

Mike Mahoney

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Education

State University of New York College of Environmental Science and Forestry (SUNY-ESF)

DOCTOR OF PHILOSOPHY IN ENVIRONMENTAL SCIENCE (AREA OF STUDY: COUPLED NATURAL AND HUMAN SYSTEMS)

Syracuse, New York

August 2020 - Present

State University of New York College of Environmental Science and Forestry (SUNY-ESF)

BACHELOR OF SCIENCE WITH HONORS MAGNA CUM LAUDE IN FOREST ECOSYSTEM SCIENCE (GPA: 3.723)

Syracuse, New York

December 2018

- Thesis: Beaver Foraging Preferences and Impacts on Forest Structure in New York's Adirondack Mountains

Publications

IN REVIEW

- 2022 **Mahoney, M. J.**, Johnson, J. K., and Beier, C. M. In Review. Classification and mapping of low-statured 'shrubland' cover types in post-agricultural landscapes of the US Northeast. In review at The International Journal of Remote Sensing. <https://doi.org/10.48550/arXiv.2205.05047>

PEER-REVIEWED PUBLICATIONS

Journal Articles

- 2022 Johnson, L. K., **Mahoney, M. J.**, Bevilacqua, E., Stehman, S. V., Domke, G. M., and Beier, C. M. 2022. Fine-resolution landscape-scale biomass mapping using a spatiotemporal patchwork of LiDAR coverages. The International Journal of Applied Earth Observation and Geoinformation, 114, 103059. <https://doi.org/10.48550/arXiv.2205.08530>
- 2022 **Mahoney, M. J.**, Johnson, J. K., Bevilacqua, E., and Beier, C. M. 2020. Ground noise filtering produces inferior models of forest aboveground biomass. GIScience and Remote Sensing, 59(1), 1266-1280. <https://doi.org/10.1080/15481603.2022.2103069>
- 2022 **Mahoney, M. J.**, Beier, C. M., and Ackerman, A. C. 2022. unfir: A Unifying API for Interacting with Unity from R. Journal of Open Source Software, 7(73), 4388. <https://doi.org/10.21105/joss.04388>
- 2022 Tamiminia, H., Salehi, B., Mahdianpari, M., Beier, C. M., Johnson, L. K., Phoenix, D. B., and **Mahoney, M. J.** 2022. Decision tree-based machine learning models for above-ground biomass estimation using multi-source remote sensing data and object-based image analysis. Geocarto International. <https://doi.org/10.1080/10106049.2022.2071475>
- 2022 **Mahoney, M. J.**, Beier, C. M., and Ackerman, A. C. 2022. terrainr: An R package for creating immersive virtual environments. Journal of Open Source Software, 7(69), 4060. <https://doi.org/10.21105/joss.04060>
- 2020 **Mahoney, M. J.** and Stella, J. C. 2020. Stem size selectivity is stronger than species preferences for beaver, a central place forager. Forest Ecology and Management, 475, 118331. <https://doi.org/10.1016/j.foreco.2020.118331>

Book Chapters and Conference Proceeding Papers

- 2022 **Mahoney, M. J.**, Johnson, L. K., and Beier, C. M. In Press. AI for Shrubland Identification and Mapping. In: Artificial Intelligence in Earth Science: Best Practices and Fundamental Challenges. (Z. Sun, N. Cristea, P. Rivas, Eds). Elsevier, Amsterdam..
- 2021 **Mahoney, M. J.**, Beier, C. M., and Ackerman, A. C. 2021. Interactive landscape simulations for visual resource assessment. VRSC 2021 Conference Proceedings.

Awards and Honors

- 2021 New York State GIS Association Application Award
- 2020 EarthCube AGU Scholarship
- 2018 Robin Hood Oak Award for Academic Excellence
- 2018 Robert M. Hicks Award for Academic Achievement
- 2018 ESF Career Fellowship
- 2017 Outstanding Student Award for Accomplishments in Field Ecology and Dendrology

Fellowships

- 2022 Federation of Earth Science Information Partners (ESIP) Community Fellowship - Machine Learning Cluster

