

# Study In Preparation For A Maryland Agriculture Climate Vulnerability Assessment



**Harry R. Hughes**  
CENTER FOR AGRO-ECOLOGY



COLLEGE OF  
AGRICULTURE &  
NATURAL RESOURCES



**Maryland**  
Department of  
the Environment



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# Executive Summary

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In response to changing climatic conditions, the Harry R. Hughes Center for Agro-Ecology was asked by the Maryland State legislature in 2021 to design a plan for conducting a climate vulnerability assessment of agriculture in the state of Maryland. Our state food systems with their agricultural foundation are imperiled by climate change. Agriculture is not just Maryland's top commercial industry, but often a family tradition with historical significance for rural communities across the entire state. In addition, the resurgence of farming in metropolitan areas is improving local environments and the nutritional well-being of urban communities. Without adaptive management strategies and practices that improve resilience, the expected impacts from climate change could be devastating for Maryland's food system, the agricultural economy, rural and urban communities and thus the state. Past climate vulnerability assessments were general and not targeted specifically to agriculture. Climate science has advanced over the last decade and a vulnerability assessment can appropriately address concerns specific to Maryland.

This report lays out a plan of work for conducting a Climate Vulnerability Assessment for Maryland Agriculture (Assessment). This effort would be led by the Harry R. Hughes Center for Agro-Ecology and a Project Leadership Team (PLT) composed of representatives from the Maryland Departments of Agriculture (MDA), Environment (MDE) and Natural Resources (DNR), the University of Maryland College of Agriculture and Natural Resources (UMD AGNR), The University of Maryland Eastern Shore (UMES) School of Agricultural and Natural Sciences and other close collaborating partners and stakeholders. In order to meet climate challenges in a more timely manner, this report recommends that the PLT work with the Maryland Commission on Climate Change (MCCC), an existing state body that currently has a structure for making recommendations to decision-makers about how Maryland can mitigate and adapt to climate change impacts. The Project Leadership Team will guide an open solicitation for proposals for the production of the Assessment, oversee the analysis of appropriate studies and models that can be specified for Maryland's farmers and the issues they face, and will work with identified stakeholders and decision-makers to ensure the Assessment is on track to meet the needs that arise for Maryland agriculture as climate change impacts are realized.

This report includes an estimated investment in the future of Maryland's No. 1 industry of up to \$500,000 of new funding spread across two years. This funding level represents 0.002 percent of the annual agricultural economic contribution to Maryland (\$20.9 billion). Beyond the benefit to agriculture, this investment will strengthen Maryland's food system, lessen food insecurity, enhance rural and urban communities and protect the environment and the Chesapeake Bay.



# Introduction

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In the 2021 Maryland legislative session, supplemental budget language was passed that required the Harry R. Hughes Center for Agro-Ecology (Hughes Center), Maryland Department of Agriculture (MDA), and Maryland Department of the Environment (MDE) to work together and develop a process/strategy to assess the vulnerability of Maryland agriculture to climate change. This core team named in the budget narrative then sought partnership with the University of Maryland College of Agriculture and Natural Resources (UMD AGNR) and USDA's Northeast Climate Hub on this initiative due to the technical nature of the report and expertise provided by the University in this area.

A Climate Vulnerability Assessment of Maryland Agriculture (“Assessment”) is needed to prepare for, adapt to, and protect this valuable industry and associated jobs in the state from climate change. Agriculture is not only Maryland’s most prominent commercial industry, but it is also the largest single land use in the state. A state-level Assessment can enable a more focused examination of Maryland agriculture’s unique assets as well as the challenges the state’s farmers and foresters will face in a changing climate. For instance, this tool can improve the decision-making process of farmers and planners in generating policies and programs that can increase the resiliency of agricultural systems, and support state investments in soil health and climate-smart agriculture programs.

A thorough and inclusive Assessment is critically needed to protect the state’s agricultural economy, jobs, and the social well-being of rural and urban populations. By providing funding to conduct the Assessment, the state will enable Marylanders to participate in developing a blueprint for agriculture’s future in the face of a changing climate.

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## Section 1: Overview Of Maryland Agriculture

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### **Synopsis:**

- *Maryland agriculture is diverse*
- *Food, feed, fiber, and equine is a \$20.9 billion industry, supporting 105,151 jobs*
- *Maryland farmer population is aging and the number of women producers are increasing*

Maryland is home to 12,429 farms that cover approximately 2 million acres of land across the state. The state’s top commodities are poultry, grain, greenhouse/nursery, dairy, livestock and vegetables. The state’s food, feed, and fiber industries combine for an economic impact of \$19.6 billion, supporting 83,619 jobs statewide. The majority of corn and soybeans produced in Maryland is used in poultry feed and consumed by poultry grown in Maryland. In contrast, most wheat produced is transported a short distance to Pennsylvania to flour mills.

