

Athmanathan Senthilnathan | CV

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Appointments

- **Department of Environmental Studies, Dartmouth College**
Postdoctoral scholar [September 2023 -]
- **Department of Ecology and Evolution, Stony Brook University**
Postdoctoral associate [August 2021 - August 2023]

Education

- **University of Tennessee, Knoxville**
Doctor of Philosophy in Ecology and Evolutionary Biology [August 2015 - July 2021]
Dissertation topic: Ecological consequences of heritable intraspecific variation
Major professor: Sergey Gavrilets
- **University of Tennessee, Knoxville**
Master of Science in Mathematics [August 2015 - December 2018]
- **Indian Institute of Science, Bangalore**
Bachelor of Science (Research) in Mathematics [August 2011 - May 2015]
Thesis topic: Group structures in heterogeneous populations
Major professors: Vishwesha Guttal and Srikanth Iyer

Publications

ORCID iD: 0000-0002-9665-8397

- **Senthilnathan, A.**, D'Andrea, R (2024). Coexistence of competing plants under plant-soil feedback. Ecology Letters. *In Press*
- **Senthilnathan, A.** (2023) Smaller is better in competition for space. Proceedings of the Royal Society B, 290(2001), 20230627. DOI: 0.1098/rspb.2023.0627
- **Senthilnathan, A.**, D'Andrea, R. (2023). Niche theory for competition in a conditionable environment. Ecology, 104(4), e3993. DOI: 10.1002/ecy.3993
- Ou, W. J., Henriques, G. J., **Senthilnathan, A.**, Ke, P., Grainger, T. N., Germain, R. M. (2022). Writing Accessible Theory in Ecology and Evolution: Insights from Cognitive Load Theory. BioScience, 72(3), 300-313. DOI: 10.1093/biosci/biab133
Recommended in Faculty Opinions.
- Grainger, T. N., **Senthilnathan, A.**, Ke, P., Barbour, M. A., Jones, N. T., DeLong, J., Otto, S. P., O'Conner, M. I., Coblentz, K. E., Goel, N., Sakarchi, J., Szojka, M. M., Levine, J. M., Germain, R. M. (2021). An empiricist's guide to using ecological theory. The American Naturalist, 199(1), 1-20. DOI: 10.1086/717206
Recommended in Faculty Opinions.

- Tverskoi, D., **Senthilnathan, A.**, Gavrillets, S. (2021). The dynamics of cooperation, power, and inequality in a group-structured society. *Scientific Reports*, 11(1), 1-16. DOI:10.1038/s41598-021-97863-7
- **Senthilnathan, A.**, Gavrillets, S. (2021). Ecological consequences of intraspecific variation in coevolutionary systems. *The American Naturalist*, 197(1), 1-17. DOI: 10.1086/711886
- Ware, I. M., Fitzpatrick, C. R., **Senthilnathan, A.**, Bayliss, S. L., Beals, K. K., Mueller, L. O., ... & Palkovacs, E. P. (2019). Feedbacks link ecosystem ecology and evolution across spatial and temporal scales: Empirical evidence and future directions. *Functional Ecology*, 33(1), 31-42. DOI: 10.1111/1365-2435.13267
Top downloaded 2018-2019 paper in *Functional Ecology* as of June 2020.
- Nair, G. G., **Senthilnathan, A.**, Iyer, S. K., & Guttal, V. (2019). Fission-fusion dynamics and group-size-dependent composition in heterogeneous populations. *Physical Review E*, 99(3), 032412. DOI: 10.1103/physreve.99.032412

Other publications under review or in revision.....

- **Senthilnathan, A.**, Ong, T. Management history can cause irreversible changes in agroecosystems: an experimental demonstration. *In review* at *Scientific Reports*
Preprint at <https://www.researchsquare.com/article/rs-4837518/latest>
- **Senthilnathan, A.**, Ke, P., Yan, X., Crawford, K., D'Andrea, R. Plants , soil, and coexistence: an alternative approach to modelling plant-soil feedback. *In revision*
- **Senthilnathan, A.**, Gavrillets, S. Ecological and eco-evolutionary dynamics of biotic-abiotic feedbacks. *In revision*

Awards and Honours

- Tom Hallam Award [2021]
Outstanding Graduate Student with interest in Math Ecology or Environmental Ecology
- National Institute for Mathematical and Biological Synthesis Graduate Award - Type A [2019]
"This was a competitive process with evaluation of applications focusing on how well the student's research description aligned with the efforts of NIMBioS at the interface of the quantitative and life sciences and on the justification for how the award would enhance the student's research and/or education."
- Chancellor's fellowship from University of Tennessee [2015-2019]
"The Chancellor's Fellowship is awarded quite selectively and is intended to attract exceptional graduate students to the University of Tennessee"
- National science fellowship (*Kishore Vaigyanik Protsahan Yojana*) [2011-2015]
KVPY is a National Fellowship Program, funded by the Department of Science and Technology to select, highly motivated and talented students for pursuing research in pure science
- Awarded 1st prize in *Mathematics of Planet Earth* (MPE), *TIFR-CAM*, Bangalore [2013]
MPE (2013) is a world wide initiative that aims to promote mathematical research on various processes occurring on planet Earth. In this competition Worked in a team to build a physical model explaining *Critical Transitions* in complex dynamical systems

Oral Presentations

- Canadian Society of Ecology and Evolution (CSEE) - Annual meeting at UBC Vancouver [May 26 - 29, 2024]
(Invited talk) Modifying plant-soil feedback experiments based on niche theory

