SIMON ASHER LEVIN

James S. McDonnell Distinguished University Professor in Ecology and Evolutionary Biology
Princeton University, Department of Ecology and Evolutionary Biology
102 Guyot Hall, Princeton, NJ 08544-1003, USA. Telephone: 609.258.6880
Mailing Address: 106A Guyot Hall, Princeton, NJ 08544-1003, USA
EEB Website: https://eeb.princeton.edu/people/simon-levin
Levin Lab Website: http://slevin.princeton.edu
ORCID: https://orcid.org/0000-0002-8216-5639

EDUCATION

1964-65	NSF Postdoctoral Fellow, Operations Research, University of California, Berkeley, CA
1964	Ph.D. in Mathematics, University of Maryland, College Park, MD
1961	B.A. in Mathematics, The Johns Hopkins University, Baltimore, MD

PROFESSIONAL EXPERIENCE

Princeton University

2022-	Faculty, Program in Biophysics
2022-	Affiliated Faculty, Center for Health and Wellbeing
2019-	Associated Faculty, Andlinger Center for Energy and the Environment
2017-	Associated Faculty, Princeton University Center for Human Values
2016-	Associated Faculty, Program in Global Health and Health Policy, Princeton School of Public and International Affairs
2016-	James S. McDonnell Distinguished University Professor in Ecology and Evolutionary Biology
2014-	Affiliated Faculty, Center for Policy Research on Energy and the Environment (C-PREE)
2012-	Faculty Associate, Graduate Certificate in Computational and Information Science (PICSciE)
2012-	Faculty Associate, Princeton Institute for International and Regional Studies (PIIRS)
2009-	Faculty, Quantitative and Computational Biology Program, Princeton University
2001-	Director, Center for BioComplexity
1994-	Affiliated Faculty, High Meadows Environmental Institute
1993-98	Founding Director, Princeton Environmental Institute (now High Meadows Environmental Institute)
1992-	Affiliated Faculty, Program in Applied and Computational Mathematics
1992-2016	George M. Moffett Professor of Biology

Cornell University

1992-	Adjunct Professor, Ecology & Evolutionary Biology
1992-	Adjunct Professor, Center for Applied Mathematics
1985-92	Charles A. Alexander Professor, Section of Ecology and Systematics, Division of Biological Sciences
1990-92	Director, Program on Theoretical and Computational Biology
1987-90	Director, Center for Environmental Research
1980-87	Director, Ecosystems Research Center
1977-92	Professor of Applied Mathematics and Ecology, Section of Ecology and Systematics, Division of Biological Sciences
1974-79	Chair, Section of Ecology and Systematics, Division of Biological Sciences
1971-77	Associate Professor, Section of Ecology and Systematics and Department of Theoretical and Applied Mechanics
1965-70	Assistant Professor, Department of Mathematics

Select Visiting & Honorary Positions

2021-23	Honorary Professor, Tsinghua University, Beijing, China
2018-	Distinguished Visiting Professor, Arizona State University

ACHIEVEMENTS IN RESEARCH

Simon Levin is an applied mathematician and ecologist, noted especially for his contributions to the development of the foundations of spatial ecology, for his work on pattern and scale, and more recently for his research at the interface between ecology and economics, especially problems of public goods, common pool resources, and the global commons. His book, *Fragile Dominion*, along with his subsequent research, weaves these themes together, invoking ecological and evolutionary theory to inform principles for management practice. He was won numerous awards, including the 2022 BBVA Foundation Frontiers of Knowledge Award in Ecology and Conservation Biology, 2014 National Medal of Science, 2014 Tyler Prize for Environmental Achievement, 2010 Ramon Margalef Prize in Ecology and Environmental Sciences, 2005 Kyoto Prize in Basic Sciences, and the 2004 A.H. Heineken Prize for Environmental Sciences. Levin's research has been devoted to understanding the dynamics of biological diversity at all levels, from the molecular diversity of diseases to the diversity of global ecological and cultural systems. It is furthermore concerned with exploring the importance of that diversity for

humans, and socioeconomic mechanisms for sustaining diversity. He has combined mathematical modeling with empirical investigations to explore the dynamics of biodiversity and biocomplexity, including infectious diseases and the interactions between ecological systems and socioeconomic systems, with attention to the management of natural resources. Throughout, a central thread has been the development of rules for scaling from the microscopic to the macroscopic, from individuals to collectives, from small scales to large, from short time scales to long. He has built interfaces between theoretical investigations and their application to the management of natural resources, used those applications to stimulate theoretical investigations and the elucidation of general principles for the management of ecological systems.

