

# Mississippi (Alcorn State University, Mississippi State University Combined)

## Plan of Work for 2023-2027

Status: Final (Approved 9/15/2022)

### Executive Summary Overview

Mississippi is a diverse state, with a variety of agricultural systems, a large population (44% of racial/ethnic minorities, and families and communities with unique needs. In 2020, Mississippi's population was 2,961,279 (0.9% of the total U.S. population), with 50.6% considered rural. Mississippi's median household income (in 2020 dollars) was \$46,511, with 19.6% of persons in poverty (compared to 12.8% of all people in the U.S.). In 2020, 15.3% of the population was food insecure.

Geographically, Mississippi has 10.4 million acres of farmland, 19.2 million forest acres, 14,000 miles of streams and 640,000 acres of ponds and lakes. Mississippi has one city with a population that exceeds 145,000 (Jackson, the state capital); the two next largest cities have populations exceeding 50,000, while all remaining cities have a smaller population. Only 76% of Mississippi residents have a broadband internet subscription, which is the lowest rate in the U.S.

This plan of work identifies critical issues in the state of Mississippi and describes the situation surrounding each issue. The work of Mississippi State University Extension Service (MSU Extension), the Mississippi Agricultural and Forestry Experiment Station (MAFES), and the Alcorn State University (ASU) School of Agriculture and Applied Sciences focuses on the following critical issues:

- 1) Enhancing the viability and sustainability of Mississippi's diverse agriculture to ensure food security, safety, and quality;
- 2) Sustaining Mississippi's natural resources and environment and promoting sustainable energy;
- 3) Growing vibrant, successful, and sustainable Mississippi communities and businesses
- 4) Improving the lives of youth through positive 4-H youth development to build Mississippi's future; and
- 5) Strengthening and sustaining Mississippi families to facilitate healthy outcomes and well-being.

MSU Extension improves the economic, social, and cultural well-being of Mississippians in all 82 counties by providing research and education in a practical and applicable way in the areas of agriculture and natural resources, 4-H youth development, family and consumer science education, and community resource and economic development; by using the latest technology and teaching techniques to serve clients; by developing and using volunteers to help disseminate programs and information; by cooperating with other groups and agencies; and by maintaining a culturally diverse staff responsive to the needs of various audiences at all socioeconomic levels.

The mission of MAFES is the creation of knowledge through fundamental and applied research in the fields of science related to agriculture, food, natural resources, the natural environment, people, and communities with the goals of providing safe, nutritious, desirable food and fiber products and processes for consumers, and assuring businesses that comprise Mississippi's agricultural industry have the information required to remain competitive in a global marketplace. Each year, about 150 MAFES scientists work on more than 585 projects. This effort has led MSU to rank number six nationally for agricultural research funding. This funding comes from a variety of sources, including taxpayers, producers, industry, and consumers.

MSU Extension and MAFES have four regional research and Extension (R&E) centers strategically located across the state (north, Delta, central, coast) that serve as hubs for Extension outreach and MAFES research in each region. Each R&E center also has satellite stations where scientists conduct research specific to each region, as well as research that is part of statewide programs. Additional units include Crosby Arboretum, Center for Research on Human-Wildlife Conflict, Extension Center for Government and Community Development, extension Center for Technology Outreach, Geosystems Research Institute, Water Resources Institute, Stennis Institute of Government and Community Development, and Southern Rural Development Center.

With three locations serving 15, southwest Mississippi counties, Alcorn State University's School of Agriculture and Applied Sciences (AAS) draws upon the organization's unique strengths and its comprehensive delivery system in conducting original research and delivering educational programs. Research and education are targeted to limited- resource audiences, those earning 80% or less of Mississippi's median household income, to provide youth and adults the opportunity to obtain and apply new knowledge and skills that will empower citizens. ASU research and Extension professionals facilitate positive change in the Capital River, Delta, and Coastal regions of Mississippi. Many of the research and education programs are tested and supported by the Model Farm on the ASU campus, two off-campus demonstration centers located in Mound Bayou and Preston, and the Natchez Farmers Market.

## Merit and Scientific Peer Review Processes

At MSU, research projects utilize both an internal university panel and an expert peer review as part of the regional research networks. These reviews cover all aspects of research project proposals, including scientific merit, budgets, and suitability of the research mission for the unit, experiment station, and regional consortium. Extension programs undergo an internal university panel review. This review takes into consideration the need for the program (including stakeholder input), the methods utilized, the audience identified, and the methods for outcome/impact evaluation. The plan of work is reviewed by a combined internal and external university and external non-university panel. Panels are set up as appropriate for specific program plans with a focus on a broader review of the needs, resources allocated, and expected outcomes of the programs.