Invited Talks

- 2022 **Mahoney, M. J.** Building trust in AI outputs: Approaches from NY's forest carbon monitoring program. Federation of Earth Science Information Partners (ESIP) July Meeting, Pittsburgh, PA.
- 2022 **Mahoney, M. J.** Using AI/ML to help New York State manage lands for net zero carbon. Federation of Earth Science Information Partners (ESIP) January Meeting, Annapolis, MD (Virtual).
- 2021 **Mahoney, M. J.** terrainr: Spatial data access and visualization in R. Federation of Earth Science Information Partners (ESIP), Severna Park, MD (Virtual).
- 2021 Nell, C., **Mahoney, M. J.**, and Platt, L. Accessing the USGS National Map and making 3D maps with terrainr. USGS Center for Data Integration, Lakewood, CO (Virtual).
- 2021 **Mahoney, M. J.** terrainr: Landscape visualizations using data from The National Map. USGS National Geospatial Technical Operations Center, Denver, CO (Virtual).

Conference Activity

SESSIONS ORGANIZED

- 2022 Sun, Z., Ma, M., Burgess, A., Nga, C., Newman, D., Rao, D., **Mahoney, M. J.**, Koren, G., and Kale, A. AI for All People: How to Make AI Useful for Earth Science Applications? Session organized at the Federation of Earth Science Information Partners (ESIP) July Meeting, Pittsburgh, PA.
- 2022 Sun, Z., Rao, Y., **Mahoney, M. J.**, Lin, C., and Burgess, A. Improving "FAIRness" and "Fairness" of AI/ML in Geoscience. Session organized at the Federation of Earth Science Information Partners (ESIP) January Meeting, Annapolis, MD (Virtual).

WORKSHOPS FACILITATED

- 2021 **Mahoney, M. J.**, Beier, C. M., and Ackerman, A. C. Interactive 3D visualizations of environmental data using the terrainr R package. Workshop organized at the Visual Resources Stewardship Conference, Syracuse, NY (Virtual).

CONTRIBUTED TALKS

- 2022 Johnson, L. K., **Mahoney, M. J.**, and Beier, C. M. Historical Time Series Biomass Modeling: To Train on Plots or Pixels?. American Geophysical Union Fall Meeting, Chicago, IL.
- 2022 **Mahoney, M. J.**, Johnson, L. K., and Beier, C. M. Detecting regenerating forestland at a landscape level. Ecological Society of America and Canadian Society for Ecology and Evolution Joint Annual Meeting, Montreal, Quebec, Canada.
- 2022 **Mahoney, M. J.**, Beier, C. M., and Ackerman, A. C. unifir: A Unifying API for Working with Unity in R. useR! 2022, Nashville, Tennessee (Virtual).
- 2022 **Mahoney, M. J.**, Johnson, L. K., Bevilacqua E., and Beier C. M. Filtering ground noise from LiDAR returns produces inferior models of forest aboveground biomass. North American Forest Ecology Workshop, Sault Ste Marie, Ontario (Virtual).
- 2022 **Mahoney, M. J.** It's not what it looks like: learning to question assumptions when debugging ML models. Data Mishaps Night, Virtual.
- 2022 **Mahoney, M. J.**, Johnson, L. K., and Beier, C. M. Detecting regenerating forestland at a landscape level. Ecological Society of America and Canadian Society for Ecology and Evolution Joint Annual Meeting, Montreal, Quebec, Canada.

CONTRIBUTED TALKS (CONT.)

- 2021 Johnson, L. K., **Mahoney, M. J.**, Bevilacqua, E., and Beier, C. M. Broad-scale forest biomass mapping: generating contiguous high-resolution predictions using a spatio-temporal patchwork of LiDAR coverages across a mixed-use landscape. American Geophysical Union Fall Meeting, New Orleans, LA.
- 2021 Johnson, L. K., Beier, C. M., and **Mahoney, M. J.** Greening Up Before Growing Up: Challenges in Modeling Forest Biomass Recovery Post-Harvest Using Satellite Imagery. Society of American Foresters National Convention, Virtual.
- 2021 **Mahoney, M. J.**, Beier, C. M., and Ackerman, A. C. Interactive 3D visualizations of environmental data using the terrainr R package. Paper presented at the Visual Resources Stewardship Conference, Syracuse, NY (Virtual).
- 2021 **Mahoney, M. J.**, Beier, C. M., and Ackerman, A. C. Virtual Environments: Using R as a Frontend for 3D Rendering of Digital Landscapes. useR! 2021, Zürich, Switzerland (Virtual).
- 2018 **Mahoney, M. J.** and Stella, J. C. Beaver Foraging Preferences and Impacts on Forest Structure in the Adirondack Mountains of New York. Forest Ecosystem Monitoring Collective Conference, Burlington, VT.
- 2018 **Mahoney, M. J.** and Stella, J. C. Beaver Foraging Preferences and Impacts on Forest Structure in the Adirondack Mountains of New York. Rochester Academy of Sciences Fall Scientific Paper Session, Geneseo, NY.