Maryland’s equine industry adds \$1.3 billion and 21,532 jobs to the state economy. In addition to the industry’s economic impact, horses play an integral role in Maryland’s heritage. Maryland is home to more horses per square mile than any other state. Maryland also recently joined Kentucky as one of only two states to host a triple crown race (Preakness Stakes) and a 5-Star event (Fair Hill International event).

The average Maryland farm size is 166 acres, though most farms are less than 50 acres in size. Despite a negligible change in total farm acres between 2012 and 2017, the number of operations rose from 12,256 to 12,429. This change is largely attributed to the increase in farm operations between 1 to 9 acres in size, which showed a 52% increase between the 2012 and 2017 Census of Agriculture.

Additionally, 43% of Maryland's farmland is leased and the most recent demographic information on the industry shows an aging workforce. The average age of Maryland farmers is 57 years and has increased steadily over the past ten years. These factors will influence the opportunities and programs delivered by the state to address climate change. Other changes in Maryland agriculture are the expansion of urban agriculture, an increasing number of female farmers statewide and increased interest in beginning farmer programs. See the 2017 Census of Agriculture for the first comprehensive look at the industry based on race and ethnicity. Details can be found at [www.nass.usda.gov/Publications/AgCensus/2017/FullReport/Census by State/Maryland/index.php](http://www.nass.usda.gov/Publications/AgCensus/2017/FullReport/Census%20by%20State/Maryland/index.php).

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## Section 2: Climate Change In Maryland

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The last climate vulnerability assessment performed for Maryland, titled [Comprehensive Strategy for Reducing Maryland's Vulnerability to Climate Change Phase II: Building Societal, Economic, and Ecological Resilience](#), was published in 2011. This assessment was written by the Maryland Commission on Climate Change Adaptation and Response and Scientific and Technical Working Groups. While this report includes a chapter on agriculture, climate science and climate change impact research have advanced since its publication. It is now possible to more thoroughly evaluate specific threats to agriculture and to develop climate adaptation and mitigation strategies to secure a sustainable and resilient future for Maryland agriculture.

### ***Scientific consensus predicts:***

- *Climate change impacts are expected to continue and intensify*
- *Climate change is expected to impact both in-land and coastal agricultural areas and many, if not all, agricultural sectors*
- *Climate change impacts will be compounded by sea-level rise*
- *Climate change will necessitate enhanced management of farm operations*

Shifts in climate are expected to continue over the next 80 years. By the end of the century, the Northeast U.S. could see average temperatures increase by as much as 8.5 degrees Fahrenheit, with the greatest warming in the winter. Precipitation is expected to continue to increase by an average of 5 or 10 percent. In addition, there will be more days with extreme heat, and increases in growing season length and extreme rainfall events (Tobin et al., 2015). In addition, the rate at which the changes occur is likely to increase over the next century. "There will be more warm nights and longer periods of extreme heat, and the incidence of both drought and very heavy precipitation events is expected to increase. Continued increases in greenhouse gas emissions will increase the amount of climate change the United States will experience in the next 100 years." (Walthall et al., 2012)

The impacts of these changes on Maryland agriculture and the environment are anticipated to be significant. For example, field, fruit, nursery and vegetable crops in Maryland will experience changes in pest, disease, and weed pressures and a need for crops tolerant to these pressures; an increased need for pesticide applications; disruptions in planting and harvesting dates; decreases in quantity and quality of food produced; and increased risk of premature bloom of fruit crops. In addition, increased energy costs will highly impact nursery operations and greenhouses.

Animal agriculture will experience a reduction in winter heating requirements for chicken houses and other animal barns. However, cooling will need to be increased significantly in the summer, which may outweigh heating reductions in winter, increasing total energy costs. In addition, dairy and beef cattle producers may need to shift to more heat-tolerant breeds. Overall, increased temperatures will put a strain on animals, animal housing, and animal feed production.

Aquaculture production will also be affected. Under projected future climate scenarios, elevated water temperatures may limit the growth of cold-water species and result in more frequent disease outbreaks. Anticipated ocean acidification and salinization can negatively impact aquaculture operations. On the positive side, warmer temperatures may extend

the growing season for certain warm-water species. Landscape-level changes will occur as a result of multiple stressors, including saltwater intrusion, coastal inundation and flooding. These changes will decrease the acreage of available and viable land for farming in addition to increasing costs associated with drainage and crop losses.

