

Council Members Present (via Zoom):

Carlo Colella Vice President & Chief Administrative Officer (Chair)
Scott Lupin Assoc. Director, Environmental Safety, Sustainability & Risk; Director, Office of Sustainability
Kelley Bishop Assistant Vice President, Division of Student Affairs
Maureen Kotlas Executive Director, Environmental Safety, Sustainability & Risk
Susan Corry Director, Engineering & Energy
Bryan Quinn Director of Technical Operation, Department of Electrical & Computer Engineering
Eric Wachsman Director, MD Energy Innovation Institute; Professor, Materials Science & Engineering
Stephanie Lansing Professor, Environmental Science & Technology
Giovanni Baiocchi Associate Professor, Geographical Sciences
Jennifer Hadden Associate Professor, Government & Politics
Laura McBride Graduate Student Representative
Marie Panday Undergraduate Student Representative; Campus Forest Carbon Project Member

Guest Attendees:

Rachel Lamb — Maryland Sea Grant State Science Policy Fellow, MD Dept. of the Environment; Campus Forest Carbon Project Team Member
Camille Delett; Maddy Albee; Amelia Patterson; Jarrett James — Campus Forest Carbon Project Members
Christopher Ho — Civil Engineer, Facilities Management

Meeting start time: 11:00am

Meeting Highlights

Welcome

Carlo Colella welcomes all Council members and guest speakers to the meeting.

Sustainability Fund Proposals – M. Panday

Marie Panday presented to the Council on the Sustainability Fund budget and proposals (Appendix A). In addition to the proposals discussed in the November meeting, the Sustainability Fund Review Committee is moving forward three additional proposals:

- *Future of Sustainable Food:*
 - This project requests funding to offset the associated costs of switching food procurement to more sustainable options, specifically locally grown grains, plant-based meat alternatives, and seaweed. The cost covers the difference between current procurement expenses and the more sustainable option.
 - The Council **unanimously approved** this project proposal.
- *Building Hope, a Podcast about Projects of Possibility:*
 - This project was previously discussed in the December 2021 Council meeting and has returned with an updated budget that removes the faculty salary, graduate student costs,

domestic travel, and design costs. The proposal also saw an increase in the number of undergraduate student positions available.

- The Council **unanimously approved** this project proposal.
- *UMD Wye Research and Education Campus iTree Analysis:*
 - This proposal requested funding to conduct an extensive iTree analysis on the WyeREC property, building on a recent inventory of 29 acres of the space. The funds are matched by WyeREC and support undergraduate student involvement.
 - The Council **unanimously approved** this project proposal.

Including Forest Carbon in UMD's Greenhouse Gas Inventory and CAP 3.0 – R. Lamb; C. Delett; M. Panday; M. Albee; A. Patterson; J. James

This presentation by the Campus Forest Carbon Project student research team highlights progress towards monitoring and reporting campus forest carbon flux. Funded by the Sustainability Fund, this project was specifically created to help the university calculate the carbon sequestered by campus forests using high-resolution LiDAR and 3D optical imagery data. The project has since expanded in scope to include models capturing the carbon storage potential gap, the impacts of land use changes on UMD's carbon storage, and ideal locations for reforestation. It has also started the process to create a peer-verified carbon offset protocol (Appendix B).

Sustainable Water Use and Watershed Report (2021) Follow-Up Discussion – S. Lupin

While the Sustainable Water Use and Watershed Report was endorsed by the Council, a few Council members shared feedback and questions to discuss. In summary:

- The 2021 Water Use and Watershed Report captures current progress in high-priority areas and identifies the Water Workgroup and Steering Committee goals for the next three to five years. It may not directly correspond to the goals in the 2014 report as attempts to meet these goals, new conditions, and increased knowledge have altered the high-priority areas. Additionally, the 2021 report refrained from including projects that are tied to larger initiatives like the NextGen Energy Project or the Facilities Master Plan renewal.
- The State of Maryland strictly regulates stormwater and UMD is extensively permitted. For example, at all redevelopment and new construction all stormwater runoff is required to mirror pre-development conditions, preventing flooding and ensuring quality control. Compliance with stormwater regulation varies by site, nullifying the usefulness of a campus-wide required stormwater management approach or minimum requirement.

Open Forum –

The Sustainability Council thank Chris Ho and other members of the Water Workgroup and Steering Committee for their continued efforts to manage stormwater on campus. Chris Ho was also lauded for his work on the campus creek restoration project.

Adjourn 1:00 pm

Appendices:

Appendix A: Sustainability Fund Proposals (March 2022)

Appendix B: Including Forest Carbon in UMD's Greenhouse Gas Inventory and CAP 3.0



GRANT RECOMMENDATIONS SPRING 2022



Sustainability Fund Budget for FY22



Revenue		Expenses	
FY22 Revenue*	\$330,000	Sustainability Mini-Grants	\$2,385
FY21 Carry-Forward*	\$17,641	Carbon Offsets for Carbon Neutral Undergrad Commuting*	\$60,000
FY22 Working Budget*	\$347,641	Grants Issued to-date	\$85,211.66
FY22 Total requested	\$632,586	Today's Grant Recommendations	\$66,526.40
FY22 Requests still pending	\$245,695.56	Remaining Balance if recommendations are approved*	\$133,517.94

*Estimated



Projects Recommended for Funding



- Future of Sustainable Food
- Building Hope: A Podcast about Projects of Possibility
- UMD Wye Research and Education Campus iTree Analysis



Future of Sustainable Food

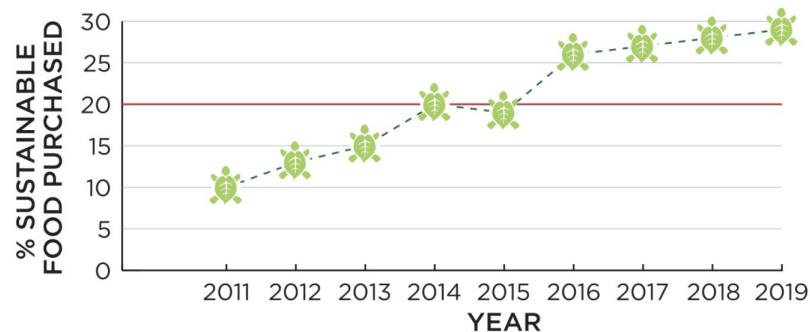


Requested: \$40,296.40

SFRC recommendation: \$40,296.40

Summary: Funding for UMD Dining Services to further progress in and introduce sustainable food within UMD dining halls (e.g., plant-based burgers)

Submitted by: Allison Tjaden, UMD Dining Services



DIVISION OF
STUDENT AFFAIRS
DINING SERVICES



BEYOND MEAT®



Future of Sustainable Food



- The Council has previously supported UMD-DS initiatives in climate-friendly food labels and providing support for COVID in 2020
- UMD Dining Services will further their commitment to sustainable food through three food categories:
 - **Locally grown grains**
 - **Plant-based meat alternatives**
 - **Seaweed**
- Funds will be used to offset increased food costs
- Working with MD's Food System Resiliency Council, MD Dept. of Agriculture, and the Common Grain Alliance



Recommended Grant: \$40,296.40



Food	Fall 2021 Volume (lbs)	Current Cost	Projected Cost	Cost Difference	Total Difference	Notes
Oats	1,764	\$0.88	\$1.18	\$0.30	\$524.72	100% substitution
Grits	1,470	\$0.65	\$1.72	\$1.07	\$1, 556.04	100% substitution
Beyond Burger	17,840	\$3.35	\$7.43	\$4.08	\$14,557.44	20% substitution
Kelp					\$3,500.00	new product
One Semester Total					\$20,148.20	
Full Year					\$40,296.40	



Building Hope: a Podcast about Projects of Possibility



Original Request: \$36,571

Revised Fall Request: \$26, 571

Revised Spring Request: \$11,230

SFRC Recommendation: \$11,230

Summary: Funding for the first six episode season of a podcast series on sustainability. The podcast will use student designed case studies and conversations with experts to convey a message of hope around building for sustainability.