At ASU, a panel consisting of individuals from within the University, other universities, and external non-university groups establishes and conducts merit review processes for the plan of work. The individuals selected include Extension program leaders, specialists, and researchers from land-grant universities within and outside of Mississippi. The non-university panel members include various partnering agencies with complementary research and Extension functions and priorities in the state. The merit review process focuses on the five critical issues identified above.

ASU's research efforts are reviewed annually to evaluate the relevancy of research priorities, the quality of the research methodology, project outputs, and measured impacts of research projects. External expert reviewers and peer reviews from governmental agencies (state and federal), other universities, and local officials are also included in the review of research conducted during the relevant reporting period.

## Stakeholder input: Action Taken to Seek Stakeholder Input

At MSU, multiple methods are used to determine issues to be addressed by Extension and/or research programs. Extension has an Overall Extension Advisory Council in each county comprised of individuals from business, social, and economic entities and those who represent needs of underserved and under-represented clients. Program and/or commodity advisory groups act as subcommittees of each Overall Council and represent agriculture, family and consumer sciences, 4-H youth, and community/rural development. All advisory councils meet at least twice per year. Producer Advisory Council (PAC) meetings are held regionally each year for producers and community leaders to communicate concerns, identify needs, and express opinions and feedback. The various agricultural commodities are represented at these meetings. Additionally, each MSU department has an advisory council that meets at least annually to make recommendations for research, programmatic efforts, and expectations for graduates.

MSU Extension agents obtain information on client needs from key community leaders and representatives of under-served populations. These groups meet several times per year in various settings to offer input and react to Extension's efforts. MSU Extension also implemented a formal statewide needs-assessment survey in 2014 that targeted the general public, Extension advisory council members in all counties, and Extension faculty and staff. Formal and informal county- or state-level needs assessment surveys are also conducted when relevant and appropriate.

MSU has four area Research and Extension Centers jointly administered by Extension and MAFES. Each has an overall advisory council where stakeholders discuss programming and research efforts and assess needs at a yearly meeting. Subgroups may meet several times during the year to discuss specific needs.

Throughout the year, MSU Extension and MAFES discuss efforts and results, coordinate activities, and set priorities with key partners (e.g., MS Farm Bureau; Natural Resources Conservation Service; Delta Council; Rural Development Offices; MS Forestry Commission; MS Department of Wildlife, Fisheries, and Parks; MS Department of Agriculture and Commerce; and state and regional commodity groups).

At ASU, local and regional print, broadcast, and interactive media will increase access to limited resource clients. Extension publications will target traditional and non-traditional stakeholders, elected and government officials, and local organizations to seek diverse stakeholders. To apply for stakeholders' input and to encourage participation, the Media and Communications Unit will publicize and market research efforts, educational programs, and events conducted at state and county levels. One-on-one contact with target audience members will be done through surveys at various annual events. Data from ASU client surveys will be used to design research projects and educational programs.

ASU Extension will continue to conduct Environmental Scanning activities to assess needs in local communities to ensure implementation of timely and meaningful educational programs. These activities will include town hall meetings, focus group meetings, and local advisory council meetings.

## Stakeholder input: Methods to Identify Individuals and Groups

As described in a previous section, the collection of input from stakeholders is an ongoing process. Multiple approaches are used by MSU and ASU to seek stakeholder input. At MSU, stakeholder input is representative of all Mississippi residents, while at ASU, efforts are made to ensure that the stakeholders involved are representatives of limited-resource households in terms of geographic location, family status, income level, age, gender, disability status, and users or non- users of existing educational programs.

Both MSU and ASU rely on Extension Advisory councils/committees to assist in gathering information about the needs and issues in local counties. These advisory groups are required to be reflective of the population of potential clientele. ASU also has a Research Advisory committee comprised of researchers from USDA and state agencies, business representation and commodity groups.

At MSU, listening sessions are sometimes held for the general public; others are specifically designed to reach under- served populations. ASU implemented a Town Hall meeting to identify issues or needs of limited-resource citizens in counties targeting the general public. Information from the analysis of the issues facilitates programming and research efforts through an action-based team response to the critical issue identified from the analysis. ASU will also implement a series of focus groups sessions to further prioritize the issues identified in the public meetings.

