

# Michael Cary

DEPARTMENT OF AGRICULTURAL AND APPLIED ECONOMICS, VIRGINIA TECH  
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## Academic Appointments

### Research Assistant Professor

DEPARTMENT OF AGRICULTURAL AND APPLIED ECONOMICS, VIRGINIA TECH

May 2023 - Present

Blacksburg, VA

## Education

### Ph.D. Natural Resource Economics

WEST VIRGINIA UNIVERSITY

Dissertation: The Economics of Pollution: Policy, Productivity, and the Structure of Road Networks

2023

Morgantown, WV

### M.A.. Economics

VIRGINIA STATE UNIVERSITY

2014

Petersburg, VA

### B.A. History

VIRGINIA COMMONWEALTH UNIVERSITY

2011

Richmond, VA

## Research Interests

Environmental Economics, Urban and Regional Economics, Transportation Economics, Sports Economics, Environmental Justice, Gender and Economics, Race and Economics, Network/Graph Theory

## Awards

### Westarctica Conservation Scholarship

DISSERTATION AWARD

2022

## Professional Service

### Reaching Regions

MEMBER - EDITORIAL BOARD

2023 - Present

### Journal of Crop Improvement

MEMBER - EDITORIAL BOARD

2024 - Present

### AfricArXiv

SUBMISSIONS MODERATOR

2019 - 2023

## Publications

### Journal Articles

[30] Prabhu, S., Nisha, Y. S., **Cary, M.**, Arulperumjothi, M., & Qi, X. (2024). On Detour Index of Join of Hamilton-connected Graphs. *Ars Combinatoria*, 160, 195-203.

[29] **Cary, M.** & Stephens, H. M. (2024). How COVID-19 Affected Participation in Ultramarathons: Gender, Risk Aversion, and Travel. *Journal of Sports Economics*, In Press.

[28] **Cary, M.** (2024). Herding and investor sentiment after the cryptocurrency crash: evidence from Twitter and natural language processing. *Financial Innovation*, 10, 142.