Submitted by: Julie E. Gabrielli, Clinical Associate Professor in the School of Architecture, Planning, & Preservation



Examples of student-designed case studies

Gabrielli, Gardner et. al. (2019) Charting a Way Forward: Research at Monie Bay
<https://indd.adobe.com/view/d0810f9f-e206-4585-92b6-5d9c4f829647>



Building Hope: a Podcast about Projects of Possibility



- Removed three line items from original budget:
 - The proposer has agreed to find other ways to cover their salary for the project
 - Received FSRA grant (\$10, 000) to support graduate student
 - Domestic travel
- Consulting services no longer needed as undergraduate student fills graphic designer role



Building Hope: a Podcast about Projects of Possibility



Type	Request	Notes
PI	-	Removed
Co-PI	\$3, 000	Podcast episode co-host
Hourly Grad Student (\$/hrs)	-	Removed
Hourly Grad Student (\$/hrs)	\$2,520	Journalism student for podcast production & marketing (\$18hr x 140hrs)
Hourly Undergrad Student (\$/hrs)	\$1, 800	Undergrad design student (\$18hr x 100hrs)
Hourly Undergrad Student (\$/hrs)	\$2, 160	Undergrad student for website development (\$18hr x 120hrs)
Fringe - legislated benefits	\$730	Co-host and hourly students
Travel - domestic	-	Removed
Publication/production costs	\$1,020	Podcast hosting service
TOTAL	\$11,230	



UMD Wye Research and Education Campus iTree Analysis



Requested: \$15, 000

SFRC recommendation: \$15, 000

Summary: Funding for paid student interns to conduct an iTree inventory and analysis of a portion of the WREC. The students develop Tree Identification knowledge; learn to use Tree Scale sticks, GPS units and the iTree software.

Submitted by: Agnes Kedmenecz, Woodland Stewardship Educator at WREC





UMD Wye Research and Education Campus iTree Analysis



- Student interns will:
 - Determine where to increase tree canopy cover by conducting a **baseline inventory** and **tree assessment** at WREC
 - Give a **final presentation to the sustainability committee** summarizing the result of the iTree analysis
- Matching support provided by WREC



UMD Wye Research and Education Campus iTree Analysis

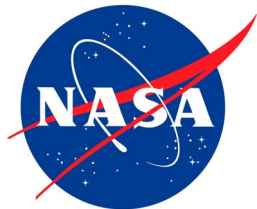


Type	Request	Notes
Training	\$1,000	Student equipment training
Two (2) Student Interns (\$15/hr x 400 hrs)	\$12,000	Summer term only (June-Aug) living on site
Materials	\$500	Caliper, tape measure, tree scale stick, etc.
Travel	\$500	10 trips of 100 miles at \$0.50/mile
Incidentals	\$1,000	
TOTAL	\$15,000	

Including Forest Carbon into UMD's GHG Inventory and CAP 3.0

**Maddy Albee, Camille Hoffman Delett, Jarrett James,
Amelia Patterson & Marie Panday**

*utilizing previous contributions from Rieley Auger, Janna Chapman,
Jordan Nicolette, & Hilary Sandborn*



 UNITED STATES
CLIMATE ALLIANCE

March 11, 2022

with support from Dr. Rachel Lamb, Dr. George Hurtt, Sally DeLeon, & the UMD Office of Sustainability

Who We Are

Undergraduate Team:

Maddy Albee: Senior ENSP Student (Fall 2020)

Marie Panday: Senior ENSP Student (Jan 2021)

Amelia Patterson: Senior ENSP Student (Fall 2021)

Jarrett James: Junior ENSP Student (Spring 2022)

Graduate Advisor:

Camille Hoffman Delett: M.S. Geographical Sciences Student (Spring 2020)

Previous Team Members:

Rieley Auger: Environmental Impact Program Manager at Eden Reforestation Projects

Jordan Nicolette: GIS Analyst and Biologist at USDA Animal and Plant Health Inspection Service (APHIS)

Hilary Sandborn: PhD Student UNC Chapel Hill

Janna Chapman: Junior ENST student

Faculty Advisors:

Dr. Rachel Lamb: Maryland Sea Grant State Science Policy Fellow at Maryland Department of the Environment

Dr. George Hurtt: Associate Chair and Professor
Department of Geographical Sciences



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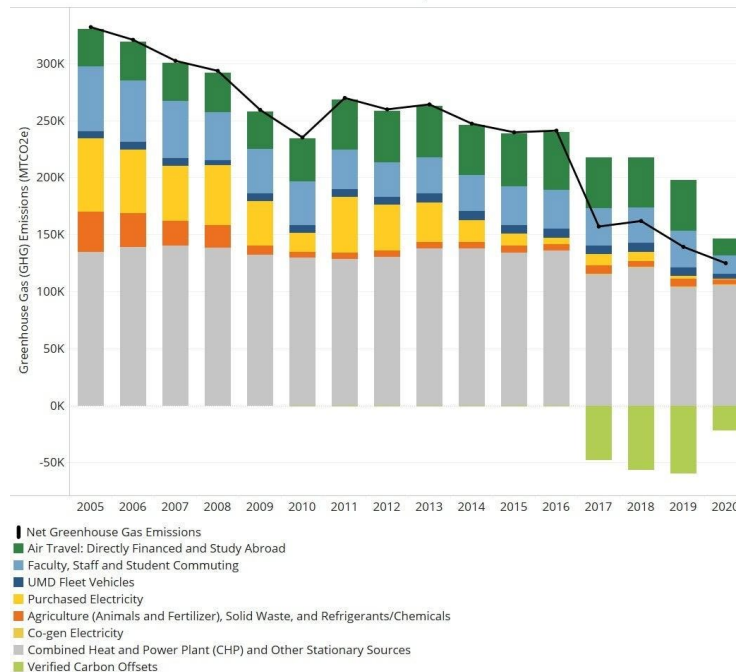
Outline

1. UMD context + project goals
2. Forest carbon science background
3. NASA science advances
4. Applications to UMD (monitoring, planning, offsets)
5. Next steps

University of Maryland Climate Goals

- Signatory of the Presidents Climate Commitment
- UMD CAP 2.0: Quantify forest carbon sequestration
- **UMD CAP 3.0: Inclusion of land-based carbon into campus GHG inventory**

