DAFVM Vision 2030 Final Task Force Report Template
Task Force: Conservation and Resiliency

Title: Enhancing The Sustainability and Resiliency of Mississippi's Agriculture, Forestry, and Natural Resources

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1. Executive Summary

The Conservation and Resiliency Task Force was formed to identify key priorities for the Mississippi State University Division of Agriculture, Forestry, and Veterinary Medicine (DAVFM) that support sustainable agricultural, forestry, and natural resources while enhancing conservation and resiliency. This report encompasses priorities that are fundamental to growing, protecting, and sustaining agriculture and forestry industries that drive our economy, aligning with the DAFVM Vision 2030 goals. Our approach to defining key priorities and actions aims to push forward innovative solutions that remain unbiased, grounded in practical needs of Mississippian's, and current environmental challenges. Specific objectives included:

- Identify the major conservation and resilience priorities across Mississippi's diverse land and water resources.
- Assess the implications of varied environmental risks to agriculture and forestry production, fish, and wildlife resources, as well as other sectors.
- Explore strategies for university-public-private engagement to advance conservation and resilience across the state.

Recommend research, education, and outreach strategies to advance conservation, natural resource sustainability, and build statewide capacity to address these goals. This report summarizes key opportunities and actionable prioritization of strategies to advance sustainable agriculture and forestry, while stewarding land and water resources to ensure these industries and communities are resilient to threats from increased development, environmental change, natural disasters, and invasive species. Major recommendations include prioritizing MSU efforts to focus on conservation and resiliency with the goals of advancing research, education, and outreach that supports diversified production systems and expansion of enhanced efficiency of soil, water, and nutrient use on-farm, with exploration into value-added crops and ecosystem service markets. Priority areas in forest health and stewardship include informing longleaf pine restoration and management, supporting markets for small diameter wood, expanding research on environmental solutions, and enhancing urban forestry through education, partnerships, and policy integration. We also emphasis the critical need to expand a one health approach for prevention of disease transmission between domestic and wildlife populations, the continued research and management of invasive species, mitigation of wildlife damage, and restoration of critical wildlife habitats that provide resilience, protection, recreation, and tourism for Mississippi communities and economies.

2. Challenges and Barriers

There are various challenges and barriers that will require innovation and collaboration across priority areas. An overarching challenge is often conflicting priorities of existing programs within DAFVM. Examples include the promotion of non-native and more resource-intensive (water, fertilizer, herbicides, pesticides, etc.) products that often decrease resiliency, sustainability and provide little to no conservation value while only providing subjective aesthetic benefits. An elevated focus on resiliency, sustainability, and conservation across all programmatic areas within DAFVM would lead to Mississippi potentially becoming global leaders in emerging markets and increase overall resiliency. In addition to conflicting priorities and a changing funding landscape around public lands and conservation initiatives, other challenges include reaching absentee landowners, instability of row-crop

markets and low-profitability margins, inconsistent support or policy for ecosystem service markets, and lack of infrastructure for scaling production and transport of certain agriculture and forestry crops. Additional challenges include continued changing weather patterns and natural disasters, uncertain in agriculture and forestry markets, conflicting priorities and focal areas of agriculture and forest professionals, coordination across multiple organizations and agencies.

3. Key Goals

Our findings suggest immediate opportunities to reprioritize or enhance strategies around four key goals:

1) Ensure sustainable and resilient agriculture production
2) Advance forest stewardship and build diverse markets for forest products
3) Ensure safe and secure water resources for Mississippi communities, environments, and economies
4) Advance natural resource conservation and restoration towards a resilient Mississippi

How these goals were addressed across each focus area are described in individual sections below. However, an overarching theme across all recommendations is to prioritize efforts within DAFVM and MSU, as a whole to focus on conservation and resiliency. Encouraging all DAFVM programs to adopt a conservation, resiliency, and sustainability forward approach could elevate MSU and the State of Mississippi to become worldwide leaders in topics of ever-increasing importance.

4. Recommended Bold Moves:

Here we outline bold ideas that stand to move the goals outlined in this report forward or remove barriers to their implementation.

