



Lessons Learned for Water Quality Outcomes: Conservation Planning and Implementation for Healthy Watersheds

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Conservation Outcomes Webinar Series | October 24, 2024



Conservation Effects Assessment Project

USDA's Conservation Effects Assessment Project, CEAP, is a multi-agency effort which includes the USDA Agricultural Research Service (ARS), and is led by the Natural Resources Conservation Service (NRCS). CEAP builds the science base for voluntary conservation efforts nationwide. Findings are used to guide conservation program development and support conservationists, producers and other land managers, and partners in making informed management decisions backed by data and science. Assessments are carried out at the national, regional, and watershed scales for conservation efforts related to cropland, grazing land, wetlands, and wildlife.

CEAP Watershed Assessments

Through CEAP, the Natural Resources Conservation Service (NRCS) works with agricultural producers and partners including other agencies like the USDA Agricultural Research Service, universities, conservation districts, and watershed groups to quantify the effects of voluntary conservation on factors such as water quality, water availability, and soil health in select small watersheds across the nation. There are currently 25 active watershed studies. Findings from these studies strengthen the science base for voluntary conservation, improve conservation planning, refine methods and tools, and ultimately help USDA deliver more focused, strategic conservation opportunities to support productive agricultural lands and environmental benefits nationwide.

October 2024 Conservation Outcomes Webinar

What have we learned about managing for water quality outcomes and watershed health through CEAP? Dr. Deanna Osmond shared lessons learned, synthesized from 13 watershed-scale studies of conservation effects conducted under CEAP by universities in partnership with NRCS and National Institute of Food and Agriculture (NIFA).

This webinar highlighted the effects of cropland and pastureland conservation practices on water quality outcomes at the watershed scale and included key insights and lessons learned to inform conservation planning and implementation in agricultural watersheds as well as ways to further improve water quality benefits of conservation.

Dr. Osmond worked at the interface of nutrient management, water quality, and conservation practices at North Carolina State University (recently retired). She led a collaborative effort with NRCS, NIFA, and a large team of university researchers, extension professionals, and USDA Agricultural Research Service scientists to synthesize the lessons learned on watershed conservation practice effects for water quality and soil resources. She extended her findings through outreach and engagement with government agency and non-governmental organization personnel, informing water quality conservation programs today.

Conservation Outcomes Webinar Series

This series provides key findings, data, and tools to support producers and partners in pursuing voluntary conservation efforts across the nation.

Learn about upcoming webinars by [subscribing for email updates, here](#).

Select the "Conservation Outcomes" topic.



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NIFA CEAP Resources

BOOKS AND/OR ARTICLES

Osmond, D.L. 2010. USDA Water Quality Projects and the National Institute of Food and Agriculture Conservation Effects Assessment Project Watershed Studies. *J. Soil Water Conserv.* 64:142A-146A. DOI: <https://doi.org/10.2489/jswc.65.6.142A>

Special Issue on National Institute of Food and Agriculture Conservation Effects Assessment Project Watershed Studies: <https://www.jswconline.org/content/65/6>

Osmond, D., D. Meals, D. Hoag, and M. Arabi. 2012. How to Build Better Agricultural Conservation Programs to Protect Water Quality: The NIFA-CEAP Experience. *Soil and Water Conservation Society*, Ankeny, IA. <https://www.swcs.org/resources/publications/how-to-build-better-agricultural-conservation-programs-to-protect-water-quality>

Osmond, D., D. Meals, D. Hoag, M. Arabi, A. Luloff, M. McFarland, G. Jennings, A. Sharpley, J. Spooner, and D. Line. 2012. Improving Conservation Practices Programming to Protect Water Quality in Agricultural Watersheds: Lessons Learned from the National Institute of Food and Agriculture Conservation Effects Assessment Project. *J. Soil and Water Conserv.* 67:123A-128A. DOI: <https://doi.org/10.2489/jswc.67.5.122A>

Osmond, D.L., D.L.K. Hoag, A.E. Luloff, D.W. Meals, K. Neas. 2014. Farmers Use of Nutrient Management: Lessons from Watershed Case Studies. *J. Environ. Qual.* <https://doi.org/10.2134/jeq2014.02.0091>.

Woods, B.R., A.E. Luloff, D.L. Osmond, and D.L. Hoag. 2014. Towards a Synthesis: Lessons from Thirteen Cropland Watershed-scale Studies. *Society & Natural Resources* 27:341-357. <https://doi.org/10.1080/08941920.2013.861551>

Durianscik, L., K. Flahive, and D. Osmond. 2018. Application of monitoring to inform policy and achieve water quality goals. *J. Soil and Water Conserv.* 73: 11A-15A. DOI: <https://doi.org/10.2489/jswc.73.1.11A>

Duncan, E.W., D. Osmond, A. Shober, L. Starr, P. Tomlinson, J. Kovar, T. Moorman, H. Peterson, N. Filliorini, and K. Reid. 2019. Phosphorus and soil health management practices. *Agriculture and Environmental Letters* <https://access.onlinelibrary.wiley.com/doi/pdf/10.2134/ael2019.04.0014>

Osmond, D.L., A. Shober, A.N. Sharpley, E. Duncan, and D. Hoag. 2019. Increasing the Effectiveness and Adoption

of Agricultural Phosphorus Management Strategies to Minimize Water Quality Impairment. *J. Environ. Qual.* <https://doi.org/10.2134/jeq2019.03.0114>

Moriasi, D.N., L.F. Durianscik, J. Sadler, T. Tsegaye, J.L. Steiner, M.A. Locke, T.C. Strickland, and D.L. Osmond. 2020. Quantifying the Impacts of CEAP in the First Fifteen Years. *J. Soil and Water Conserv.* 75: 57A-74A. DOI: <https://doi.org/10.2489/jswc.75.3.57A>.