University of Maryland Greenhouse Gas Emissions
Metric Tons of Carbon Dioxide Equivalent (MTCO₂e)



UMD's History of Including Forest Carbon

- UMD initially used the **Campus Carbon Calculator** which is no longer available
- UMD has also supported the **Urban Forest Effects (UFORE)** assessment in 2008 (Keen et al. 2008)
- UMD currently uses **The Sustainability Indicator Management & Analysis Platform (SIMAP)** = *does not debit* forest carbon sequestration in its calculation **unless it can be entered as an offset with credible, consistent measurement and verification against a baseline calculation**

Campus Forest Carbon Project Goals

- 1 Complete historical analysis of forest carbon dynamics
- 2 Update carbon budget annually for campus GHG inventory
- 3 Quantify carbon impact from future land use change
- 4 Build support for approach across Climate Commitment Members
- 5 Develop new forest offset protocol for scope 3 emissions

Forest Carbon Science and Climate Change

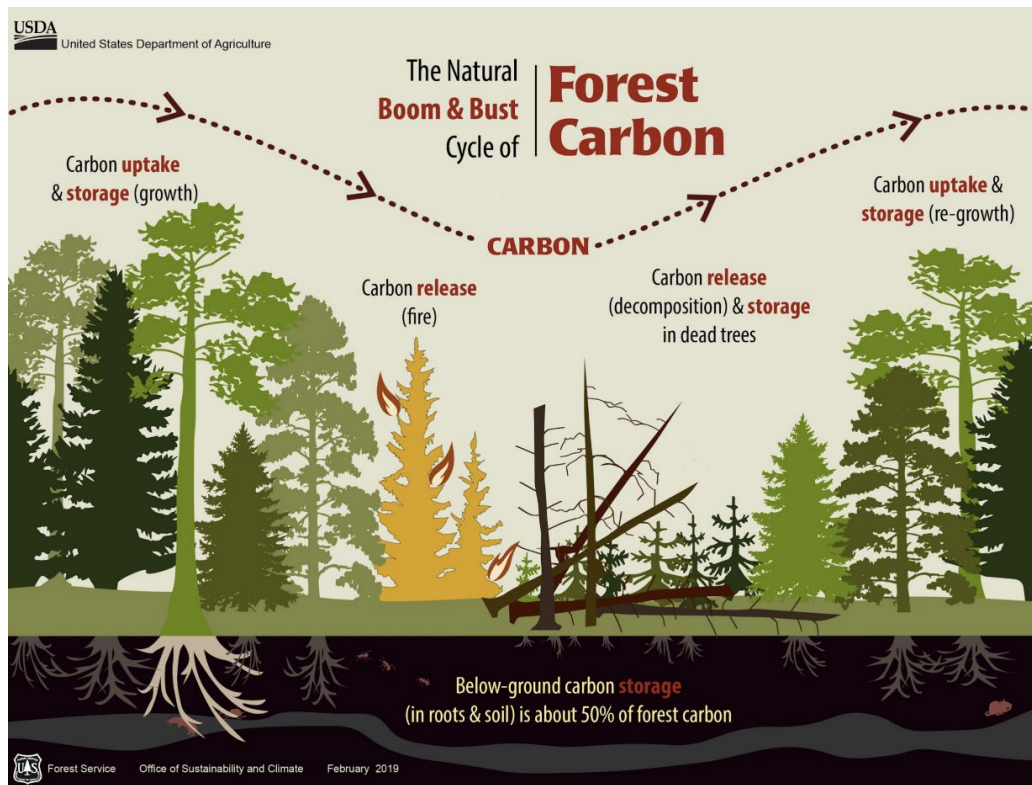
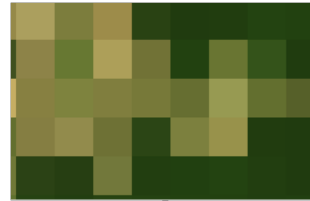
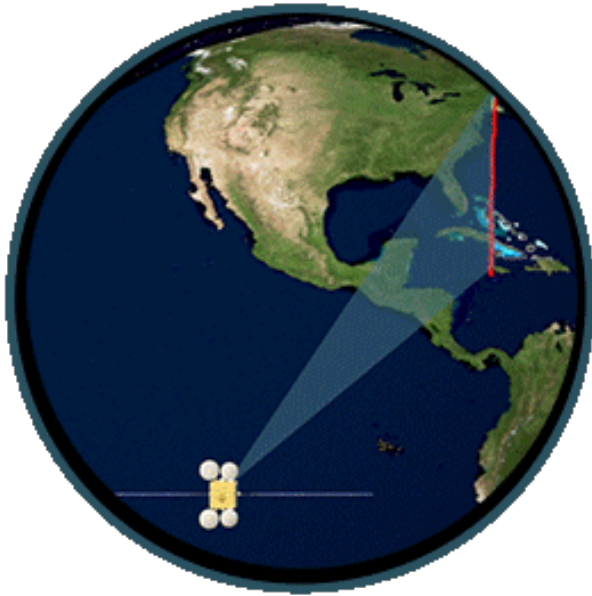


Image: USFS

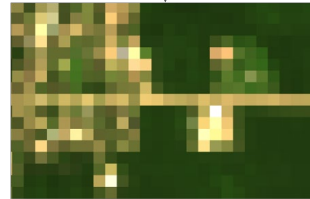
Key Definitions and Terms

- **Aboveground Biomass (AGB):** the total amount of living plant matter that sits above the soil where ~50% of this value is carbon (tonnes per unit area)
- **Carbon Sequestration Potential (CSP):** the maximum amount of forest carbon that could be captured and stored in a given area
- **Carbon Sequestration Potential Gap (CSPG):** the remaining amount of carbon that could potentially be stored from current AGB
- **Carbon Flux:** the amount of carbon gained or lost between carbon reservoirs
- **LiDAR:** a form of remote sensing data that measures ranges in elevation

Role of High-Resolution Remote Sensing and Modeling



100 m



30 m

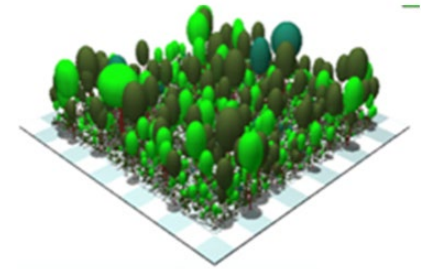


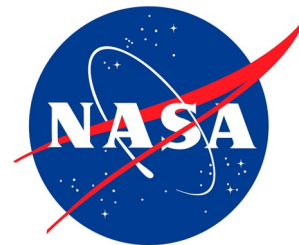
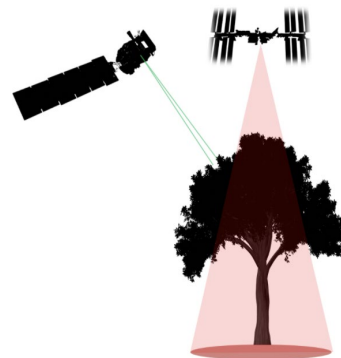
Image: NASA