- [27] **Cary, M.** & Stephens, H. (2024). Economic, Environmental, and Technical Gains from the Kyoto Protocol: Evidence from Cement Manufacturing. *Resources Policy*, 91, 104926.
- [26] **Cary, M.** (2023). Climate policy boosts trade competitiveness: Evidence from timber trade networks. *Renewable and Sustainable Energy Reviews*, 188, 113869.
- [25] **Cary, M.** (2023). Core-periphery models via integer programming: Maximizing the influence of the core. *Computational and Applied Mathematics*, 42(4), 162.
- [24] **Cary, M.** & Stephens, H. (2023). Gendered Consequences of COVID-19 Among Professional Tennis Players. *Journal of Sports Economics*, 24(2), 241-266.
- [23] **Cary, M.** & Ahmed, Z. (2022). Do heavy-duty and passenger vehicle emissions standards reduce per capita emissions of oxides of nitrogen? Evidence from Europe. *Journal of Environmental Management*, 320, 115786.
- [22] Haggerty, T., Stephens, H., Peckens, S., Bodkins, E., **Cary, M.**, Dino, G., & Sedney, C. (2022). Telemedicine versus in-person primary care: impact on visit completion rate in a rural Appalachian population. *Journal of the American Board of Family Medicine*, 35(3), 475-484.
- [21] Ahmed, Z., **Cary, M.**, Ali, S., Murshed, M., Ullah, H., & Mahmood, H. (2022). Moving toward a green revolution in Japan: Symmetric and asymmetric relationships among clean energy technology development investments, economic growth, and CO2 emissions. *Energy & Environment*, 0958305X211041780.
- [20] **Cary, M.** (2021). Down with the #Doge father: Evidence of a Cryptocurrency Responding in Real Time to a Crypto-Tastemaker. *Journal of Theoretical and Applied Electronic Commerce Research*, 16(6), 2230-2240.
- [19] Ahmed, Z., **Cary, M.**, Shahbaz, M., & Vo, X.V. (2021). Asymmetric nexus between economic policy uncertainty, renewable energy technology budgets, and environmental sustainability: Evidence from the United States. *Journal of Cleaner Production*, 127723.
- [18] **Cary, M.** & Bekun, F. (2021). Democracy and Deforestation: The Role of Spillover Effects. *Forest Policy and Economics*, 125, 102398.
- [17] **Cary, M.** (2021). Dominator Chromatic Numbers of Orientations of Trees. *Open Journal of Discrete Applied Mathematics*, 4(1), 4-11.
- [16] **Cary, M.**, Cary, J., & Prabhu, S. (2021). Independent Domination in Directed Graphs. *Communications in Combinatorics and Optimization*, 6(1), 67-80.
- [15] Ahmed, Z., **Cary, M.** & Le, H.P. (2021). Accounting asymmetries in the long-run nexus between globalization and environmental sustainability in the United States: An aggregated and disaggregated investigation *Environmental Impact Assessment Review*, 86, 106511.
- [14] Ahmed, Z., Zhang, B. & **Cary, M.** (2021). Linking economic globalization, economic growth, financial development, and ecological footprint: Evidence from symmetric and asymmetric ARDL. *Ecological Indicators*, 121, 107060.
- [13] Frey, G. & **Cary, M.** (2020). Under what management and policy scenarios can alley cropping be a competitive alternative in the United States Southeast? *Agroforestry Systems*, 94(6), 2167-2183.
- [12] **Cary, M.** & Frey, G. (2020). Alley cropping as an alternative under changing climate and risk scenarios: A Monte-Carlo simulation approach. *Agricultural Systems*, 185, 102938.
- [11] **Cary, M.** (2020). A Linear Algorithm for Minimum Dominator Colorings of Orientations of Paths. *Engineering and Applied Science Letters*, 3(3), 10-14.
- [10] **Cary, M.** (2020). Dominator Colorings of Digraphs. *Open Journal of Discrete Applied Mathematics*, 3(2), 50-67.
- [9] Prabhu, S., Murugan, G., **Cary, M.**, Arulperumjothi, M., & Liu, J. (2020). On Certain Distance and Degree Based Topological Indices of Zeolite LTA Frameworks. *Materials Research Express*, 7(5), 055006.
- [8] **Cary, M.** & Rockwell, T. (2020). International Collaboration in Open Access Publications: How Income Shapes International Collaboration. *Publications*, 8(1), 13.
- [7] **Cary, M.** (2020). Molecules of Inefficiency: How tariffs impact carbon intensities, carbon dioxide emissions, and the environment. *Science of The Total Environment*, 136531.
- [6] **Cary, M.** (2020). Have Greenhouse Gas Emissions from US Energy Production Peaked? State Level Evidence from Six Subsectors. *Environment Systems and Decisions*, 40(1), 125-134.
- [5] **Cary, M.** (2020) Cycle intersection graphs and minimum decycling sets of even graphs. *Discrete Mathematics, Algorithms and Applications*.
- [4] **Cary, M.** (2019). Increasing Access to Clean Fuels and Clean Technologies: A Club Convergence Approach. *Clean Technologies*, 1(1), 247-264.
- [3] **Cary, M.** (2019). Vertices with the second neighborhood property in Eulerian digraphs. *Opuscula Mathematica*, 39(6) 765-772.

[2] **Cary, M.** (2018). Perfectly regular and perfectly edge-regular fuzzy graphs. *Annals of Pure and Applied Mathematics*, 16(2), 461-469.

[1] **Cary, M. A.**, Frey, G. E., & Mercer, D. E. (2014). The value of versatile alley cropping in the Southeast US: A Monte Carlo simulation. In: *Proceedings of the Inaugural Symposium of the International Society of Forest Resource Economics*, 6-11.

## US Forest Service Technical Reports

[1] Frey, G. E., **Cary, M. A.**, Goodwin, B. K., & Mercer, D. E. (2018). Agroforestry land-use economic yield and risk (ALLEY) model 2.0: a computer suite to simulate and compare stochastic yield and returns of alley crop, monocrop, and pine plantation systems in the US. e-Gen. Tech. Rep. SRS-235. Asheville, NC: US Department of Agriculture Forest Service, Southern Research Station. 235, 1-35.

## Other Publications

[1] Justin Sègbédji Ahinon, Hisham Arafat, Umar Ahmad, Joyce Achampong, Osman Aldirdiri, Obasegun Tekena Ayodele, Luke Okelo, Louise Bezuidenhout, **Michael Cary**, Nada Fath, Nabil Aziz Ksibi, Fayza Nasr, Carine Nguemeni, Mahmoud Bukar Maina, Priscilla Mensah, Johanssen Obanda, Joy Owango, Ahmed Ogunlaja, Gregory Simpson, Johanna Havemann. (2020). AfricArXiv–the pan-African Open Scholarly Repository. *AfricArXiv*.

## Book Reviews

[1] **Cary, M.** Review of Céline Rozenblat and Zachary P. Neal, 2021 Handbook of Cities and Networks. Edward Elgar Publishing Limited: Cheltenham, UK. ISBN: 9781788114707, 651 pp., \$340. *The Review of Regional Studies* (2022) 52, 274–282.