O'Connell, C, Osmond, D.L., 2022. Why soil testing is not enough: A mixed methods study of farmer nutrient management decision-making among U.S. producers. *Journal of Environmental Management.* <https://www.sciencedirect.com/science/article/pii/S0301479722006004?via%3Dihub>.

Kleinman, P.J.A., D.L. Osmond, L.E. Christianson, D.N. Flaten, J.A. Ippolito, H.P. Jarvie, J.P. Kaye, K.W. King, A.B. Leytem, J.M. McGrath, N.O. Nelson, A.L. Shober, D.R. Smith, K.W. Staver, A.N. Sharpley. 2022. Addressing conservation practice limitations and tradeoffs for reducing phosphorus loss from agricultural fields. *Agriculture and Environmental Letters.* <https://doi.org/10.1002/ael2.20084>.

FACT SHEETS

Osmond, D. D. Meals, D. Hoag, M. Arabi, A. Luloff, G. Jennings, M. McFarland, A. J. Spooner, Sharpley, and D. Line. 2012. CEAP-NIFA Watershed Studies: A Synthesis. <https://www.nrcs.usda.gov/publications/ceap-watershed-2012-nifa-SynthesisStudySummary.pdf>

Osmond, D., D. Meals, D. Hoag, M. Arabi, A. Luloff, G. Jennings, M. McFarland, A. J. Spooner, Sharpley, and D. Line. 2012. Locally Led Efforts to Protect Water Quality in Agricultural Watersheds. (A national slide set developed from the NIFA CEAP for farmer-led watershed organizations.) <https://nrcs.usda.gov/publications/ceap-watershed-2012-CitizenWatershedPlanning.ppt>

Meals, D. W., D. L. Osmond, D. L.K. Hoag, M. Arabi, A.E. Luloff, G.D. Jennings, M.L. McFarland, J. Spooner, A.N. Sharpley, and D.E. Line. 2012. Lessons Learned from the NIFA CEAP: Insights for Developing Successful Agricultural Watershed Projects. NC State University, Raleigh, NC. <https://content.ces.ncsu.edu/insights-for-developing-successful-agricultural-watershed-products>

Osmond, D. L., D. W. Meals, A. N. Sharpley, M. L. McFarland, and D. E. Line. 2012. Lessons Learned from the NIFA-CEAP: Conservation Practice Implementation and Adoption to Protect Water Quality. NC State University, Raleigh, NC. <https://content.ces.ncsu.edu/conservation-practice-implementation-and-adoption-to-protect-water-quality>

Meals, D. W., D.L. Osmond, and A. N. Sharpley. 2012. Lessons Learned from the NIFA-CEAP: Identification of Critical Source Areas. NC State University, Raleigh, NC. <https://content.ces.ncsu.edu/identifying-critical-source-areas>

Hoag, D., A. E. Luloff, and D. L. Osmond. 2012. Lessons Learned from the NIFA-CEAP: How Farmers and Ranchers Make Decisions on Conservation Practices. NC State University, Raleigh, NC. <https://content.ces.ncsu.edu/how-farmers-and-ranchers-make-decisions-on-conservation-practices>

Jennings, G. D., D. Hoag, M. McFarland, and D. L. Osmond. 2012. Lessons Learned from the NIFA-CEAP: Effective Education to Promote Conservation Practice Adoption. NC State University, Raleigh, NC. <https://content.ces.ncsu.edu/effective-education-to-promote-conservation-practice-adoption>

Meals, D. W., D. L. Osmond, J. Spooner, and D.E. Line. 2012. Lessons Learned from the NIFACEAP: Water Quality Monitoring for the Assessment of Watershed Projects. NC State University, Raleigh, NC. <https://content.ces.ncsu.edu/water-quality-monitoring-for-the-assessment-of-watershed-projects>

Arabi, M., D. W. Meals, and D. Hoag. 2012. Lessons Learned from the NIFA-CEAP: Simulation Modeling for the Watershed-scale Assessment of Conservation Practices. NC State University, Raleigh, NC. <https://content.ces.ncsu.edu/simulation-modeling-for-the-watershed-scale-assessment-of-conservation-practices>

WEBSITES

CEAP Watershed Assessment Studies: <https://www.nrcs.usda.gov/ceap/watersheds>

WEBINARS

USDA's NIFA-CEAP Watershed Synthesis: Lessons Learned, May 15, 2012

Ten Years of Watershed Assessment in Conservation Effects Assessment (CEAP): Insights and Lessons Learned, February 5, 2015

May 28, 2020 – Measuring and Understanding the Effects of Conservation within Watersheds: [Webinar Recording](#)