In 2014, MSU Extension implemented a statewide telephone-based needs assessment survey with the general public, using the Extension national brand survey as a starting place to identify topics and programs of interest. An electronic survey was distributed to all county Extension advisory group members (overall council and programmatic councils), as well as regional, and statewide councils, to stakeholder groups, and to Extension faculty and staff. Data collected during this survey were used to identify imperatives to guide future work.

Specific needs assessments are conducted when warranted, such as for the development of a new program or when an issue emerges. For example, in April 2020, MSU Extension Evaluation Specialists conducted a formal, online, internal assessment of MSU Extension professionals (agents, specialists, associates) to document their perceived needs related to COVID-19, to identify opportunities for Extension, and to determine the professional needs of Extension personnel as they responded to the evolving needs of Extension clients.

## Stakeholder input: Methods for Collecting Stakeholder Input

General methods that are an ongoing part of the needs assessment process used by MSU and Alcorn include meetings with and surveys of traditional stakeholder groups, the general public (open meeting advertised to all), and nontraditional groups and individuals as well as meetings with invited selected individuals from the general public. The specific methods used to collect stakeholder input are based on knowledge of the stakeholder group, immediacy of the need for information, and focus of the input (i.e., topic).

Two MSU Extension examples were described at the beginning of this section (2014 statewide needs assessment survey targeting all county Extension advisory group members, regional and statewide councils, stakeholder groups, and the general public; 2020 Extension personnel needs assessment survey on emerging issues resulting from the COVID-19).

ASU's Environmental Scanning Process is designed to collect data on the needs and strengths of limited-resource communities. The meetings are planned to facilitate the gathering of pertinent information that assists ASU Extension in identifying critical needs/issues of limited-resource communities. The goal of these meetings are to listen and facilitate open, democratic dialogue of expressed needs, issues, and perspectives. After collecting and analyzing group and individual input, program administrators, specialists, and researchers establish community priorities and identify resources necessary to implement action steps and focus on pairing educational activities with desired outcomes.

## Stakeholder input: A Statement of How the Input Will Be Considered

The stakeholder input collected is used in a variety of ways by MSU and ASU: 1) to identify emerging issues that need attention, 2) to develop new or redirect existing Extension or research programs, 3) to develop action plans and set priorities, and 4) to inform the budgeting process and staff hiring decisions.

At MSU, stakeholder input influences most aspects of the plan of work. Issues are identified through the needs assessment process discussed earlier. The information is used in strategic planning processes at different organizational levels (e.g., college, department, R&E Center). The information helps Extension Agents and Specialists determine their individual plans of action, including redirecting programs to meet clientele needs. MAFES scientists use knowledge of issues to develop cutting edge research that enhances commodity production and conserves the environment. Administration must provide the resources to accomplish these changes, including setting new priorities or revising existing priorities, and hiring appropriate staff members as required to address the priorities.

At ASU, budget allocation, identification of emerging issues, redirection of research and outreach programs, selection of staff, action plans, and priority setting are directly connected to ASU's mission. A statewide advisory council, program areas, environmental scan, Town Hall meetings, individual survey findings, research results and merit reviews support our decision-making process to establish clear budget priorities and action plans to satisfy our educational mission. When possible, budget changes are made to allocate necessary resources and staff to address program priorities. It is also critical to conduct internal assessments and monitor organizational talent for capacity to deliver priority programs. In 2018, a SWOT analysis was distributed to Extension personnel to assess individual and organizational strengths, weaknesses, opportunities and threats. The results of the analysis were used to examine the relevancy of current program foci and to determine best practices for fulfilling the needs of limited-resource audiences.

## Critical Issues

### **Enhancing the viability and sustainability of Mississippi's diverse agriculture to ensure food security, safety, and quality**

Initiated on: Nov 26, 2019

State: Mississippi

Term Length: Long-term (>5 years)

Agriculture in MS is diverse; it includes animals (beef, dairy, equine, swine, goats, aquaculture, poultry), row crops (cotton, soybeans, corn, rice, wheat, grain sorghum, peanuts), and horticulture. In 2021, MS

had 10.4m farmland acres in 34,700 farms (300-acre average) and 33,900 water acres for catfish. Almost 16,000 of these farms are involved in livestock production; livestock and forage are produced in all 82 counties. The ag/forestry industry employs 17.4% of the population, has a farm-gate value of \$8.33b, and contributes another \$16.05b in value-added.

