

Comments on the Arkansas Nutrient Reduction Strategy

Provided by the University of Arkansas Division of Agriculture

Approach

[The University of Arkansas Division of Agriculture](#) (UADA) commends the multi-agency committee led by the Arkansas Department of Agriculture – Natural Resources for preparing the draft update of the Arkansas Nutrient Reduction Strategy in partial fulfillment of participation as a member of the Gulf of Mexico Hypoxia Task Force as described in the [Gulf Hypoxia Action Plan of 2008](#). To prepare these comments, a UADA committee consisting of researchers and Extension Specialists was assembled by Dr. J.F. Muellenet, Associate Vice President and Director of the Agricultural Experiment Station and Dr. Deacue Fields, Dean of the Dale Bumpers College of Agricultural and Life Sciences. The committee consisted of Dr. Mike Daniels (Chair), Dr. Brian Haggard, Dr. Trent Roberts, Dr. Bill Robertson, Dr. Kris Brye (couldn't attend due to teaching conflict), Dr. Mary Savin, Matt Fryer, John Pennington and Lawrence Berry. The Committee met with Drs. Muellenet and Dr. Fields on March 8, 2022, via Zoom, to build consensus in developing the Division's comments, which follow below.

Comments

UADA Participation and Program Recognition in the Update Process

The Division was pleased to make contributions to the draft update of the Strategy as Dr. Brian Haggard provided the lead on scientific analysis (Appendix A) to prioritize watersheds based on available historical, in-stream water quality data collected by the Arkansas Department of Environmental Quality, the United States Geological Service and the Arkansas Department of Agriculture – Natural Resources. Dr. Haggard is nationally known for his research in characterizing nutrients in streams and relating land use to ambient water quality in streams. Dr. Mike Daniels served as an Ex-officio scientific advisor to the committee. Dr. Daniels is nationally recognized for his on-farm work with agricultural producers to address water quality, soil health, nutrient management and water use especially through the Arkansas Discovery Farm program. We were also pleased that several of the Division's research, extension and service programs were recognized as key elements of the plan including:

1. Nutrient Management
 - a. Soil Testing led by Dr. Nathan Slaton and Dr. Trent Roberts
 - b. Development and Implementation of Arkansas P-Index for Pastures led by Dr. Andrew Sharpley with team members Dr. Mike Daniels, Dr. Brian Haggard, and Dr. Karl VanDevender
 - c. Development and Delivery of the State's Certification training for nutrient management planners and applicators in Nutrient Surplus areas (Northwest and Western Arkansas) led by

Dr. Daniels with team members Dr. Sharpley, Dr. Slaton (reviewed training materials) and VanDevender

- d. Migration of Nutrient Management Certification Training to On-line training led by Dr. VanDevender with team member Dr. Daniels

3. Water Quality

- a. Arkansas Discovery Farm Program led by Dr. Daniels and Dr. Sharpley (Emeritus) with team members Dr. VanDevender, Dr. Roberts, Dr. Bill Robertson, Dr. McWhirt, Mr. Matt Fryer, Dr. Kishan Mahmud, Dr. Savin, and Dr. Brye
- b. Participation in SERA-46 Committee to Coordinate with the Hypoxia Task Force - Daniels (Past Chair of SERA 46)
- c. In-Stream Water Quality Monitoring – Dr. Haggard
- d. Committee to Determine Nutrient Reduction Effectiveness of common conservation practices in Arkansas led by FTN and Associates with participation from Dr. Daniels, Dr. VanDevender and Dr. Robertson
- e. Arkansas Watershed Steward Program – Mr. John Pennington
- f. Arkansas Water Resources Center and Water Quality Lab – Dr. Brian Haggard

4. Soil Health

- a. Team members Dr. Roberts, Dr. Daniels, Dr. Brye, Dr. Mahmud, Dr. Robertson, Dr. Savin, Dr. Alejandro Rojas, Matt Fryer, Dr. Sharpley and Dr. Amanda McWhirt.

Additionally, the UADA has hired a new faculty member for Water Science, Dr. Shannon Spier, in the Crops, Soils and Environmental Sciences Department to conduct nutrient-related water quality research with emphasis on reducing nutrient losses from agricultural landscapes and to teach both undergraduate and graduate-level classes in Water Science. The Division will also be hiring a new faculty member in Applied Soil Fertility and Nutrient Management to conduct research and teaching.

The Strategy's Approach and Philosophy

The UADA, being a leading source of research-based, unbiased information related to the fate and transport of nutrients from both point and nonpoint sources is uniquely qualified to comment of the scientific approach outlined in Appendix A that was utilized as the foundation of watershed prioritization. We feel this approach was most appropriate but also recognize two major limitations: 1) Nonuniform availability in time or space of ambient water quality monitoring data across all 58 eight digit watersheds (HUC) and 2) prioritization based only on watersheds where current data already

indicates a trend of nutrient increase without recognition that major land use shifts could prompt increased nutrient loading in the future such as not promoting prevention but remediation only.