Advances offered by NASA Carbon Monitoring System

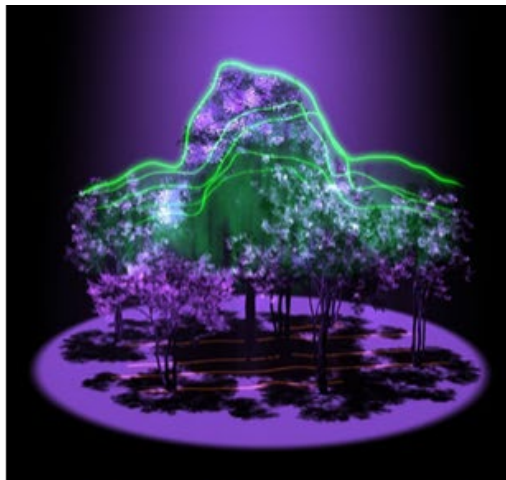
Inputs: High resolution optical imagery (NAIP) + LiDAR to measure existing canopy height and generate contemporary AGB

- **Advanced** forest ecosystem modeling
 - **High accuracy** (*USFS Forest Inventory & Analysis Data to validate*)
 - **High resolution** (*1m lidar, 30m disturbance, 90m carbon*)
 - **Large spatial domains** (*state → regional → national*)

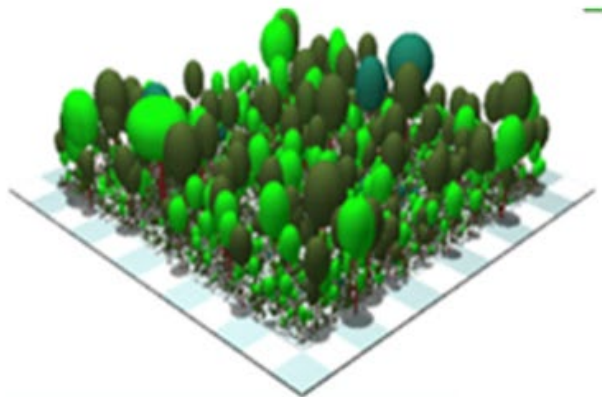
Output: NASA Carbon Monitoring System (CMS) provides annual **carbon stock** and **flux estimates** of any given region = monitoring of carbon dynamics over time



Key Science Applications



Mapping to Establish Baseline



Modeling to Facilitate Planning



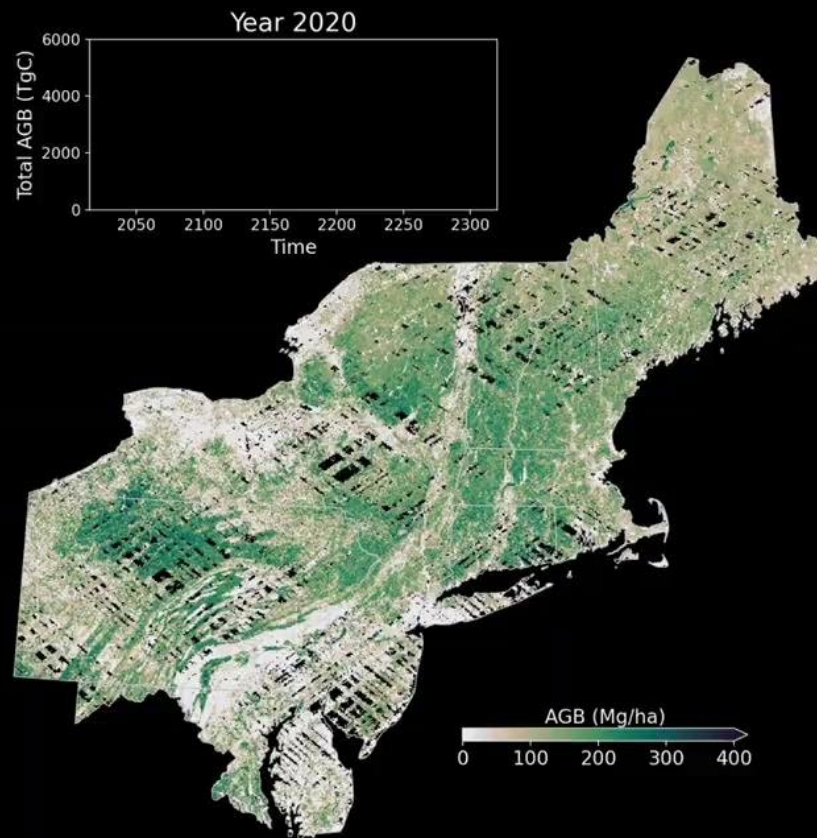
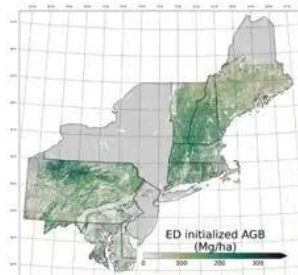
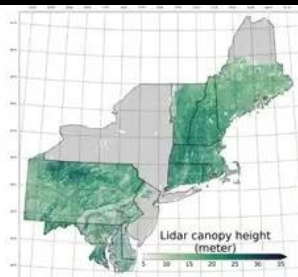
Monitoring to Provide Assessment

Key Science Applications

NASA Carbon Monitoring System

The goal for NASA's CMS project is to prototype the development of capabilities necessary to support stakeholder needs for Monitoring, Reporting, and Verification (MRV) of carbon stocks and fluxes.

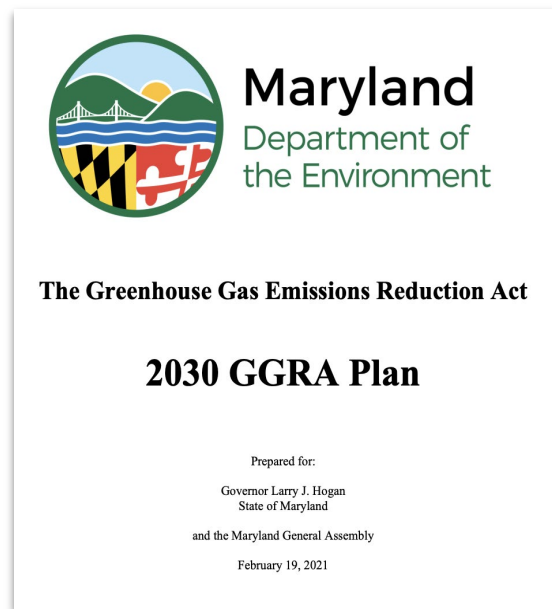




Regional Greenhouse Gas Initiative Domain

NASA CMS Use in Maryland and Beyond

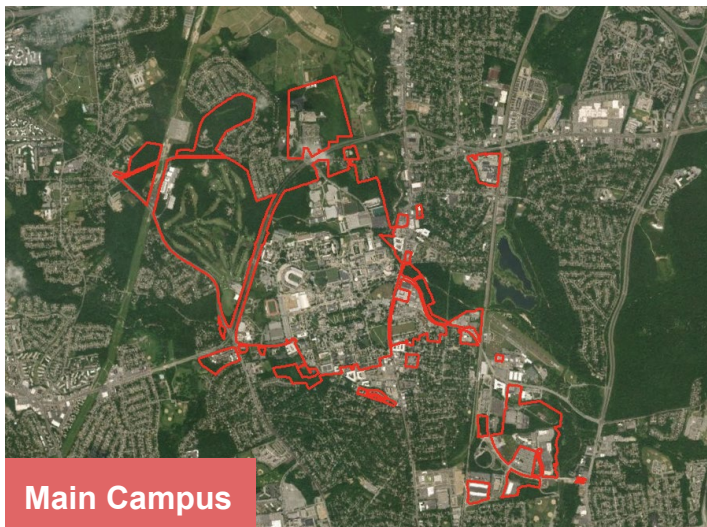
- The **State of Maryland** announced at **COP26** in early Nov 2021 that it is **incorporating NASA CMS science** into GHG inventory to monitor GGRA Plan progress
- Underlying data available across the eastern US with interest from other states
- Prototyping national and global products