HONORS AND AWARDS

Major International Prizes

2022	BBVA Foundation Frontiers of Knowledge Award in Ecology and Conservation Biology
2016	National Medal of Science (2014, announced 2015, awarded 2016)
2014	Tyler Prize for Environmental Achievement
2014	Luca Pacioli Prize, Ca'Foscari University of Venice, Italy
2010	Ramon Margalef Prize in Ecology and Environmental Sciences, Government of Catalonia
2005	Kyoto Prize in Basic Sciences, Inamori Foundation, Japan
2004	A.H. Heineken Prize for Environmental Sciences, Royal Netherlands Academy of Arts and Sciences

Major Honorary Societies

2014	Foreign Member, Istituto Lombardo di Scienze e Lettere, Milan, Italy
2008	Foreign Member, Istituto Veneto di Scienze, Lettere ed Arti, Venice, Italy
2003	Member, American Philosophical Society
2000	Member, National Academy of Sciences
1992	Fellow, American Academy of Arts and Sciences

Major Society Awards

2021	Fellow, American Mathematical Society (AMS)
2012	Fellow, Ecological Society of America
2011	National Associate, National Research Council of the National Academies
2010	Eminent Ecologist Award, Ecological Society of America
2009	Fellow, Society for Industrial and Applied Mathematics
2007	Distinguished Scientist Award, American Institute of Biological Sciences
2006	I.E. Block Community Lecture Award, Society for Industrial and Applied Mathematics
2003	Distinguished Landscape Ecologist Award, U.S. Regional Association of the International Association for Landscape Ecology (US-IALE)
2001	The First Okubo Lifetime Achievement Award, Society for Mathematical Biology and Japanese Society for Theoretical Biology
1998	Distinguished Service Citation of the Ecological Society of America
1994	Distinguished Statistical Ecologist Award, International Association for Ecology (INTECOL)
1992	Fellow, American Association for the Advancement of Science (AAAS)
1988	MacArthur Award, Ecological Society of America

Honorary Degrees

2019	Honorary Doctor of Science, University of Victoria
2015	Honorary Doctor of Science, McMaster University
2009	Honorary Doctor of Science, Michigan State University
2004	Honorary Doctor of Humane Letters Honoris Causa, Whittier College
1990	Honorary Doctor of Science, Eastern Michigan University

Fellowships

1983-84	Japan Society for the Promotion of Science Fellowship, Kyoto, Japan
1979-80	Fellowship, Applied Mathematics, John Simon Guggenheim Memorial Foundation
1964-65	NSF Postdoctoral Fellow, University of California, Berkeley
1962-64	NSF Predoctoral Fellow, University of Maryland, College Park

Publication Awards

2023 Co-author of Most Cited Paper in Population Ecology, 2021-2023, for: Pinsky, M.L., Fenichel, E., Fogarty, M., Levin, S., McCay, B., St. Martin, K., Selden, R.L., and T. Young. 2020. Fish and Fisheries in hot water: What is happening and how do we adapt? *Population Ecology*. https://doi.org/10.1002/1438-390X.12050.

2023 Co-author of Honorable Mention (Outstanding Ecological Theory Paper Award category) from the Ecological Society of America (ESA) for: Gibbs, T., Levin, S.A., and J.M. Levine. 2023. Coexistence in diverse communities with higher-order interactions. *PNAS* 119(43): e2205063119.

2021 Co-author of ESA Outstanding Paper (Theory Section) for: Goel, N., Guttal, V., Levin, S.A., and A.C. Staver. 2020. Dispersal increases the resilience of tropical and savanna and forest distributions. *The American Naturalist* 195(5): 833–850.

2020   Co-author of ESA Outstanding Paper Prize 2020 (Theory Section) for: Tekwa, E., Fenichel, E.P., Levin, S.A., and M. Pinsky. 2019. Path-dependent institutions drive alternative stable states in conservation. *PNAS* 116(2): 689–694.

2018   Co-author of One of the Most-Cited 2018 *PNAS* Papers for: Klein, E.Y., Van Boeckel, T.P., Martinez, E.M., Pant, S., Gandra, S., Levin, S.A., Goossens, H., and R. Laxminarayan. 2018. Global increase and geographic convergence in antibiotic consumption between 2000 and 2015. *PNAS* 115(15): E3463–E3470.

2018   International Consortium of Chinese Mathematicians (Beijing) Best Paper Award 2018 for: Lei, J., Levin, S.A., and Nie, Q. 2014. Mathematical model of adult stem cell regeneration with cross-talk between genetic and epigenetic regulation. *PNAS* 111(10): E880–887.

2014   Co-author of President's Award for best paper in *The American Naturalist* for: Farrior, C.E., Dybzinski, R., Levin, S., and S. Pacala. Competition for water and light in closed-canopy forests: A tractable model carbon of allocation with implications for carbon sinks. *The American Naturalist* 181(3): 314–330

2012   Co-author of George Mercer Award 2012 for: Staver, A.C., Archibald, S., and S. Levin. 2011. Tree cover in sub-Saharan Africa: Rainfall and fire constrain forest and savanna as alternative stable states. *Ecology* 92(5): 1063–1072.

2010   A Most Cited Paper(s) 2005-2009, Elsevier's Economic and Finance Journals for: Durrett, R. and S.A. Levin. 2005. Can stable social groups be maintained by homophilous imitation alone? *Journal of Economic Behavior and Organization* 57(3): 267–286.