Limitation number 1 was clearly stated in the draft strategy under Challenges to a Statewide Prioritization Framework on page 23. We agree that the classification of watersheds into tiers helps to address this limitation and that ambient water quality monitoring needs to be more comprehensive with respect to temporal and spatial coverage.

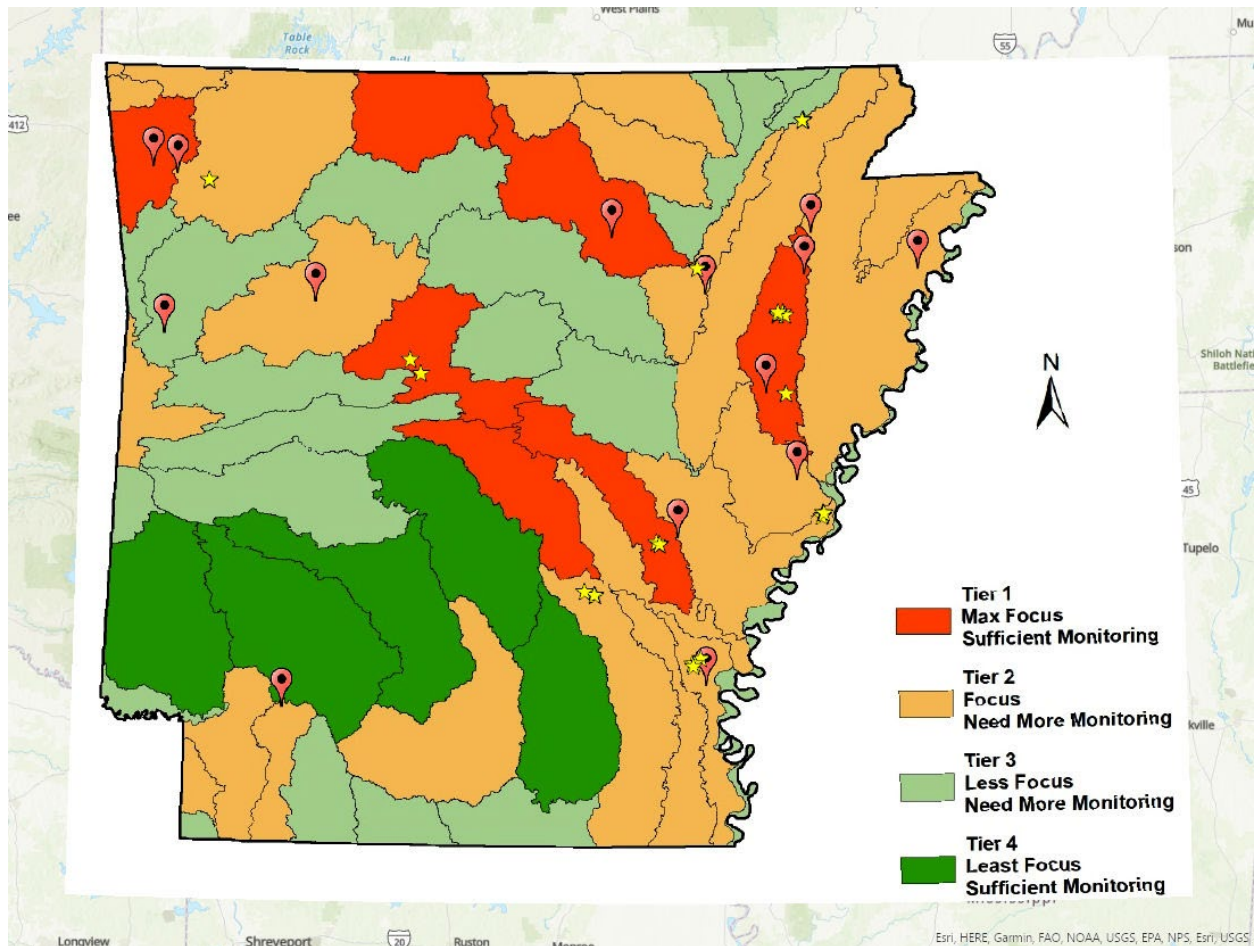
Limitation 2 is marginally addressed in the tier classification approach but could be better accounted for with a Land Use and land cover analysis over time. For example, new poultry companies have recently located in Northeastern Arkansas with the addition of over 700 new poultry operations within the last decade. Some litter is being utilized to fertilize adjacent grazing lands however, it is thought that most of the generated litter is being utilized as a compliment to commercial fertilizer nearby row crop operations in watersheds within Independence, Lawrence, Jackson, Green, Woodruff, Craighead and Poinsett Counties. With increased litter applications in these watersheds, there is great potential for increased nutrient loss if mismanaged, however, the transport of nutrients to receiving streams may not happen immediately but may increase over the next several years as biological and hydrological times scales may govern the rate of increase in streams.