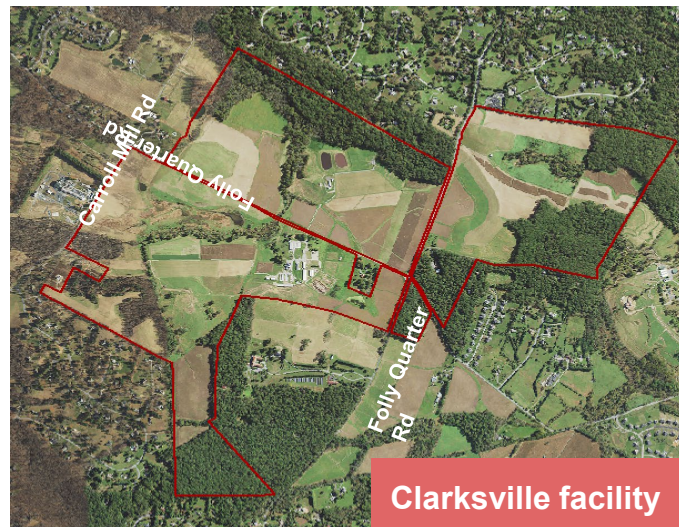
Project Scope

Analysis is made up of forest carbon change over land that the University of Maryland College Park owns and operates:

- Main Campus
- Satellite properties located throughout Maryland



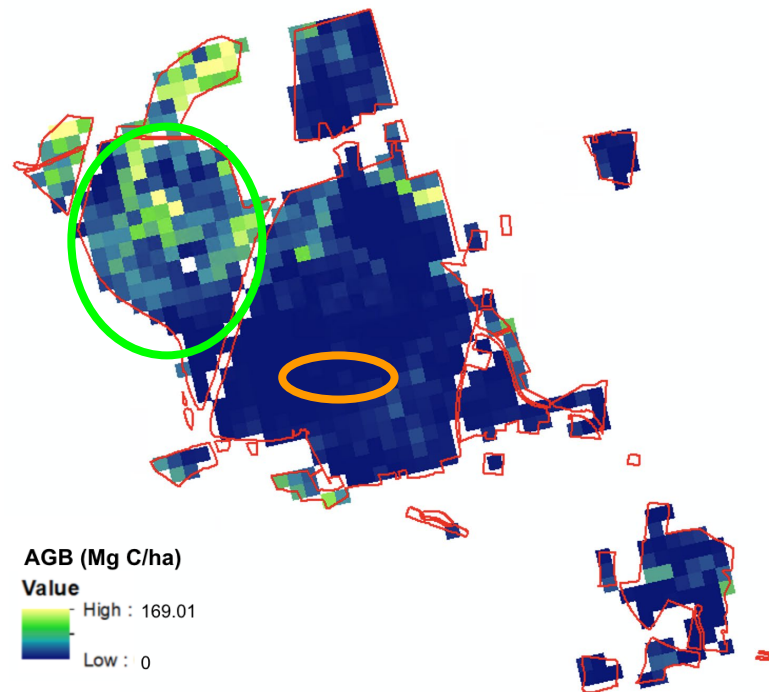
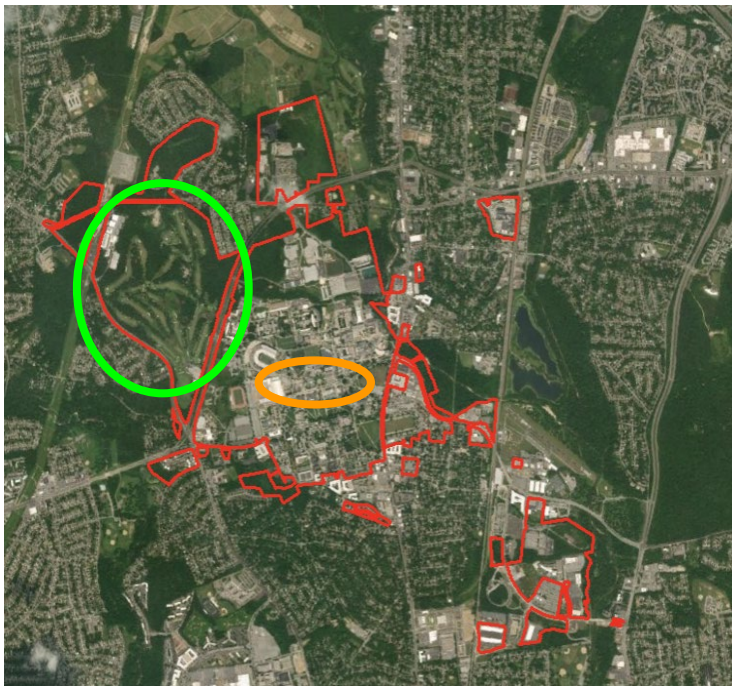
Main Campus



Clarksville facility

Baseline Mapping

Aboveground Biomass (AGB)



Aboveground Biomass (AGB): the total amount of living plant matter that sits above the soil (tones per unit area)