In 2021, the seven leading ag commodities were 1) broilers/eggs/chickens, 2) soybeans, 3) forestry, 4) corn, 5) cotton, 6) cattle/calves, and 7) catfish. The \$2.42b poultry industry produced 737m broilers on 1,237 farms. Soybeans were harvested on 3,087 farms (2.19m acres), producing 120.45m bushels. Cotton was harvested on 780 farms totaling 430,000 acres, producing 1.03m bales. Nearly 700,000 acres of corn were harvested, and 129.5m bushels were produced. Beef production (cattle and calves) on 15,980 farms had a value of \$282m. The channel catfish is the most important aquaculture species in the U.S., with 95% of production in 4 states. MS leads production, a \$232m industry, with more acreage than the other states combined. The \$108m horticulture industry includes vegetables and fruit production, turf, floriculture, and ornamental nurseries, and an additional \$110m sweet potato industry. Additionally, MS spends over \$2b annually on the installation and management of turf. The impact of crops on the state's economy accounts for several times the actual commodity values, when considering the inputs utilized to grow, harvest, store, transport, process, market, and utilize them.

The average age of principal operators in MS is 59.9, and 74% of producers overall are male. The majority of MS farms are family farms (95%) or family-owned businesses. Many farms are small and generate <\$50,000 gross cash farm income. These farms exist independently of the farm economy because the operators rely heavily on off-farm income. Growing alternative crops such as fresh fruits and vegetables is seen as a way to satisfy market needs and increase income. Financial performance varies, but these operators farm for reasons other than profit and will remain in business as long as losses are not unduly large. Often due to the lack of knowledge on new and successful production and market practices, small farmers are not able to maximize yield per acre, increase sales, or reach a better quality of life.

This critical issue works to enhance the animal and plant production process. Enhancing animal production includes helping beef, dairy, equine, swine, goats, aquaculture, and poultry producers and industry personnel. MSU focuses on production problems, profitability enhancement, and commodity-related and natural resource management through applying technical, business, and management skills and influencing farm policy. Further, ASU focuses on best management practices, improving herd genetics, alternative livestock production, and forage production. ASU's new Climate Smart Agriculture focuses on engaging socially disadvantaged farmers and ranchers, low-income persons in underserved or marginalized communities, and communities of color in understanding climate change and its impact on agricultural production, adoption of climate resilient agricultural practices for sustainable agriculture production, and risk management strategies to adapt or overcome climate-change induced farm profitability.

Enhancing plant production includes efforts related to the primary row crops produced in MS each year (cotton, soybeans, corn, rice, wheat, grain sorghum, and peanuts), as well as producers, manufacturers, suppliers, managers, homeowners, and consumers in the horticulture industry (vegetable and fruit production, turf, floriculture, and ornamental nursery industries). Best practices are developed, identified, and promoted, and business, management, and marketing skills are enhanced. Farm policy is

also addressed. ASU assists small-scale farmers in sustainable crop production, horticulture production, food safety, Integrated Pest Management (IPM), and community gardening.

## Science Emphasis Area

Agroclimate Science, Food Safety, Sustainable Agricultural Production Systems

## **Growing vibrant, successful, and sustainable Mississippi communities and businesses**

Initiated on: Nov 26, 2019

State: Mississippi

Term Length: Long-term (>5 years)

Most of MS's 82 counties are socioeconomically depressed; 69 counties have per capita income less than the MS average of \$25,444. The unemployment rate in impoverished counties ranges from 3.2-16.4% (state average in 2021 was 5.6%). Of 296 municipalities, only 3 cities have a population over 50,000. Small, rural communities have poor access to healthy foods, inadequate schools, failing infrastructures, and a lack of unity among residents. Since 1910, 80% of land owned by blacks has been lost due to heir property. Most communities lack the resources to appropriately examine the consequences of events that can affect the economy. Growing MS communities and businesses require attention in areas such as leadership, economic and small business development, community facilities and services, and disaster preparedness.

Successful communities nurture a leadership philosophy that welcomes widespread citizen involvement. Within election cycles, 3,000 local elected officials are given responsibility for public policy. Typically, 1/3 to 1/2 have never held public office and need education. Services are essential. For example, internet access is important for businesses, communication, and connecting to information. Yet only 75.8% of MS residents have a broadband internet subscription—the lowest in the 50 states. Most residents receive their drinking water from public water supplies, which are tested monthly for contaminants. However, 58 counties have populations not served by a public water system and thus depend on private wells. Private well owners are independently responsible for monitoring the quality of their well(s) and water to ensure it is safe.