We commend the draft Strategy in the comprehensive list of government and non-government organizations that play a role in nutrient reduction across the State, and while individual members of the [Arkansas Conservation Partnership](#) (ACP) are listed and recognized as important contributors to nutrient reduction, a description of the synergistic capabilities and role of the ACP is lacking. The ACP provides a unique and comprehensive set of services to landowners to voluntarily implement soil and water conservation practices that can be tailored to individual farms to reduce nutrient loss. This includes providing financial, technical and educational assistance in the form of unbiased, research-based recommendations from Federal and state organizations and the State's Land Grant University, the University of Arkansas Division of Agriculture. The ACP has a rich tradition of delivering joint programming to help landowners address soil and water concerns including development of the Arkansas P-Index for Pastures, certified nutrient management and application training under State Title 22, Discovery Farms, and the Mississippi Healthy Basin Initiative, joint field days, workshops and meetings.

We commend the strategy for promoting voluntary adoption of practices that reduce nutrient losses. We understand that pre-existing state and federal regulations must continue but future approaches to non-point source pollution emphasize the need for additional landowner education and financial assistance programs to catalyze voluntary efforts and limit new regulatory approaches that limit landowner management.

While the draft Strategy strongly recognizes the need for future extension education of and outreach to agricultural and forest landowners in implementing the strategy, it doesn't as effectively recognize the need for additional research nor formal classroom instruction needed to produce the future workforce to address nutrient and water quality concerns especially associated with agricultural production. UADA research and extension scientists conduct both basic and applied research in the fate and transport of agriculturally derived nutrients including field evaluation and development of new soil and water conservation practices with issues such as characterizing and improving soil health, nutrient

management, increased nutrient use efficiency through improved manure management and fertilizer recommendations in terms of the 4 R's and increased water efficiency to reduce runoff and transport mechanisms as well as defining the governing scientific relationships between agricultural practices and water quality.



The UADA is strongly positioned to conduct research across the State as it has [Research and Extension centers](#) located across the State where red pins show the location of stations and yellow stars indicate Discovery Farms.

Of the 14 Agricultural Experiment Stations across the state, 6 of them are in Tier 1, 7 of them are in Tier 2. Traditionally, these stations have been utilized primarily for research to increase agricultural productivity and profitability that has resulted in much of the unbiased, research-based recommendations for crop and livestock production. However, these stations have historically been an underutilized resource in terms of conducting water quality and nutrient reduction research due to

insufficient funding in these critical research topics. We feel that these stations could potentially provide important sites for nutrient reduction research that is needed.

Additional comments have been provided directly in a Word Document version of the Draft Strategy.

Recommendations

- We recommend that a Change in Land Use and Land Cover study be conducted especially for the addition of over 700 poultry operations in Northeast Arkansas to address scientific Limitation 2 listed above. The study should provide measurements or estimates of the tonnage of poultry litter generated and spatial tracking of where litter is being applied as fertilizer to further prioritize watersheds based on prevention rather than remediation. The study should also identify and prioritize voluntary prevention measures including training and research needs such as determining the appropriate application rate and method of poultry litter use on row crops.
- We recommend that the Strategy provide better promotion of the Arkansas Conservation Partnership as a key entity for providing comprehensive assistance to private landowners to include a list of current activities as well as future endeavors to achieve nutrient reduction strategies and how the Partnership provides synergistic efforts on behalf of landowners in implementing soil and water conservation. We also recommend that the Strategy points out the local resources provided by the Partnership via County Extension offices, local conservation district offices and USDA Service Centers. We recommend that the strategy invoke the ACP to develop a comprehensive of training needs and funding strategies that they can uniquely deliver such training such as field days, workshops, etc. Possible activities include developing voluntary nutrient reduction strategy farm plans that can be tailored to individual fields and farms a la nutrient management planning but focused on specific reduction practices and an electronic Nutrient Reduction newsletter.
- We recommend that the Strategy be founded primarily on voluntary efforts, existing regulations non withstanding, and not new regulations as we feel voluntary approaches is a superior approach to addressing non-point source pollution.
- We recommend the Strategy place stronger emphasis on research to reduce nutrient losses from agricultural research and on future workforce development via formal higher education. At a minimum, we feel the plan should provide a comprehensive list of anticipated research needs and undergraduate and graduate classroom training. We feel that the Strategy should identify and promote a research subcommittee including selected agricultural producers to develop this portion of the plan. Additionally, we recommend that this committee develop a funding strategy to better utilize the UADA Research and Extension Centers especially in Tier 1 for research to support and complement our on-farm programs such as Discovery Farms and Research Verification trials where more specific and controlled experiments can be conducted to determine scientific relationships that govern the fate and off-site transport of nutrients especially related to:

- a. soil health with specific emphasis of improving soil physical properties to increase infiltration and reduce runoff and improving the quantity and diversity of soil microbiology to increase nutrient cycling and availability to improve nutrient use efficiency;
- b. evaluation and development of soil and water conservation practices improved nutrient use efficiency, climate change resiliency, and climate smart practices;
- c. improved nutrient management utilizing precision agriculture technology and drones;
- d. field data to develop more robust field scale models that can feed into watershed-based models such as the Soil and Water Assessment Tool (SWAT) to provide results at the appropriate management scale; and
- e. soil hydrological studies to better understand transport mechanisms.