Monitoring

FUNDAMENTAL EQUATIONS

Annual Net Carbon Flux = Carbon **Gains** - Carbon **Losses**

Gains = growth over forested fraction of a pixel

Losses = amount of carbon in disturbed or deforested area

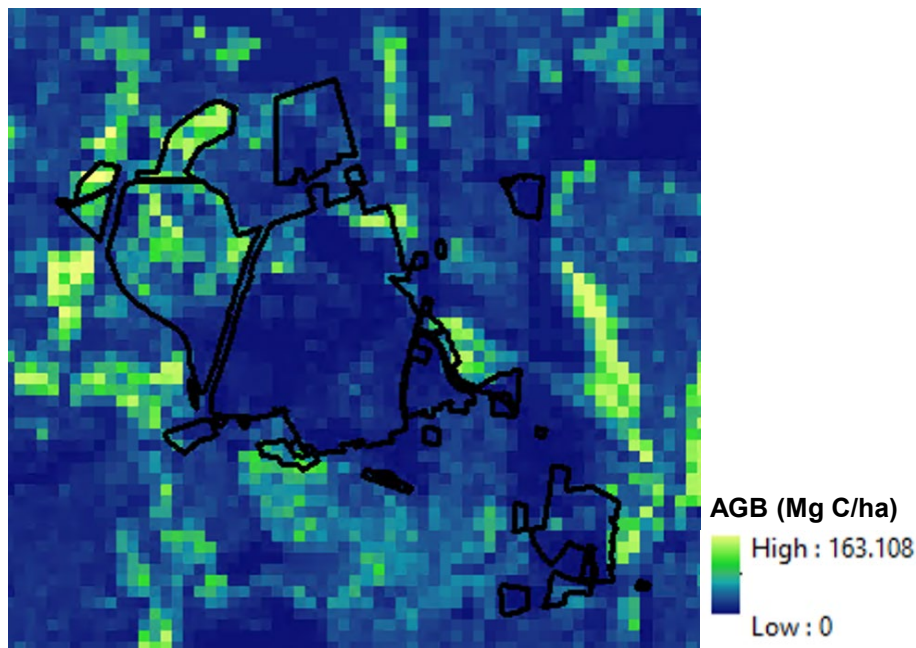
+ flux = carbon sink

- flux = carbon source

Key Data Inputs

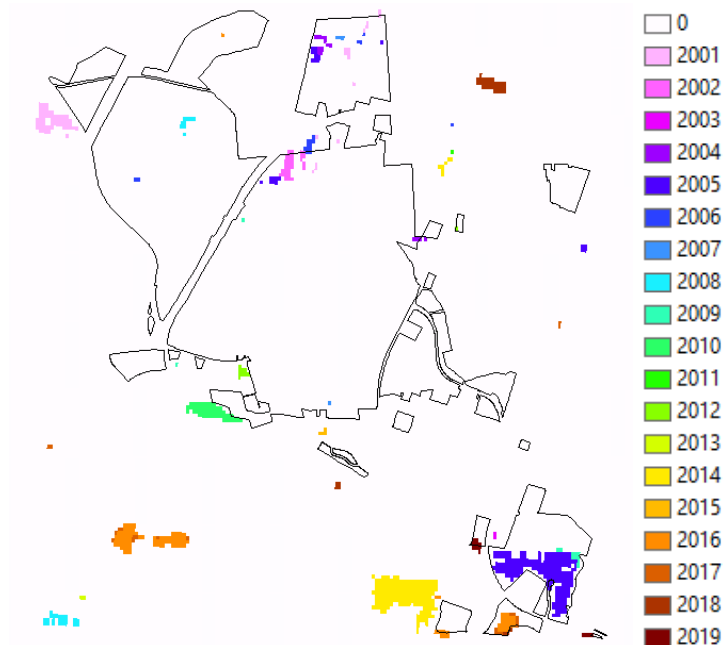
GAIN

Aboveground Biomass (AGB) Trajectories from ED Model
(90m resolution) (Ma et al., 2021)



LOSS

Observed Forest Loss by Year
(2000-2020, 30m resolution) (Hansen et al. 2013)

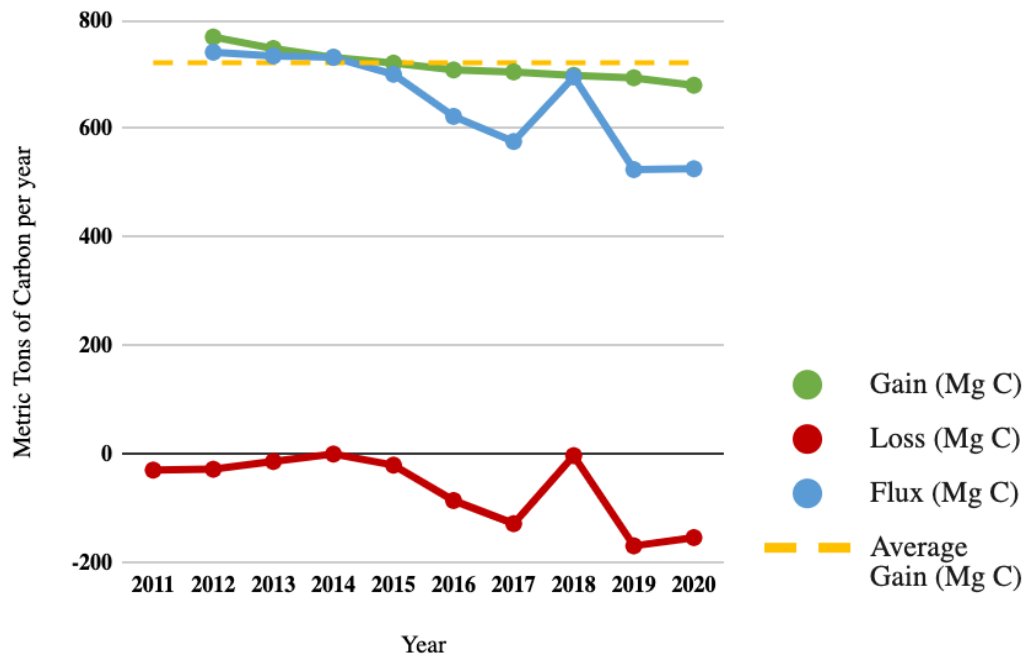


Aboveground Biomass (AGB): the total amount of living plant matter that sits above the soil (tones per unit area)