Although a changing climate presents significant challenges to Maryland agriculture, there is some good news. Systems and practices producers can adopt to improve resilience can also produce high-value climate mitigation benefits and other important ecosystem services, including carbon sequestration, water filtration and storage, and improvements in biodiversity and soil health.

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## What Farmers Are Telling Us

### **Synopsis:**

- *Farmers are already experiencing impacts to their operations due to climate change*
- *The impacts underscore the need for stakeholder involvement as decision-makers continue to seek solutions*

Farmers are already experiencing climate change impacts to their operations. In developing this action plan for the Assessment, project leaders solicited written and verbal feedback from Maryland farmers and stakeholders on the vulnerabilities they are observing in their operations due to climate change.

Many of the respondents indicated experiences consistent with the science outlined above. Many producers are challenged with more frequent high temperatures and more intense rainfall events, while others indicate they have experienced warmer nighttime temperatures, alterations in rainfall patterns, more frequent periods of drought, and altered patterns of pest pressure.

Likewise, many farmers and other respondents agreed that implementing best management practices is vital to adapt to observed climate changes. Others agreed that technical assistance, financial assistance, and access to government programs were necessary. Overwhelmingly, the respondents agreed that information on ways to enhance sustainability and improve resiliency is useful, and many agreed that information on diversifying their farm operation may help them adapt to climate changes.

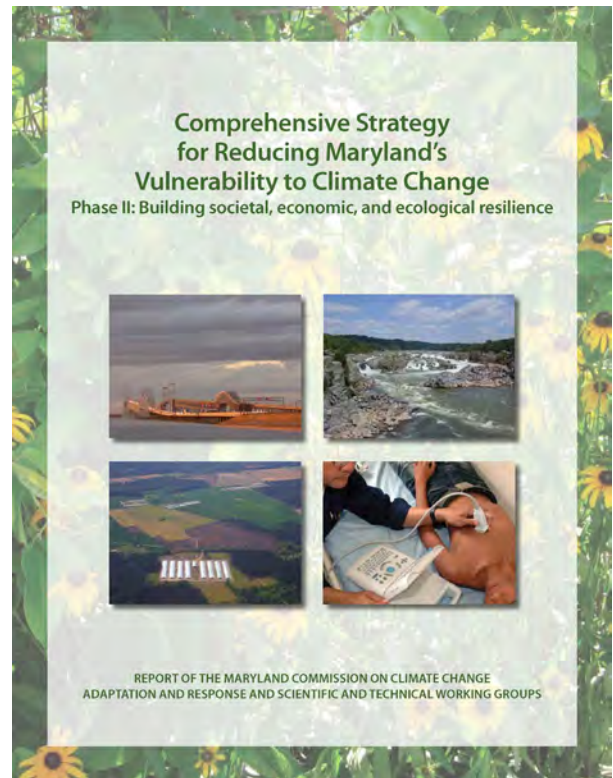
Overall, growers expressed a wide range of concerns related to a changing climate. Farmers and other respondents identified many projected threats and cited the need to develop better infrastructure, such as improved drainage systems, so that farmers can adapt to new climate patterns. Farmer concerns highlight the importance of continued and robust stakeholder involvement to devise solutions that are inclusive to all stakeholders.



# What We Need To Understand Better

The [last climate vulnerability assessment](#) report, completed in 2011, can serve as a strong starting point to develop more detailed recommendations using recent advances in climate science and climate impact research. Specifically,

- *There is a critical need to look at the fine-resolution climate data (which have recently become available) through the agricultural lens to determine how specific changes in climate variables will impact Maryland agriculture;*
- *Economic impacts of future climate changes on Maryland agriculture, including aquaculture, need to be estimated;*
- *Climate adaptation and mitigation strategies need to be developed in light of current state and federal programs; and*
- *Specific research gaps that quantify climate change impacts on Maryland agriculture need to be identified.*



