Meeting Summary
March 11, 2022

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 gains, 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*
## Sustainability Fund Budget for FY22

<table>
<thead>
<tr>
<th>Revenue</th>
<th>Expenses</th>
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</thead>
<tbody>
<tr>
<td>FY22 Revenue*</td>
<td>Sustainability Mini-Grants</td>
</tr>
<tr>
<td>FY21 Carry-Forward*</td>
<td>Carbon Offsets for Carbon Neutral Undergrad Commuting*</td>
</tr>
<tr>
<td>FY22 Working Budget*</td>
<td>Grants Issued to-date</td>
</tr>
<tr>
<td>FY22 Total requested</td>
<td>Today’s Grant Recommendations</td>
</tr>
<tr>
<td>FY22 Requests still pending</td>
<td>Remaining Balance if recommendations are approved*</td>
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<tr>
<td>*Estimated</td>
<td><strong>Revenue</strong> $330,000</td>
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<tr>
<td><strong>Revenue</strong> $17,641</td>
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<tr>
<td><strong>FY22 Working Budget</strong> $347,641</td>
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<tr>
<td><strong>FY22 Total requested</strong> $632,586</td>
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<tr>
<td><strong>FY22 Requests still pending</strong> $245,695.56</td>
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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
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

<table>
<thead>
<tr>
<th>Food</th>
<th>Fall 2021 Volume (lbs)</th>
<th>Current Cost</th>
<th>Projected Cost</th>
<th>Cost Difference</th>
<th>Total Difference</th>
<th>Notes</th>
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<tbody>
<tr>
<td>Oats</td>
<td>1,764</td>
<td>$0.88</td>
<td>$1.18</td>
<td>$0.30</td>
<td>$524.72</td>
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<td>Grits</td>
<td>1,470</td>
<td>$0.65</td>
<td>$1.72</td>
<td>$1.07</td>
<td>$1,556.04</td>
<td>100% substitution</td>
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<tr>
<td>Beyond Burger</td>
<td>17,840</td>
<td>$3.35</td>
<td>$7.43</td>
<td>$4.08</td>
<td>$14,557.44</td>
<td>20% substitution</td>
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<tr>
<td>Kelp</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$3,500.00</td>
<td>new product</td>
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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

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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

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

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

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
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
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

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
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 (tonnes per unit area)
Monitoring Results

Net Carbon Fluxes

UMD Annual Monitoring 2011-2020

- Gain (Mg C)
- Loss (Mg C)
- Flux (Mg C)
- Average Gain (Mg C)

Example Map - 2017

AGB 2017 (Mg C/ha)
Value
High: 160.47
Low: 0
Potential for Scaling Impact

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

Maximum Green Campus Strategy

Target Emissions Level
President’s Carbon Neutral New Development Initiative
President’s Purchased Power Initiative
President’s Energy Conservation Initiative: Facilities Enhancements
President’s Energy Conservation Initiative: Behavior Change
Heat and Power Plant Improvements
Carbon Capture Technology
Commuter Programs
Carbon Neutral Air Travel
Waste Management Programs
Maximum Green Campus Strategy
Remaining Emissions
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