- Stand up an Agriculture, Forestry and Natural Resource Enterprise Incubator to foster entrepreneurship focused on Mississippi grown products, scaling of products, research partnership for economic feasibility, market access, agriculture diversification and partnerships with private industry.
- Create a dedicated multidisciplinary research institute that brings together experts in water, agriculture, forestry, ecology, economics, and climate science within MSU. Connect existing faculty from multiple departments to bring interdisciplinary teams together. This institute will focus on integrated research addressing the intersections of these fields. (Multidisciplinary Research Center: Center for Integrated Conservation and Water Management, Natural Resources Conservation and Resiliency Institute... etc.)
    - Utilize existing faculty by fostering a multidisciplinary approach that encourages collaboration across colleges and departments,

developing solutions to complex environmental challenges that cannot be addressed within the confines of traditional silos.
    - Prioritize funding for innovative projects that enhance sustainability and resiliency, particularly using advanced technology (e.g., AI, machine learning, remote sensing, and big data).
    - Actively seek grants and partnerships with federal and state agencies, private foundations, and corporations to fund initiatives that promote conservation and resiliency.
    - Incorporate educational programs within the institute that train students and professionals in interdisciplinary collaboration, preparing the next generation of leaders equipped to tackle complex challenges.
- Develop an interdisciplinary graduate program that focuses on water and natural resources. Water is an aspect of many disciplines, and it uniquely connects existing faculty to tackle the world's biggest problems. Utilizing faculty from multiple departments and colleges, students can be trained across disciplines and be better equipped to tackle current and emerging concerns
    a. Faculty from various departments—environmental science, engineering, forestry, plant and soil science, wildlife, public policy, and sociology—can provide diverse perspectives, enhancing problem-solving through innovative, interdisciplinary approaches.
    b. Equip graduates with interdisciplinary skills that are increasingly sought after by employers navigating technology, policy, and environmental intersections.
    c. Position the university as a leader in developing new research initiatives that promote sustainability and conservation.

We welcome external support and collaboration with all stakeholders, including various partner organizations and agencies identified in later sections of this report. Stakeholders are invited to partner in advancing opportunities and strategies below through serving on advisory committees, collaboration on pilot projects and demonstrations, advocating for science, technology, and policies, utilizing their networks to connect key partnerships, supporting experiential learning through internships and novel public-private enterprises.

5. Opportunities and Strategies

Goal 1: Ensure Sustainable and Resilient Agriculture Production

Opportunity 1: Enhance soil and water management, irrigation efficiency and drought resilience.

Short-Term Action Strategies (1-3 years)

- Offer training and resources on irrigation efficiency techniques, rainwater harvesting, and surface water re-use, with a focus on integrating these practices into local farming systems.
- Implement educational activities to encourage farmers to adopt practices which improve efficiency, conserve resources, and reduce risk.
- Promote research and adoption of improved systems or technology, including precision agriculture, remote sensing, and data analytics to optimize resource use (water, fertilizers, herbicides, etc.) and enhance crop health.
- Expanding training and certifications for agriculture and natural resource professionals.

Long-term Action Strategies (4+ years)

- Invest in multidisciplinary research focused on utilizing environmentally resilient crop varieties, soil health management techniques, integrated pest management practices, and adaptive farming technologies.
- Collaborate with producers, stakeholder organizations and government agencies which shape national and regional agricultural policies that prioritize

sustainability and resilience. Offer expertise to policymakers about our leading issues such as regional climatic risks and natural disasters, including over abundant spring rainfall and conversely drought during the late summer, and conservation incentive programs.

Opportunity 2: Enhance agriculture profitability, viability, and market expansion.

Short-Term Action Strategies (1-3 years)

- Serve as the premier resource of training, information, and technology for producers, consultants, and industry on sustainable farming practices, mitigating risk, reducing production limitations, and increasing efficiency for agriculture, forest, and aquaculture production in Mississippi.
- Partner with government agencies, financial institutions, and NGOs to create and promote funding opportunities (grants, loans, subsidies) for farmers adopting sustainable practices, and providing financial literacy workshops.
- Strengthen and promote interdisciplinary educational programs that build capacity for sustainable agriculture workforce development.

Long-Term Action Strategies (4+ years)

- Conduct research on land tenure issues, including the effects of land ownership and access on sustainable land management.
- Invest in agricultural research and educational assistance which will provide farmers, industry stakeholders, and government agencies knowledge and tools to strengthen local and regional agricultural systems. Research and develop management strategies and practices that address production risks, promote sustainability, and improve profitability.
- Explore participation opportunities in ecosystem service markets and inform producer opportunities to participate in such markets, including tradeoffs in time and expenses in participation as compared to market incentive opportunities.