The data to assess the vulnerability of Maryland agriculture to climate change need to be at a fine spatial and temporal resolution to be most relevant to Maryland food systems. Projected changes to maximum and minimum daily temperatures, nighttime temperature, and duration of high and low temperatures can apprise us of impacts on the yield and quality of commodities. Changes in extremely hot and cold days can affect heat-related illnesses to farmworkers, crop yields, and disease-carrying insects and pests. Extension of the length of the frost-free season can create favorable conditions for pests and invasive species but also lengthen the growing season and may improve crop productivity. Changes in the amount of average annual and seasonal precipitation, length of dry periods in between rainfall events and changes in rainfall intensity, duration, and frequency can affect crop production, farm and field operations, flood risks, drainage, erosion, soil health erosion, water deficit periods requiring irrigation, and water quality through nutrient runoff transport of sediment and other contaminants to Maryland's waterways. Elevated temperatures, acidification and salinization of water can affect growth and diseases in individual commercial aquatic species. Energy use in agricultural production may be affected by changes in heating and cooling degree-days. An increase in atmospheric CO<sub>2</sub>, sea-level rise, and saltwater intrusion can result in changes in crop growth, yield, and quality, increased flooding in coastal agricultural lands, and loss of productive farmland and important habitats. Also, climate changes might impact the mitigation potential of agricultural lands (e.g., soil carbon accrual and greenhouse gas emissions). Data can be complemented by state and federal programmatic efforts to incentivize mitigation efforts such as the retirement of marginal and sensitive croplands, and healthy soils programs aimed at increasing carbon sequestration.

Econometric modeling studies are needed to quantify the economic impact of climate change on the State's agricultural sector. Costs to farm infrastructure, production inputs, alternative equipment needs, labor force, adaptation technologies, in-field and edge-of-the-field conservation practices to reduce nutrient loss, changes in regulatory fees to be paid, and other impacts must be evaluated. The agricultural community must develop tools to protect against incoming insect pests, weeds, and diseases, including improved scouting programs and early-warning systems that forecast, detect, prevent, and eradicate pest species. Innovative technologies (robotics, automation, etc.) to work in high heat stress and wet environments, or for reduced resource utilization and water quality protection may be needed. Technologies that reduce energy costs may also be essential but have a cost. Concurrently, the continued development of new markets for agricultural biofuels, methane recapture, carbon sequestration and nutrient load trading offer opportunities for farmers to reduce their dependence on external energy, thereby

generating alternative revenue streams that also benefit the environment. However, many of these may be affected by climate change as well, which needs to be quantified.

Improving environmental justice outcomes during adaptation to climate change's adverse outcomes will be critical. For example, many members of underrepresented communities farm; some are principal operators while others work on the farms. Historical discrimination also led to many communities of color locating in rural areas and outside towns with modern infrastructure. Understanding how climate change impacts disproportionately affect underrepresented groups and communities in urban and rural areas and planning for targeted, equitable, and inclusive solutions must be done proactively.

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## Section 3: Action Plan For A New Climate Vulnerability Assessment For Maryland Agriculture

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### **Synopsis:**

- *A comprehensive review and analysis of recent and ongoing research that quantifies how agriculture-relevant climate variables are projected to change under certain greenhouse gas emissions scenarios*
- *A comprehensive review and analysis of recent and ongoing regional research that quantifies how projected climate changes are expected to impact Maryland agricultural sectors in different regions of the state*
- *Robust engagement of stakeholders and decision-makers in identifying needs for climate impact research, development of potential adaptation measures, and sharing of information*
- *Identification of future climate change and impact research needs that fill the research gap*
- *An assessment of potential economic impacts of climate changes on urban and rural Maryland agriculture*
- *The identification of response strategies to improve resilience, mitigate impacts and reduce greenhouse gas emissions from the agricultural sector*

### **Process**

The Assessment will be led by the Hughes Center in collaboration with MDA and MDE and guided by a Project Leadership Team (PLT) made up of climate and agricultural science experts, farmers and other private stakeholders, state and local agency representatives, and members of land grant and other public and private universities. The Assessment will synthesize the latest scientific research to help Maryland agricultural stakeholders and policymakers understand and quantify the threats of changing climate to Maryland agriculture and develop adaptation measures (including policies) to alleviate the negative impacts.



Considering the pace of climate change and the need to respond quickly, the PLT recommends that the Assessment process be conducted in close collaboration with the Maryland Commission on Climate Change Adaptation and Resiliency Work Group. The MCCC provides annual recommendations on how local and state governments can adapt to anticipated consequences of climate change. The PLT recognizes that the potential impacts of climate change on agriculture will continue beyond the release of the Assessment. Integrating this work into an ongoing state-supported structure will allow the Assessment to be proactive and dynamic, and help prepare the agricultural industry to adapt to challenges as they arise. A Coordinator, hired through the Hughes Center, will work with the MCCC to develop information on immediate adaptation recommendations based on currently available knowledge and science for the MCCC's annual report. The Hughes Center and PLT will oversee the work between the Coordinator and the MCCC.