POSTER PRESENTATIONS

- 2021 **Mahoney, M. J.**, Johnson, L. K., Bevilacqua, E., and Beier, C. M. Filtering ground noise from LiDAR returns produces inferior models of forest aboveground biomass. American Geophysical Union Fall Meeting, New Orleans, LA.
- 2019 Dillon, G., **Mahoney, M. J.**, Chase, S., and Johnston, M. Nutritional Impacts on Invasive Beech Scale Quantification in Beech Bark Disease Aftermath Forests. New York Society of American Foresters Annual Meeting, Syracuse, NY.
- 2018 **Mahoney, M. J.**, Zevin, R., and Stella, J.C. Impacts of Beaver on Forest Structure and Composition. Spotlight on Student Research, Syracuse, NY.
- 2018 **Mahoney, M. J.**, Leimanis, V., Desrochers, M. L., Giambona, B., Johnston, M. T., Yanai, R. D., and Dillon, G. A. Impacts of Fertilization on Causal Organisms of Beech Bark Disease. Spotlight on Student Research, Syracuse, NY.
- 2017 Lasser, G. A., Johnston, M., **Mahoney, M.**, Leimanis, V., and Stoodley, J. An Investigation of Nutritional Effects on Beech Bark Disease Causal Organisms. Forest Ecosystem Monitoring Collective Conference, Burlington, VT.
- 2017 Lasser, G. A., Johnston, M., **Mahoney, M.**, Leimanis, V., and Stoodley, J. An Investigation of Nutritional Effects on Beech Bark Disease Causal Organisms. Poster session presented at the Rochester Academy of Sciences Fall Scientific Paper Session, Rochester, NY.

Research Experience

2020- **Climate And Applied Forest Research Institute (SUNY-ESF)**
Present Research Assistant

Teaching Experience

GRADUATE COURSES

Machine Learning Concepts and Applications. Instructor of Record. Fall 2021.

WORKSHOPS FACILITATED

- 2021 **Software Carpentry: The Unix Shell, Version Control with Git, and R for Reproducible Scientific Analysis.** Mahoney, M. J., and Devlin, M.D. SUNY-ESF, Syracuse, NY (Virtual).

Service To Profession

- 2022 **Reviewer:** Journal of Statistical Software; Journal of Open Source Software; 11th International Conference on Climate Informatics.
- 2022 - Present **Data Carpentry Geospatial Curriculum Advisory Committee.** Member.

Non-Academic Experience

- RStudio PBC.** Open Source Engineering Intern.
- 2022 Intern with RStudio's tidymodels team, working on the R packages 'spatialsample' for spatial cross-validation, 'rsample' for resampling and cross-validation, 'waywiser' for measuring spatial autocorrelation in model residuals, and 'applicable' for calculating model applicability domains.

Community Involvement and Outreach

- 2019-2020 **Code for Boston - Clean Slate Project.** Data Scientist and Project Manager (Volunteer).
Project working with Greater Boston Legal Society to advance criminal justice reform efforts.

Software Development

- 2022 **waywiser:** Lead developer
Infrastructure for assessing spatial autocorrelation in model residuals
- 2022 **rsample:** Developer
Data resampling infrastructure for model evaluation
- 2022 **spatialsample:** Developer, Maintainer
Functions for spatial resampling with the 'rsample' package
- 2022 **unifir:** Lead developer
A Unifying API for working with Unity in R
- 2021 **terrainr:** Lead developer
Retrieve Data from the USGS National Map and Transform it for 3D Landscape Visualizations.
- 2020 **heddlr:** Lead developer
Tools to enable functional programming workflows for dynamic R Markdown document generation.
- 2020 **spacey:** Lead developer
USGS and ESRI data access for beautiful landscape visualization.

Affiliations

- 2021 - Present **The Carpentries.** Instructor in good standing.
- 2021 - Present **American Geophysical Union.** Member.
- 2021 - Present **NYS GIS Association.** Member.
- 2019 - Present **Data Visualization Society.** Member.