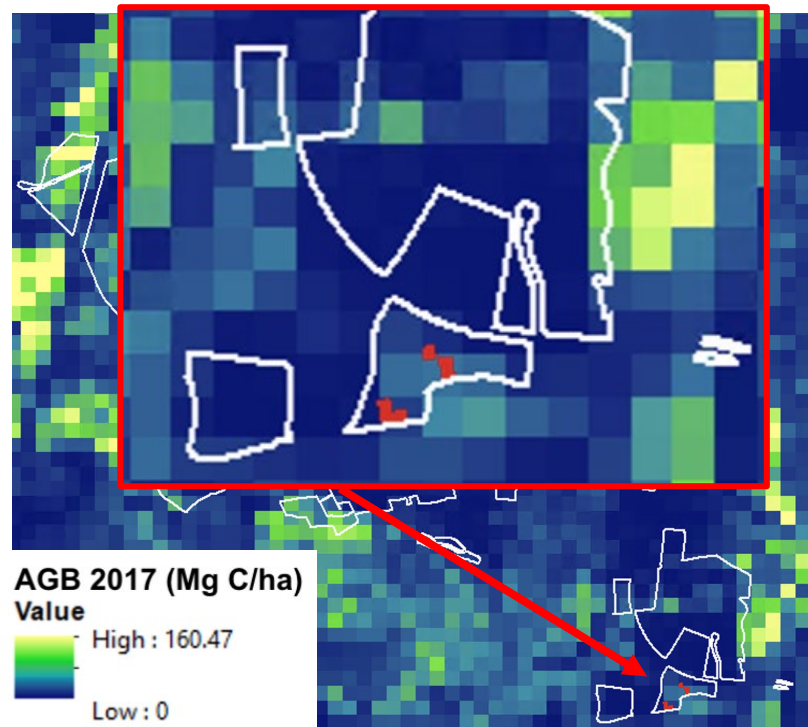
Monitoring Results

Net Carbon Fluxes

UMD Annual Monitoring 2011-2020

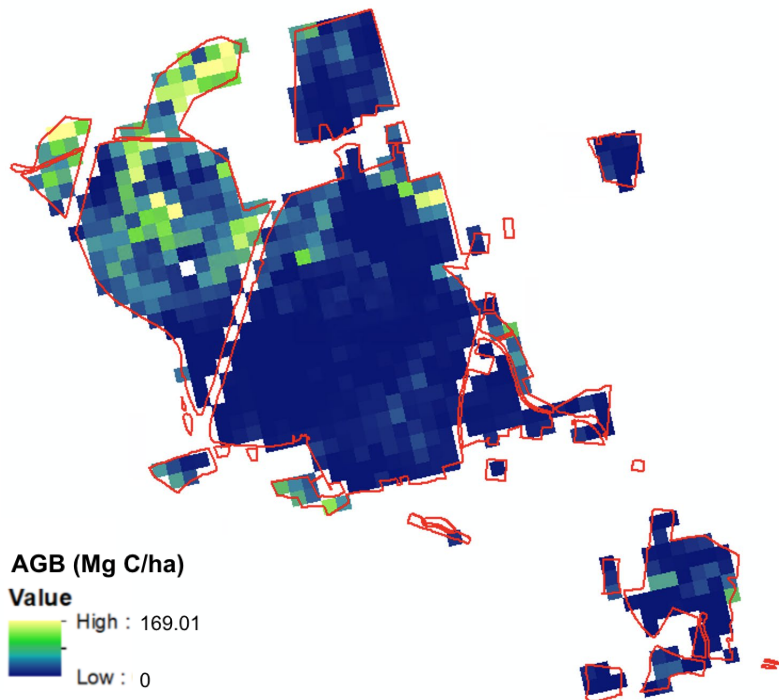


Example Map - 2017

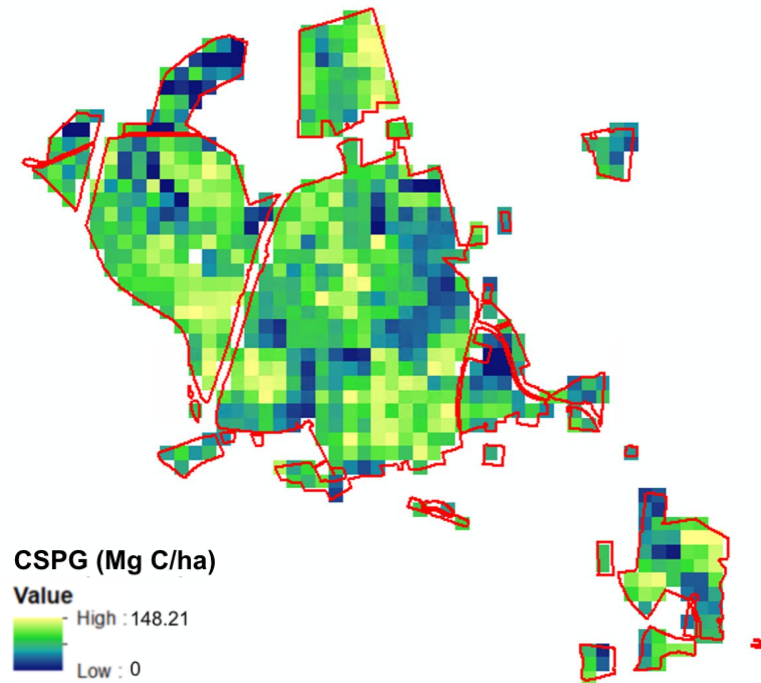


Potential for Scaling Impact

Aboveground Biomass (AGB)



Carbon Sequestration Potential Gap (CSPG)

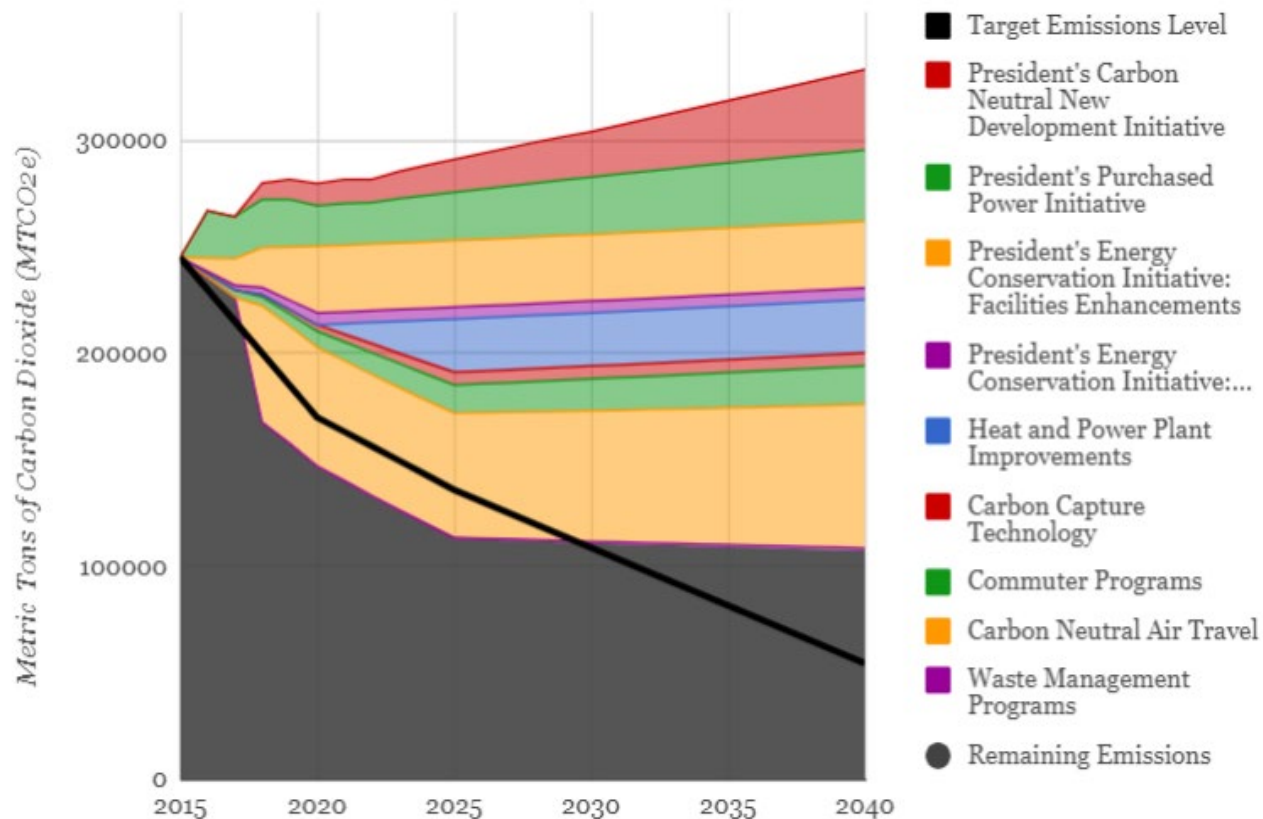


Aboveground Biomass (AGB): the total amount of living plant matter that sits above the soil (tones per unit area)