Concurrently in a parallel process, the PLT will convene researchers, who will be drawn from diverse institutions with broad agriculture and climate change expertise as identified by the PLT. The goal of the researcher convening is to identify all areas that should be addressed and the affiliated gaps in research. The Coordinator will also share research analysis with the MCCC, which in turn can deliberate and provide adaptation recommendations to decision-makers in its annual report. Once all appropriate research areas are identified, the PLT and Hughes Center will issue an open request for proposals. The group(s) that receives the award, up to about \$350,000, will construct the Assessment for review and approval by the PLT.

**The Assessment will provide the following deliverables:**

1. *A science-based description of changes farmers should anticipate and how projected changes in the state's climate will likely affect:*
  - a. *The production of crops and livestock, and soil health statewide;*
  - b. *Weed, insect, pest and disease pressure for production statewide;*
2. *The state of research, policy and programs that address the impacts of climate change on Maryland's agricultural industries;*
3. *Recommendations to inform the enhancement of new and current state-level public and private sector policies and procedures relevant to agriculture for climate change adaptation and mitigation, including specific policy areas where equity should be evaluated;*
4. *A network of experts who will continue to explore observed and projected climate impacts to agriculture and generate solutions;*
5. *Improved stakeholder knowledge on the breadth of ongoing research, programs and policy that will help them adapt to climate change; and*
6. *A network of stakeholders to provide feedback on their experiences and identify needs to address climate change impacts.*

**Previous National/Regional Research and the Proposed Assessment:** The Assessment will build on previous regional and state assessments such as the Northeast Regional Climate Hub Assessment of Climate Change Vulnerability and Adaptation and Mitigation Strategies (Tobin et al., 2015) and the Comprehensive Strategy for Reducing Maryland's Vulnerability to Climate Change Phase II: Building Societal, Economic, and Ecological Resilience (Boicourt and Johnson, 2010); and current efforts such as those by the Maryland Commission on Climate Change (MCCC). Pre-Assessment feedback gathered through an online questionnaire and two listening sessions from stakeholders interested in and/or affected by climate change will be included. Similarly, both rural and urban agricultural stakeholders will be engaged early and often throughout the Assessment process to better understand their experience and concerns, secure their participation, develop relevant content, and increase their awareness of the changing Maryland climate and its observed and anticipated impacts.

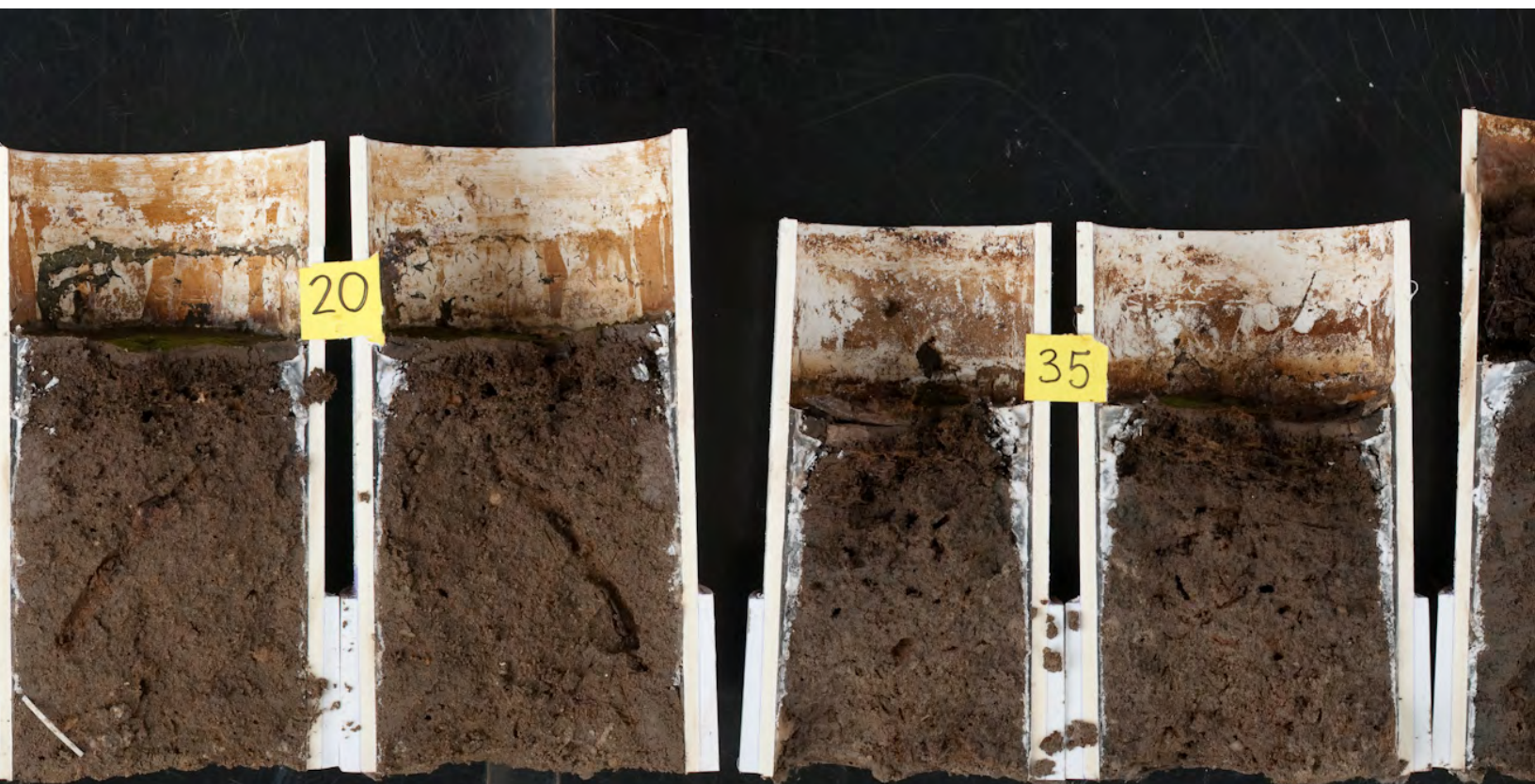
The new Assessment will engage experts at all relevant organizations in Maryland, including universities, state and local governments, federal agencies and nonprofit organizations.