## Presentations

<b>North American Regional Science Conference</b>	2024
ENVIRONMENTAL CONSEQUENCES OF JOB GROWTH: A STUDY OF LAND USE DYNAMICS	New Orleans, LA

<b>North American Regional Science Conference</b>	2024
ESTIMATING THE EFFECT OF A UTILITY-SCALE SOLAR FACILITY ON HOUSE PRICES	New Orleans, LA

<b>Missouri Valley Economic Association Conference</b>	2024
THE GOLDEN TICKET: EXAMINING THE IMPACT OF WINNING THE WESTERN STATES ENDURANCE RUN LOTTERY ON SUBSEQUENT ULTRAMARATHON PERFORMANCE AND TRAVEL DECISIONS	Kansas City, MO

<b>Appalachian Translational Research Network Annual Health Summit</b>	2024
JOB GROWTH REDUCES OPIOID OVERDOSES	Abingdon, VA

<b>Southern Regional Science Association Conference</b>	2024
TIME ZONES, PRODUCTIVITY, AND DISCONTINUITIES IN THE SPATIAL (DIS)EQUILIBRIUM	Washington, DC

<b>North American Regional Science Conference</b>	2023
DESIGNING GEOSPATIAL AND REGIONAL SCIENCE TOOLS FOR VIRGINIA COOPERATIVE EXTENSION	San Diego, CA

<b>Southern Regional Science Association Conference</b>	2023
AMBIENT AIR POLLUTION AND PHYSICAL PRODUCTIVITY: EVIDENCE FROM ULTRAMARATHONS	Savannah, GA

<b>Mid-Continent Regional Science Association Conference</b>	2022
DOES ROAD NETWORK STRUCTURE AFFECT POLLUTION STOCKS AND FLOWS? EVIDENCE FROM ROAD CLOSURES IN VIRGINIA	Virtual

<b>Southern Regional Science Association Conference</b>	2022
DOES ROAD NETWORK STRUCTURE AFFECT POLLUTION STOCKS AND FLOWS? EVIDENCE FROM ROAD CLOSURES IN VIRGINIA	Austin, TX

<b>North American Regional Science Conference</b>	2021
AMBIENT AIR POLLUTION AND PHYSICAL PRODUCTIVITY: EVIDENCE FROM ULTRAMARATHONS	Denver, CO

<b>WVU Division of Resource Economics and Management Seminar</b>	2020
ECONOMIC, ENVIRONMENTAL, AND TECHNICAL GAINS FROM THE KYOTO PROTOCOL: EVIDENCE FROM CEMENT MANUFACTURING	Morgantown, WV

## Grants

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Easton, Z. (PI), White, R., Mercadante, V., Jacobs, L., Pent, G., Golightly, W., Stewart, R., Mehrizi-Sani, A., **Cary, M.**, Stallknecht, E., Fike, J., Chen, Z., and Ignosh, J., (2024-2025). "Sungrazers: Piloting Agri-photovoltaic Solutions for Sustainable Ruminant Production Systems", Virginia Tech Pratt Equipment Fund, \$150,000.

## Teaching Experience

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**AAEC 4324/5244 - Rural and Regional Development Policy**  
VIRGINIA TECH

Fall 2023

**ARE 150 - Introductory Agricultural and Agribusiness Economics**  
WEST VIRGINIA UNIVERSITY

Spring 2023

**ARE 150 - Introductory Agricultural and Agribusiness Economics**  
WEST VIRGINIA UNIVERSITY

Spring 2022

## Advising

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Gabe Wiggins, Agricultural and Applied Economics, M.S., Expected 2026.

## Professional Affiliations

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North American Regional Science Association, Southern Regional Science Association, Agricultural and Applied Economics Association, Southern Agricultural Economics Association, International Society for Forest Resource Economics

## Computer Skills

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**Languages** Python, R, Matlab, Stata, Julia, GAMS,  $\text{\LaTeX}$ , Markdown, Alteryx, Tableau  
**Skills** Statistical Analysis, GIS, Machine Learning, Network Analysis, Textual Analysis/NLP, Web Scraping, Simulation, Mathematical Programming, Data Management, Data Processing, Data Visualization, Dashboard Development

## Industry Experience

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**Data Scientist**  
MYLAN (PRE-MERGER) / VIATRIS (POST-MERGER)

2019 - 2021  
Morgantown, WV

**Data Scientist**  
WVU CENTER FOR ALTERNATIVE FUELS, ENGINES, AND EMISSIONS

2017 - 2019  
Morgantown, WV

**Co-Founder**  
MORGANTOWN FERAL AND STRAY CATS

2015 - 2018  
Morgantown, WV