Opportunity 3: Promote sustainable domestic animal production.

Short-Term Action Strategies (1-3 years)

- *Develop collaborative relationships and mechanisms for rapid communication to proactively identify, prevent, track, and respond to emerging diseases that have the potential to impact domestic animal production.*
- *Expand education and research on rotational grazing strategies, multi-species, grazing and extended forage management to enhance productivity and sustainability in Mississippi's livestock sector.*
- *Expand research on forage varieties and livestock genetics to address disease, weather extremes, and herd adaptability and resilience in relation to environmental threats and reproductive health.*

Long-Term Action Strategies (4+ years)

- *Expand a One Health approach to domestic animal production by providing education and outreach regarding environmental and transmission risk management.*

Opportunity 4: *Advance decision support tools and education to support sustainable management* goals.

Short-Term Action Strategies (1-3 years)

- Collaborate with local government agencies, meteorological departments, and tech companies to develop and disseminate early warning systems for extreme weather events, pest outbreaks, and droughts, leveraging university research and technology.
- *Expand interdisciplinary programs bridging DAFVM and Supply Chain Logistics to provide research, education, and policy recommendations that support all scales of production, from backyard and homestead animal production to domestic and international commodity markets.*

Long-term Action Strategies (4+ years)

- Develop and implement programs that help farmers utilize and interpret innovative technology, including precision agriculture, remote sensing, and data analytics. Create partnerships with tech companies to provide accessible platforms for farmers to manage their farms sustainably.
- *Expand research and education documenting critical human health needs and supply chain considerations and adaptations to protect and expand infrastructure for local, regional, and domestic supply chains.*

Goal 2: Advance Forest Stewardship and Build Diverse Markets for Forest Products

Opportunity 1: *Inform forest management, restoration, and enhancement of ecosystem services.*

Short-Term Action Strategies (1-3 years)

- Serve as regional leader in forest restoration and forest management demonstration projects on MSU Bulldog Forest land, with a particular focus on longleaf pine.
- Advance understanding of sustainable management practices (e.g., prescribed fire, thinning, invasive species control, and grazing) through research to build resilient forests.
- Host workshops and field days for landowners, foresters, and policymakers on sustainable forest management to meet challenges of today and the future.
- Create a cohesive narrative highlighting the role of sustainable and resilient land management for MSU Bulldog Forest fundraising and recruiting.

Long-term Action Strategies (4+ years)

- Advocate for ecosystem services payment markets (carbon sequestration, water provisioning, wildlife habitat) and forest certification to incentivize forest management and restoration.
- Develop online courses, certification programs, and extension publications to train future forest managers.
- Strengthen collaborations with forest industry partners to enhance workforce development.

Opportunity 2: Advance mill sustainability and markets for small diameter wood to promote healthy forest management.

Short-Term Action Strategies (1-3 years)

- Support research programs that conduct market analyses to identify emerging opportunities, cost-effective harvesting techniques, and optimize transportation and supply chain logistics for mill sustainability.
- Identify ways to create a circular bioeconomy by reducing waste and improving residue utilization (e.g., engineered wood products, biochar).
- Expand industry partnerships to pilot new processing technologies.

Long-term Action Strategies (4+ years)

- Encourage regional wood hubs to improve market access.

Opportunity 3: Expand research to support implementation of conservation solutions and renewable bioenergy production.

Short-Term Action Strategies (1-3 years)

- Initiate afforestation, reforestation, and soil carbon sequestration trials on university and partner lands.
- Strategically invest in lab and field research infrastructure to measure carbon flux, biomass potential, and ecosystem resilience.
- Create extension resources and digital tools to help landowners assess the viability of nature-based solutions and bioenergy projects.

- Host workshops, field days, and training sessions on sustainable forestry, regenerative agriculture, and bioenergy.
- Engage stakeholders through publications, webinars, and advisory services.

Long-term Action Strategies (4+ years)

- Establish regional and national research consortia to drive innovation in conservation solutions and carbon-neutral/negative feedstock production.

Opportunity 4: Expand urban forestry education and management.