**New Research:** We anticipate the researchers will synthesize published and unpublished research that has already been completed in Maryland and, where appropriate, re-examine high-resolution climate data through the agricultural lens and seek expert input on the anticipated impact on agriculture of relevant changing climate variables. Funding for the Assessment will provide the state with the knowledge to address additional research gaps where experts anticipate significant impacts on particular sectors or areas of the agricultural industry.

**Examples of such research include:**

- *Modeling using coupled land surface and crop models to project the effect of climate changes on agricultural surface drainage, crop yield, and nutrient uptake and losses*
- *Research that improves our understanding of how simultaneously interacting factors such as climate, in-field management decisions, technology advances and adoption, and local and global economic trends impact agriculture*
- *Hydrodynamic modeling to project the extent of sea-level rise and saltwater intrusion on agricultural lands in the coastal areas*
- *Econometric modeling studies to quantify the economic impact of climate change on the state's agricultural sector*

Farmers can use many technologies to adapt to climate change to minimize its negative impacts. Where appropriate, research and technologies that help Maryland farmers adapt, improve resilience and simultaneously deliver high-value mitigation co-benefits will be identified. The Assessment will also identify ways to strengthen current state-level policies and procedures relevant to agriculture and recommend response strategies to policymakers, researchers, and business partners.