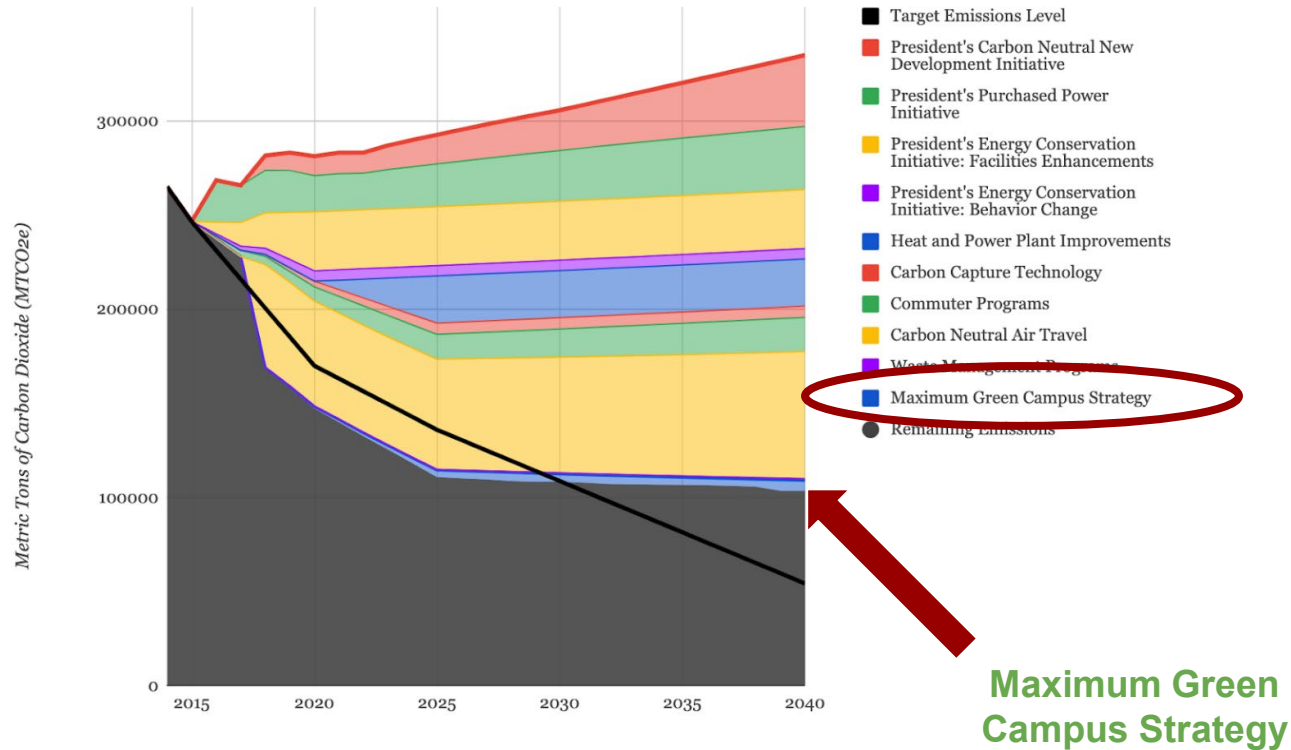
Carbon Sequestration Potential Gap (CSPG): the maximum amount of carbon that could be stored minus current AGB

Modeling to Facilitate Planning

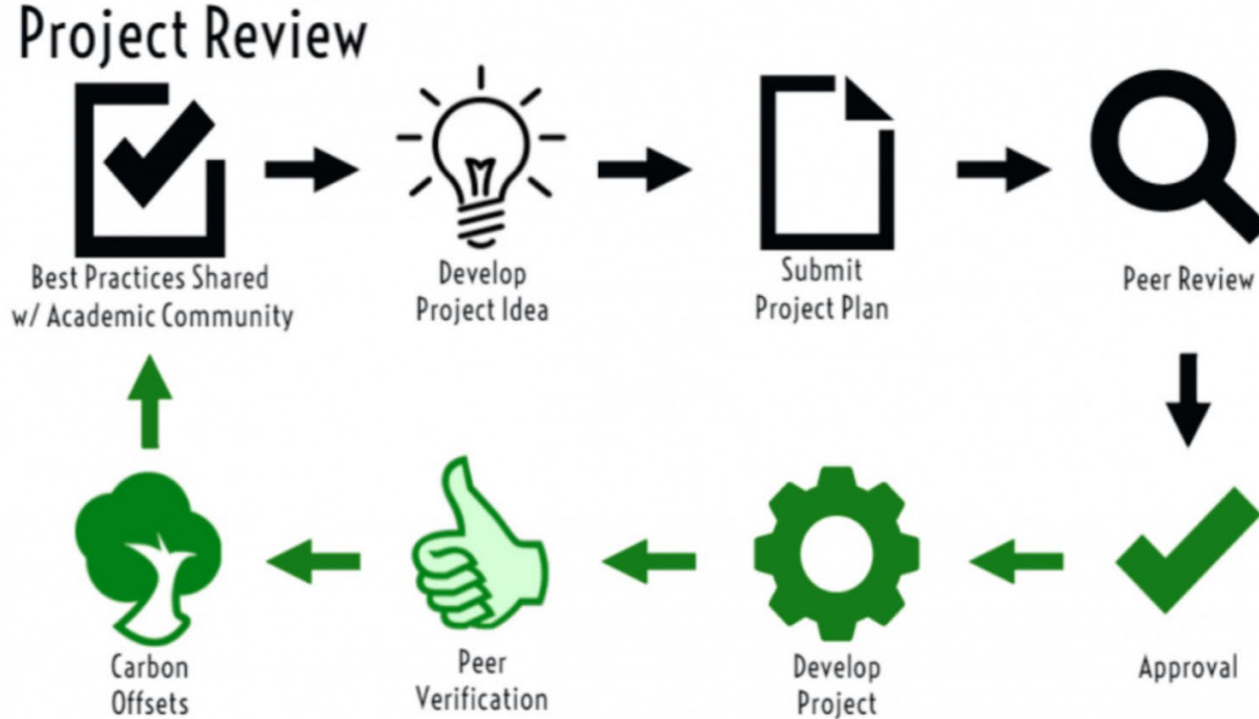
Current CAP emissions goals



Reforestation Scenarios on UMD Main Campus



Re-Tooling Science for Scope 3 Peer-Reviewed Offset Protocol



Next Steps

1. Include current estimates into 2021 Campus GHG Inventory
2. Incorporate forest carbon into CAP 3.0
 - Develop reforestation scenarios with facilities management and other campus partners to support strategic planning
 - Expand planning scenarios to AGNR Research and Education Centers across the state
3. Chart path for UMD to offset a portion of Scope 3 emissions through new Peer-Reviewed Reforestation Offset Protocol

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Learn more at <https://geog.umd.edu/project/campus-forest-carbon-project>