Short-Term Action Strategies (1-3 years)

- Develop urban tree research plots in Mississippi cities to study species selection, canopy cover benefits, and ecosystem services.
- Collaborate with municipal governments to plant trees in vulnerable areas and demonstrate best management practices for urban tree health.
- Collaborate with K-12 schools and community organizations to increase awareness of the benefits of urban forests.
- Collaborate with municipalities, nonprofits, and state agencies to secure funding and implement urban forestry projects.

Long-term Action Strategies (4+ years)

- Work with state policymakers to integrate urban tree conservation into municipal planning and development policies.

Goal 3: Ensure safe and secure water resources for Mississippi communities, environments, and economies

Opportunity 1: Enhance sustainability of the Mississippi River Alluvial Aquifer

Short-Term Action Strategies (1-3 Years)

- Advance groundwater and well monitoring programs to enhance research efficacy and support stakeholder-led mitigation efforts.

Long-Term Action Strategies (4+ years)

- Coordinate an integrated research and education effort at the National Center for Alluvial Aquifer Research to enhance communication and demonstration of water conservation strategies.
- Expand research on groundwater recharge and opportunities to expand surface water sources for irrigation to alleviate aquifer drawdown.
- Advance surface and groundwater surveillance to identify, prevent and respond to any water quality related threats to agronomic production.
- Develop forecasting and decision support tools that track water management savings for producers.

Opportunity 2: Advance trash and stormwater management in urban communities.

Short-Term Action Strategies (1-3 Years)

- Inventory and support litter removal/prevention programs.
- Develop spatial and temporal assessments and databases of litter, types, and sources.
- Assess the economic and environmental impact of litter.
- Develop litter prevention and removal strategies.

Long-Term Action Strategies (4+ years)

- Implement litter prevention and removal strategies.
- Expand community engagement in litter education and removal efforts statewide ranging from elementary education to adults.

Opportunity 3: Inform and expand watershed planning to address water quality and runoff across the state.

Short-Term Action Strategies (1-3 Years)

- Expand research and education programs that emphasize watershed conservation planning as an essential component of community planning.
- Coordinate interdisciplinary research and education to advance watershed monitoring, modeling, and planning efforts, specifically around land use change to predict and mitigate flooding in rural and urban areas.
- Support the development of watershed management plans in collaboration with MDEQ, county governments, and other partners.
- Expand education and resources for non-point source pollution mitigation, with emphasis on reducing sediment and nutrient transport.
- Explore water quality credit markets and opportunities for trading.

Long-Term Action Strategies (4+ Years)

- Acquire funding for and implement priority projects identified in watershed management planning efforts.
- Collaborate with state and federal agencies to coordinate and enhance stream monitoring and surveillance of watershed health and restoration impacts.
- Expand research on emerging contaminants to identify, track, and mitigate risks to production, recreation, or human health.
- Advance research and restoration of riparian borders and wetlands in areas with high flood risk.

Opportunity 4: Expand education and training in integrated water resources management.

Short-Term Action Strategies (1-3 Years)

- Survey and compile water resource expertise and coursework at Mississippi State University.
- Develop and interdisciplinary program on integrated water resource management.
- Coordinate experiential and applied water resource management learning opportunities for students and professionals.
- Expand education and resources for municipal managers to adopt automated water system management tools and address infrastructure failures.

Long-Term Action Strategies (4+ Years)

- Develop a continuing education and Extension program around integrated water resource management to advance training of water resource professionals in Mississippi.
- Expand Community Resource Development efforts to include Sustainable and Resilient Planning Resources that includes resources, digital planning tools, outreach programs, and education to continually safeguard Mississippians.

Goal 4: Advance natural resource conservation and restoration towards a resilient Mississippi

Opportunity 1: Expand research and inform the implementation of nature-based solutions that enhance the resilience of Mississippi communities.

Short-Term Action Strategies (1-3 Years)

- Collaborate with local communities to identify and prioritize locations for nature-based solutions.
- Identify effective design considerations for nature-based solutions through applied research.
- Develop technical assistance and training programs focused on nature-based solutions workforce development.
- Develop a conservation planning toolbox of publicly available digital tools.

Long-Term Action Strategies (4+ years)

- Work with and help communities acquire funding to implement nature-based solutions.

Opportunity 2: Provide research and conservation delivery support for state-priority game- and non-game fish and wildlife and their habitats to ensure sustainable populations.

Short-Term Action Strategies (1-3 Years)

- Inform management and control of invasive species (Chinese tallow, Cogan grass, wild pigs) that threaten ecosystems and agriculture production.