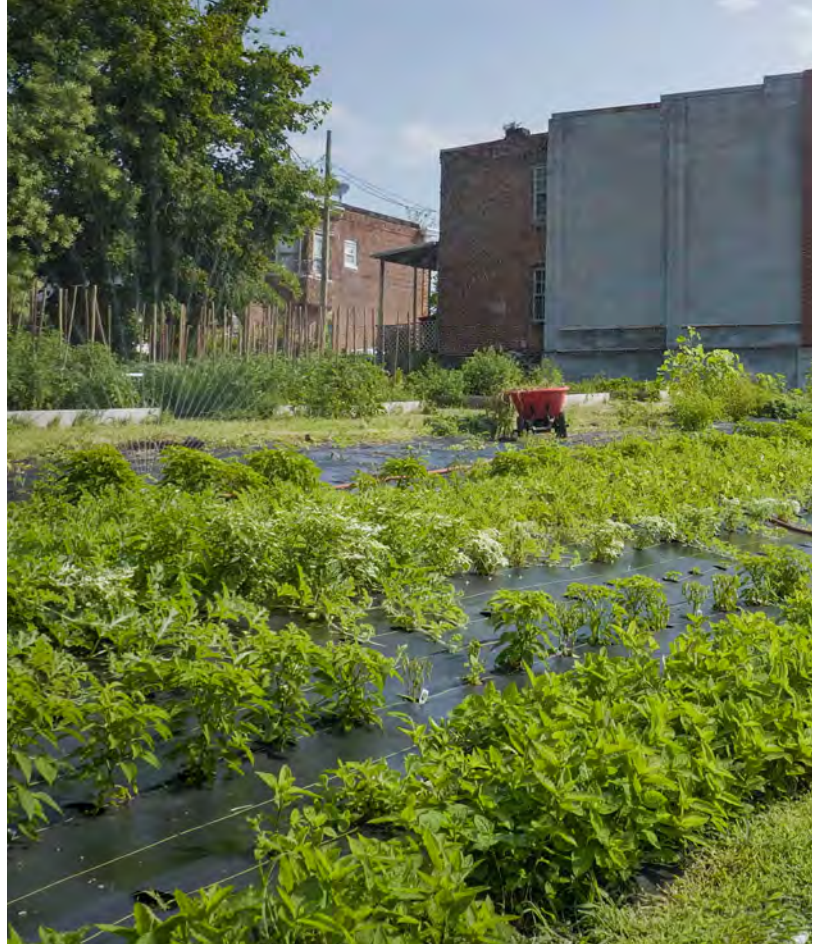


# Soliciting Input/Feedback From Stakeholders

The Assessment will require significant human resources and stakeholder engagement. Importantly, project leaders will need to ensure stakeholder participation and their repeated feedback to ensure the Assessment meets agriculture's needs as it is completed. This process will also allow project leaders to identify any priority climate-related issues that were not included in prior outreach and are unique to individual sectors.

## **Stakeholders include but are not limited to:**

- *Farmers and growers from all sectors and markets operating in Maryland, both rural and urban;*
- *Service and technical assistance providers, both public and private;*
- *Landowners and owners of leased agricultural land;*
- *Food supply chain experts and other stakeholders;*
- *Underrepresented groups and communities;*
- *Environmental justice groups and communities;*
- *Organizations that represent farmers, including but not limited to trade groups, nonprofit organizations and industry boards;*
- *Water quality and environmental nonprofit organizations that work with farmers;*
- *Ag business partners and relevant industry entities;*
- *Public scientific committees related to agriculture;*
- *Federal agencies, scientists and staff;*
- *Local and state government officials and staff;*
- *Academia.*



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## Engagement Plan

The Hughes Center, in conjunction with PLT partners, will conduct outreach throughout the duration of the Assessment. Maryland state agencies will play a supporting role and be actively engaged in stakeholder outreach. Information gathered during outreach may inform state agencies' decisions regarding how they serve their constituents and how to make the best use of their internal programs and funding mechanisms.

Once a complete list of farmer stakeholders is created, keeping them engaged will be paramount. The Hughes Center will leverage partner organizations, such as Maryland Farm Bureau and Maryland Soil Conservation Districts, to distribute key information. Knowing farmers' preferences to learn from other farmers, the Hughes Center will also seek to build a word-of-mouth reputation among the state's producers to maximize the success of the Assessment.

# Timeline

We anticipate July 1, 2022, as the projected start date and a duration of 24 months for this Assessment. The Assessment report will be delivered to the state legislature by June 30, 2024.

**The following activities would be included in Year 1 and Year 2 of the Assessment:**

| Year                   | Team Objective  | Activities   |
|------------------------|---|--|
| Year 1<br>Quarter 1    | Project Leadership Team convenes <ul style="list-style-type: none"> <li>Identified by Hughes Center, relevant state agencies and state land grant institutions</li> </ul> | <ul style="list-style-type: none"> <li>Develops Assessment goals, objectives and strategies</li> <li>Develops specific project timeline</li> <li>Meetings held regularly during Years 1 and 2</li> <li>The frequency of meetings will be determined by the PLT</li> <li>Develop RFP for Climate Vulnerability Assessment</li> </ul>  |
| Year 1<br>Quarter 2    | Coordinator hired   | <ul style="list-style-type: none"> <li>In coordination with the Hughes Center</li> </ul>   |
| Year 1<br>Quarter 1-2  | Researchers in appropriate fields are identified and convened   | <ul style="list-style-type: none"> <li>Initial meeting held and frequency determined by group</li> <li>Identify research to analyze and gaps</li> <li>Provide recommendations to PLT on measures to include in RFP</li> </ul>  |
| Year 1<br>Quarter 2-4  | Hughes Center Request for Proposals   | <ul style="list-style-type: none"> <li>RFP issued and widely advertised (Quarter 2)</li> <li>Grant awarded (Quarter 3)</li> <li>Grant recipient(s) initiate work on the Assessment (Quarter 4)</li> </ul>  |
| Year 1<br>Quarters 1-4 | Coordination with Maryland Commission on Climate Change (MCCC)  | <ul style="list-style-type: none"> <li>MCCC meets quarterly</li> <li>Project Coordinator and researchers will coordinate methods to regularly share results with appropriate MCCC workgroup for consideration into the MCCC's annual report and recommendations</li> <li>Workgroups may include the Climate Change Adaptation and Resiliency Workgroup, the Science and Technical Workgroup</li> </ul>                       |
| Year 1<br>Quarter 1    | Stakeholder outreach  | <ul style="list-style-type: none"> <li>Individual stakeholders identified and contact made</li> <li>Outreach plan detailed</li> <li>Organize and hold two stakeholder workshops held in different regions of Maryland. Ensure project goals, objectives, strategies and timeline are in line with stakeholders' needs</li> <li>Update presentations given during key and relevant conferences throughout Maryland</li> </ul> |
| Year 1<br>Quarter 3    | Legislative Updates   | <ul style="list-style-type: none"> <li>In-person progress report updates in 2023 General Assembly</li> </ul>   |
| Year 1<br>Quarter 4    | Written progress report   | <ul style="list-style-type: none"> <li>Due July 1, 2023</li> </ul>   |

