUNICATION

Challenge: Utilize open government data sources to create visualizations that inform individuals and communities on nutrient pollution

Winner: <http://resourceoutofplace.com/>





VISUALIZE YOUR WATER (High School)

- Challenge: Develop compelling visualizations of nutrients in the Chesapeake Bay and Great Lakes
- Open-source data
- Geographic analysis





NUTRIENT SENSORS / MONITORING





Challenging Nutrients Coalition

12

NUTRIENT SENSOR CHALLENGE

Affordable, accurate and dependable sensors
(N and P)

Available for purchase 2017

5 teams / 8 sensors competed

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



**National
Oceanography Centre**
NATURAL ENVIRONMENT RESEARCH COUNCIL





REQUIREMENTS

Measurement Criterion	Nitrate (\pm nitrite)	Orthophosphate	Weights
Accuracy	$\pm 5\%$ or 0.01 mg/L - N (at upper range) from reference value	$\pm 5\%$ or 0.005 mg/L - P (at upper range) from reference value	20%
Precision	$\pm 5\%$ or 0.01 mg/L - N (at upper range) from reference value	$\pm 5\%$ or 0.005 mg/L - P (at upper range) from reference value	15%
Range	0.005 - 60 mg/L – N	0.005 - 2 mg/L – P	15%
Deployment Length	3 months (at 15 minute sampling interval)		25%
Cost	Less than \$5,000 purchase cost Bill of materials for sensor and package		25%



Challenging Nutrients Coalition

14



Winner

Honorable Mention



**National
Oceanography Centre**

NATURAL ENVIRONMENT RESEARCH COUNCIL



Challenging Nutrients Coalition

15

Part II: NUTRIENT SENSORS – IN ACTION (Summer 2017)

Deployment and *use* of nutrient sensors by users in a range of applications and settings

- Gulf of Mexico
- Baltimore Harbor
- Long Island Sound
- Location TBD...IN ACTION CHALLENGE





On Site Waste Water Treatment CHALLENGE

Seeking design for an N sensor for use in advanced N removal OWTS to monitor long term performance.

<https://www.challenge.gov/challenge/advanced-septic-system-nitrogen-sensor-challenge/>





Phase I - Design

Collaborators:

MA, RI, NH, CT, ME, VT, NY and NJ regulators
New England Onsite Wastewater Training Program
Massachusetts Alternative Septic System Test Center (MASSTC).

Status:

- Submissions under review
- Sensor Showcase Day in NYC in June, 2016.
- Phase II, prototypes in collaboration with The Nature Conservancy & others



<https://www.challenge.gov/challenge/advanced-septic-system-nitrogen-sensor-challenge/>



Challenging Nutrients Coalition

18



National Atmospheric
Deposition Program

Coordinate atmospheric deposition monitoring (NADP) and water quality monitoring for nitrogen

Reaching out to users, communities and organizations to hear about their needs and requirements

Questions?
shaw.denice@epa.gov