In 2020, MS experienced 10 federal disasters (e.g., tropical storms, hurricanes, flooding, tornadoes). The destruction affects individuals and communities. However, approximately 30% of adults in the U.S. do not have plans in place, emergency supplies or first aid kits, or copies of personal documents that would be needed in the event of a disaster. Disasters also impact tourism, a \$7.0b industry in MS. Tourism is the fourth largest private sector employer in MS, with over 124,000 employees (responsible for 87,335 direct travel and tourism jobs in 2017, 98% being in the private sector). Rural tourism is especially important as a way to diversify and improve community economic vitality.

This critical issue involves partnerships with citizens, local leaders, and local government to strengthen the capacity of rural and urban communities to meet their most pressing needs and address public issues effectively. Focus areas and activities include developing demographic, economic, and fiscal profiles; developing economic analyses; strategic planning; tourism development; leadership development; small business development; estate planning and managing heir property; workforce development; municipal official certification programs; and providing technical assistance to counties

and municipalities in areas of general management, financial administration, personnel administration, community facilities and services, and solid waste management.

Science Emphasis Area

Education and Multicultural Alliances

## **Improving the lives of youth through positive 4-H youth development to build Mississippi's future**

Initiated on: Nov 26, 2019

State: Mississippi

Term Length: Long-term (>5 years)

Positive 4-H youth development can improve the lives of youth and build MS's future. Parents want their children to grow into healthy, productive, successful adults. 4-H youth development programming helps youth acquire knowledge to develop life skills (e.g., communication, decision-making, leadership, interpersonal relations, community awareness) and form attitudes that will enable them to become self-directing, productive, and contributing members of society.

In 2021, MS ranked 50th overall on four key indicators of child well-being: 50th in economic well-being (e.g., poverty, no parent with full-time employment); 39th in education (e.g., math achievement level, reading achievement level, young children not in school); 50th in health (e.g., low birth-weight babies, child, and teen death rate, obesity); and 50th in family and community (e.g., children in single-parent families, births to teenagers). MS youth are also at risk for school failure, abuse, neglect, poor health, crime, and violence. Almost half of children ages 3 and 4 (47% in 2019) are not in school. In 2019, over two-thirds of fourth graders are not proficient in reading, 76% of eighth graders are not proficient in math, and 15% of high school students do not graduate on time. MS youth are also at long-term risk of not becoming dependable family members, workers, and involved citizens. Youth of limited-resource families experience fewer opportunities to become leaders and gain skills to enhance their own development to build their self-confidence within their schools and in communities.

Experiential learning opportunities through 4-H positive youth development programs are designed to help youth work with others in real-life situations. These experiences encourage family interactions by promoting individual growth in knowledge, skills, and attitudes. The involvement of parents, volunteer leaders, Extension agents, and other adults who organize and conduct educational experiences in community, school, and family settings is essential.

This critical issue includes all efforts regarding 4-H youth development by Extension, including military, volunteer development, and youth at risk. Additional topics affecting the broader youth population addressed in this program include helping youth reduce high-risk behaviors; increase healthy behaviors; increase involvement in science, engineering, and technology; and develop leadership and citizenship skills.

Science Emphasis Area

Youth Development



## **Strengthening and sustaining Mississippi families to facilitate healthy outcomes and well-being**

Initiated on: Nov 26, 2019

State: Mississippi

Term Length: Long-term (>5 years)

MS health and poverty statistics show great need. Residents have significantly higher rates of morbidity and mortality due to chronic diseases related to human behaviors. Low education levels and high unemployment contribute to a lack of insurance and possibly a high premature death rate (calculated through years of potential life lost). MS has the highest obesity rate in the U.S. (39.7% of adults are obese, ranked 50th), and approximately 38% (in 2019) of children are overweight or obese. Obesity-related problems are largely due to poor diets and a perception that being overweight/obese is normal and healthy. Southern style cooking is often rooted in deep-fried foods, so it is very difficult to change cooking patterns that are deeply ingrained in Southern culture. Many consumers lack the knowledge and skills essential for healthy living. For example, they might have trouble identifying foods that are good sources of key nutrients, do not understand the link between food choices and health, are not familiar with proper food handling techniques, and need instruction in saving money on food shopping. Compounding this is that people living below the poverty line often eat unhealthy foods and lack access to exercise facilities.