- Ecology, Evolution and Society Lunch seminar, Dartmouth College [October 10, 2023]
How does plant-soil feedback structure plant communities?
- Ecological Society of America - Mid Atlantic section meeting at University of Delaware [April 30 - May 2, 2023]
Does plant-soil feedback promote coexistence or competitive exclusion?
- Ecology and Evolution Colloquium, Stony Brook University [February 8, 2023]
How does plant-soil feedback structure plant communities?
- Ecological Society of America and CSEE joint meeting at Montreal [August 14-19, 2022]
Niche theory for plant competition in a conditionable environment
(Organized the oral session "Integrating the frontiers of plant-soil feedback research")
- Models in Population Dynamics, Ecology, and Evolution at Leicester [April 20-24, 2020]
(Cancelled due to the COVID-19 pandemic)
Effects of heritable trait variation on two-species coexistence
- American Society of Naturalists satellite meeting at Asilomar, California [January 3-5, 2020]
Coexistence in coevolutionary systems - effects of intraspecific variation
- Ecological Society of America and USSEE joint meeting at Louisville, Kentucky [August 11-16, 2019]
Ecological consequences of intraspecific variation for two-species interactions
- II Joint Congress on Evolutionary Biology at Montpellier, France [August 19-22, 2018]
Coexistence and intraspecific variation
- Center for Ecological Sciences In-House symposium at the Indian Institute of Science [February, 2015]
Group structures in heterogeneous populations

Working Groups

- Theory of microbial symbiosis, Hawai'i Institute of Marine Biology [February 26 - March 15, 2024]
Worked with 11 other early-career ecologists to build mathematical models and theoretical frameworks to address an ecological problem introduced by a senior ecologist every week
- An empiricists' guide to ecological theory, University of British Columbia [May 24-29, 2020]
(Cancelled due to the COVID-19 pandemic, group meetings on zoom). Discussed the significance of the feedback between theoretical and empirical research in ecology. Co-wrote a manuscript outlining how theory is developed and how empiricists can learn about theory and use it effectively

Teaching Experience

- UT CIRTLL Associate Level Certification in Teaching and Learning
- Graduate teaching at the University of Tennessee:
 - MATH 151/152: Mathematics for life sciences [2015-2017]
3 recitation sections for 1 class hour per week; Prepared and instructed students on MATLAB, and problem sets; Grader
 - BIO 150: Organismal and ecological biology [Spring 2019]
3 discussion sections for 1 class hour per week; Lead class discussion and in-class assignments; Grader
 - BIOL 240: Genetics [Fall 2019]
3 discussion sections for 1 class hour per week; Prepared in-class assignments and lead class discussion; Grader
 - EEB 406/MATH 405: Models in Biology [Spring 2020, 2021]
Held office hours for problem sets and exams; Grader
 - BIOL 260: Ecology [Fall 2020]
Held office hours for assignments and exams; Grader

Mentoring

- Jennifer Cao: Post-bachelor researcher [June 2022 - September 2022, May 2023 - November 2023]
Extended single-species stochastic space competition model to two-species and included individual growth dynamics
- Kshan Pandey: High school researcher [October 2021 - February 2023]
Learned basic linear algebra, difference equation modelling and programming in OCTAVE

Academic Service

- Github workshop - Professional development at University of Tennessee, Ecology and Evolutionary Biology
- What does a postdoc do and how to find a postdoc position? - Graduate student professional development at Stony Brook, Ecology and Evolution
- Volterra award judge at ESA 2022
- Student poster judge at ESA Mid Atlantic section meeting 2023

Peer review.....

- (Grant) Division of Environmental Biology, National Science Foundation
- (Manuscript) American Naturalist, Bulletin of Mathematical Biology, Ecology, Ecological Monographs, Frontiers in Ecology and Evolution, Functional Ecology, Journal of Theoretical Biology, PNAS Nexus, Theoretical Ecology, Environmental Microbiology

Programming Skills

C, Octave and MATLAB, Mathematica, Bash, R, HTML/CSS, PHP, TYPE SETTING: \LaTeX

Workshops

- Summer School on Applied Mathematics [June 29 - July 15, 2015]
Indo-French Center for Applied Mathematics (IFCAM), Indian Institute of Science
- Blackwell-Tapia Conference, University of Tennessee [October 28-29, 2016]
- Quantitative Genetics Tutorial, NIMBioS, University of Tennessee [August 8-12, 2016]
- Uncertainty Quantification for Biological Models (Tutorial) [June 26-28, 2017]
NIMBioS, University of Tennessee
- XSEDE HPC Monthly Workshop - MPI [October 3-4, 2017]
- Advanced Computing Facility (ACF) Spring Training [March 15-16, 2018]
Joint Institute for Computation Sciences, University of Tennessee

Outreach and Other Service

- Science Day at Dartmouth - co-led "Tree detectives" activity-based learning for K-12. [April 2024]
- Rules judge for the Tennessee Science Bowl. [2017-2020]
- Co-taught Animal Behavior for middle school kids at the kidsU summer camp in Knoxville, TN. [June 2019]
- Organized activities for kids to learn about evolution at the Farmer's market in Knoxville, TN. [July 2017]
- Volunteered to assist Darwin Day events at the University of Tennessee. [2016, 2017]
- President of Manthan - Indian Students Association in the University of Tennessee. [2017-2018]

References

- **Dr. Theresa Ong**, Postdoc advisor [September 2023 -]
Department of Environmental Studies,
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Hanover, New Hampshire, 03755, USA.
Email: *theresa.w.ong@dartmouth.edu*
- **Dr. Rafael D'Andrea**, Postdoc advisor [August 2021 - August 2023]
Department of Ecology and Evolution,
State University of New York,
Stony Brook, New York, 11794, USA.
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- **Dr. Sergey Gavrilets**, PhD advisor [August 2015 - July 2021]
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