| Year                   | Team Objective            | Activities   |
|------------------------|---------------------------|--|
| Year 2<br>Quarters 1-4 | Climate Assessment Report | <ul style="list-style-type: none"> <li>Recent regional climate studies reviewed and analyzed for state use</li> <li>Recent regional and state-level climate change impact studies relevant to agriculture reviewed and analyzed</li> <li>Future climate change and impact research needs identified</li> <li>Assessment of the potential economic impact of climate changes on Maryland agriculture conducted</li> <li>Final report completed</li> </ul> |
| Year 2<br>Quarters 1-4 | Coordination with MCCC    | <ul style="list-style-type: none"> <li>Results from grant recipient(s) will be offered for consideration into MCCC's annual report and recommendations</li> </ul>  |
| Year 2<br>Quarter 1-4  | Stakeholder Outreach      | <ul style="list-style-type: none"> <li>Ensure continued engagement by maintaining consistent communication with identified stakeholders</li> <li>Organize and hold two stakeholder workshops held in different regions of Maryland. Ensure project goals, objectives, strategies and timeline are in line with stakeholders' needs</li> <li>Update presentations given during key and relevant conferences throughout Maryland</li> </ul>                |
| Year 2<br>Quarter 3    | Legislative Updates       | <ul style="list-style-type: none"> <li>In-person progress report updates in 2024 General Assembly</li> </ul>   |
| Year 2<br>Quarter 4    | Final Report              | <ul style="list-style-type: none"> <li>Due June 30, 2024</li> </ul>  |



# Budget

\$500,000 of new funding spread over two years. This report recommends the allocation of new funding for the Assessment to ensure the future resiliency of Maryland's food system supported by the state's No. 1 industry, agriculture. In the framework of the agricultural economy for Maryland, it is equivalent to 0.002% of the annual economic impact. Additionally, this represents an investment beyond agriculture, to the totality of the state's climate work. The work that would be completed in the Assessment has the potential to enhance current state initiatives, such as Maryland's Plan to Adapt to Saltwater Intrusion and Salinization, the Watershed Implementation Plan, 2030 Greenhouse Gas Emissions Reduction Act Plan, and federal efforts.

Expended over two years, the budget includes salary for a Coordinator, who is key to ensuring a timely Assessment response and ensuring the work is meeting the needs of the state and its agriculture sector. The funding request for stakeholder engagement and the dissemination of information will ensure the Assessment is responding to the needs of the agriculture community. The remaining funding will be used in the award of the request for proposals to write the Assessment.

## Assessment Summary Budget

| <b>Item</b>                                       | <b>Budget</b>    |
|---|------------------|
| Coordinator (salary and benefits)                 | \$116,730        |
| Outreach, Stakeholder Meetings and Communications | \$30,000         |
| Request for Proposals Solicitation                | Up to \$353,270  |
| <b>Total</b>                                      | <b>\$500,000</b> |

# Acronyms And Abbreviations

| Acronym or Abbreviation | Definition  |
|-------------------------|---|
| Assessment              | Climate Vulnerability Assessment for Maryland Agriculture           |
| DNR                     | Maryland Department of Natural Resources                            |
| Hughes Center           | Harry R. Hughes Center for Agro-Ecology                             |
| MCCC                    | Maryland Commission on Climate Change                               |
| MDA                     | Maryland Department of Agriculture                                  |
| MDE                     | Maryland Department of the Environment                              |
| PLT                     | Project Leadership Team   |
| UMD                     | University of Maryland  |
| UMD AGNR                | University of Maryland College of Agriculture and Natural Resources |
| UME                     | University of Maryland Extension                                    |
| UMES                    | University of Maryland Eastern Shore                                |
| USDA                    | United States Department of Agriculture                             |

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## Citations

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