Ensuring a safe food supply is of great importance. Under the MS Food Code, anyone serving food for payment is required to have a permit to operate their facility. These facilities are required to show documentation of food safety knowledge. Required training in the state leads to cleaner and safer facilities and employees who have increased knowledge of how food becomes unsafe and what groups are at an increased risk for foodborne illnesses.

Health issues in MS are often compounded by family resource management and education needs. Twenty-eight percent of children (in 2019) live in poverty, with 12% in extreme poverty and 22% (in 2020) in high-poverty areas; 22% of children have reported two or more adverse experiences (e.g., frequent socioeconomic hardship; parental divorce, separation, death, incarceration; family or neighborhood violence). In 2020, the child maltreatment rate was 11.7/1,000 children compared to a national average of 8.4/1,000 (MS total referrals rate was 46.2/1,000 in 2020). Nearly 34% of children have parents who lack secure employment.

Disparities based on race, ethnicity, gender, age, and socioeconomic status are common. Families need information on healthy lifestyles, food safety, family resource management, parenting skills, and human development to enhance overall family health and well-being.

This critical issue focuses on human development and family wellbeing. At MSU, special emphasis is placed on healthy lifestyle education (nutrition, health, fitness, wellness, and obesity), proper food handling, family resource management, preparing a competent early childcare workforce, and human development. At ASU, the emphasis is on implementing programs to provide information about nutrition, healthy lifestyles, and physical fitness to help reduce obesity and conducting research on these topics. Other topics addressed at ASU include parenting education, family financial management, food safety, and family and child well-being.

Science Emphasis Area

Family & Consumer Sciences, Food Safety, Human Nutrition

## **Sustaining Mississippi's natural resources and environment and promoting sustainable energy**

Initiated on: Nov 26, 2019

State: Mississippi

Term Length: Long-term (>5 years)

Sustaining MS's natural resources and environment require consideration of water quality, use, and conservation; the control and prevention of pests; efforts in forestry; wildlife management and enterprise development; and sustainable energy and climate changes. Most of MS is privately-owned, industrial forest, or agricultural land with potential for fish and wildlife production and management.

In 2020, forestry was the third-ranked MS commodity, with 19.2m acres of forestland (62% of MS land area) and 125,000 landowners, for a \$1.3b production value and \$4.99b value-added. Forest-related activity generated 61,619 jobs and \$2.96b in income. MS is also rich in wildlife and fisheries resources, with 14,000 miles of streams, 345,000 acres of ponds, and 295,000 acres of large lakes and reservoirs. Over the past few years, flooding in MS has caused significant disruptions. Additionally, the nature of agricultural land and water resources in MS requires attention to water quality and environmental impacts associated with nutrient management and agricultural production as well as water conservation practices.

Fishing, hunting, and wildlife watching had a \$2.7b economic impact and 66,171 jobs. Urbanization, changing lifestyles, and demand for the enjoyment of wildlife and fisheries resources have led to conservation issues, user conflicts, and human-wildlife conflicts. These issues are compounded by increased awareness and involvement in endangered/threatened species conservation, traditional hunting/fishing activities, environmental stewardship, and ecosystem/habitat management. Feral hogs have resulted in economic losses, disease transmission to livestock and humans, competition with native species, and destruction of natural resources. West Nile Virus, Rocky Mountain spotted fever, and other tick-borne diseases, and invasive pest species in MS also require attention due to their public health and economic effects.

Recent climate data indicate that higher variability and greater incidence of catastrophic weather will occur in MS. As climate change concerns increase and fossil fuel supplies decrease, alternative energy sources are needed. Renewable plant-based biomass (e.g., woodchips, sunflowers) can be used to produce bioenergy/biofuel for sustainable environments and energy.

This critical issue (MSU only) focuses on water quality, use, and conservation in production agriculture (irrigation efficiency, nutrient management, and proper disposal of agricultural wastes); the control and prevention of pests, including pest identification, biology, inspection, and monitoring; pest thresholds and habitat management as it relates to pest control, exclusion, and pesticide formulations; efforts in forestry, including forest production and management, forest recovery, timber harvesting, and environmental stewardship; wildlife habitat management, wildlife enterprise development, and management of human-wildlife conflicts; and sustainable energy and climate changes.

Science Emphasis Area

Agroclimate Science, Bioeconomy, Bioenergy, and Bioproducts, Environmental Systems