- Advance knowledge and management strategies to monitor and mitigate animal damage (i.e., deer, pigs, cormorants) to agriculture, aquaculture, and forest products.
- Research and develop technical recommendations related to management recommendations on private working lands that would document species conservation while maintaining profitable production systems.

Long-Term Action Strategies (4+ years)

- Leverage regional conservation planning to education and inform state level management priorities and to education the next generation of wildlife and natural resource managers and scientists.

Opportunity 3: Expand research and development of ecosystem specific restoration and natural resource management, and native plant production.

Short-Term Action Strategies (1-3 Years)

- Collaborate with state natural resource agencies to identify priority imperiled ecosystems and threats, along with training and restoration needs.
- Expand conservation planning and decision support tools for landowners.
- Incorporate more private landowners into conservation and restoration efforts through promotion of best management practices and reduction of barriers.
- Inventory and support native plant/landscaping informational programs.
- Prioritize and encourage use of native plants in landscaping and provide technical assistance and training to growers interested in growing native plants.
- Conduct applied research on production measures and strategies to maximize yield and environmental benefit from native plant production.

Long-Term Action Strategies (4+ years)

- Implement more robust and prevalent public and private partnership programs for habitat conservation and restoration.
- Facilitate Mississippi becoming a global leader in native plant production and use.
- Address large supply shortages of native plants in Mississippi.

Opportunity 4: Expand conservation education, outreach, and training.

Short-Term Action Strategies (1-3 Years)

- Promote research-based conservation principles and practices to landowners and land managers.
- Expand public and landowner education on fire ecology and its utility in mitigating wildfires.

Long-Term Action Strategies (4+ years)

- Facilitate Mississippi becoming a national leader in conservation science and strategy.
- Explore opportunities to develop an online M.S. program in Coastal Conservation and Restoration.

Workforce Development and Education

Workforce training, education, and skill development are critical to achieving the goals laid out in this report. Pathways for training youth, undergraduate, and graduate students are detailed in the above opportunities and are specified below:

- Create educational programs to train a skilled workforce in sustainable land management and water conservation practices. Partner with the MSU Extension Service to train farmers, natural resource professionals, and undergraduates.
- Promote local, sustainable workforces with a focus on youth education and technical skills, including partnerships with community colleges for 2-year programs and Extension certifications.
- Incorporate outreach that alters perceptions of resource waste (e.g., crop residue as a valuable resource instead of waste) and emphasize sustainable practices that improve soil and water health.

6. Collaboration and Partnerships

DAVFM has long-standing relationships with key stakeholders that could champion the goals included in this report. These include, but are not limited to, Delta Council and Delta F.A.R.M. Mississippi Farm Bureau, commodity boards, USDA Natural Resources Conservation Service, Mississippi Soil and Water Conservation Commission, the Mississippi Department of Agriculture, Mississippi Department of Environment Quality, Mississippi Forestry Commission, Mississippi Department of Wildlife, Fisheries, and Parks, Mississippi Department of Marine Resources, Mississippi-Alabama Sea Grant Consortium, Mississippi Sound Estuary Program, The Nature Conservancy Mississippi, National Council for Air and Stream Improvement, U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Army Corps of Engineers, National Oceanic and Atmospheric Administration, Weyerhaeuser, and International Paper.

In addition, we recommend:

- Strengthening relationships and communication with key partners to advance initiatives, develop resources, and implement action strategies that are responsive to the needs of Mississippians.
- Forging new partnerships with industries to tailor training and messaging to the needs of sustainable practices, including internships, job opportunities, and skills bridging.
- Expanding public-private partnerships as it relates to research and development of agriculture and forestry commodities and market development.

- Advance workforce development in agriculture and natural resource management through Extension programs that integrate volunteerism.
- Expand opportunities and programs to engage Mississippians in outdoor recreation.

7. Policy Recommendations

Recommendations for state and institutional policies to support task force key goals and opportunities include support for production and sale of Mississippi grown products, especially those native to the state and region. Policies that remove barriers to sell locally grown products, encouraging consumers to support the state Agriculture and Conservation economy. We also recommend policies that support the advancement of market opportunities for row crop growers to access value added markets, promotion and protection of public land access, outdoor recreation, and tourism development of green spaces in urban areas to enhance health and economic resilience across Mississippi's communities.