2002   Most Cited Paper in the Field of Ecology and Environment for the 1990s (Institute for Scientific Information, Philadelphia, PA) for: Levin, S.A. 1992. The problem of pattern and scale in ecology. *Ecology* 73(6): 1943–1967.

2001   Outstanding Paper in the Discipline of Landscape Ecology Award for 2001 (U.S. Chapter, International Association for Landscape Ecology) for: Keymer, J.E., Marquet, P.A., Velasco-Hernandez, J.X. and S.A. Levin. 2000. Extinction thresholds and metapopulation persistence in dynamic landscapes. *The American Naturalist* 156(5): 478–494.

Other Honors & Awards

2024   Sven Berggren Prize Royal Physiographic Society, Lund, Sweden (announced in 2023; to be awarded in 2024)

2024   Research Excellence Award, University of Maryland Alumni Association (announced in 2023; awarded in 2024)

2022   Distinguished Senior Fellow, Intercollegiate Biomathematics Alliance

2022   Fellow, Academia Europaea

2021   Highly Cited Researcher, Web of Science Group

2021   Luohun Academy Distinguished Fellow, Hangzhou, China

2020   Research Fellow, Gruter Institute for Law and Behavioral Research

2020-23   Affiliate, MIT Laboratory for Financial Engineering (LFE)

2019-23   Highly Cited Researcher, Web of Science Group

2018   Lifetime Fellow, Santa Fe Institute, Santa Fe, NM

2017   Society for Mathematical Biology Fellow

2014   IIASA Distinguished Visiting Fellow

2014   The Mathematical, Computational and Modeling Sciences Center at Arizona State University Relaunched in Honor of Simon A. Levin as The Simon A. Levin Mathematical, Computational, and ModelingSciences Center

2012   IIASA Honorary Scholar

2011   Distinguished Alumnus of the Year Award, University of Maryland, College of Computer, Mathematical and Natural Sciences

2009   SIAM Fellow

2007   Beijer Fellow, Beijer Institute of Ecological Economics, Stockholm, Sweden

2008   University Fellow, Resources for the Future

2004   Medallion of the Université de Montpellier

2004-05   Clay Mathematics Institute Senior Scholar

1991   The Honor Society of Phi Kappa Phi Biology Colloquium Award, Oregon State University

CURRENT PROFESSIONAL ACTIVITIES

SCIENCE/ADVISORY:

Board of Directors

Vice Chair (Mathematics), The Committee of Concerned Scientists (1979-)

Science/Advisory Boards

Advisory Board, Institute for Medical BioMathematics, Bene Ataroth, Israel (1999-)

Chair, Scientific Advisory Board, Quantitative Biology Group, African Institute for Mathematical Sciences (AIMS) (2014-)

Scientific Advisory Board, Vienna Complexity Hub, Vienna, Austria (2016-)

Advisory Board, Institute for the Mathematical Sciences of the Americas, University of Miami (Funded by the Simons Foundation) (2018-)

Scientific Advisory Council, Stockholm Resilience Centre (2019-)

Scientific Advisory Board, Instituto Serrapilheira, Brazil (2019-); SAB, Serraphilheira: Training Program in Biology and Ecology (Serraphilheira with ICTP-SAIFR (2020-)

Scientific Advisory Board, The Future of the Greater Venice: Toward Seven Transition Scenarios to a Thriving Venice 2100, Istituto Veneto di Science, Lettere ed Arti, Venice (2023-)

Advisory Committees

Advisory Committee, Program at the Isaac Newton Institute for Mathematical Sciences on "The Mathematics of Movement" (2021-)

Advisory Board, University of Virginia Global Biothreats T32 Training Program (2022-)

Advisory Group, Complexity Science Coalition, UNESCO Management of Social Transformations Program (2024-)

Planning/Organizing Committees

Co-Director & Co-Organizer, Planning Committee, Complexity Theory and International Relations Study Group, with New America and Arizona State University

Other Committees

ESA Past Presidents Committee

Review Committee, NAS, Review of Board on Mathematical Sciences and Analytics

Fellows Selection Committee, Schmidt Futures and Rhodes Trust, Oxford, UK (2021-)

Scientific and Strategic Partnerships Committee, Global South Artificial Intelligence for Pandemic and Epidemic Preparedness and Response Network, University of Toronto, Canada (2022-)

External Review Committee, Natural Capital Project, Stanford University (2023-)

Memberships

Pandemic Research for Preparedness and Resilience (PREPARE), University of Virginia, Biocomplexity Institute (2021-)

SSE Corona Economics Research Network (SSE-CERN), Stockholm School of Economics (2020-)

PRINCETON UNIVERSITY SERVICE:

Directorships

Co-Director and Co-Faculty Organizer of EEB's Theoretical Ecology Tea (2022-)

Advisory Boards

Faculty Advisory Board/Faculty Review Board, Princeton Undergraduate Research Journal (2016-)

Faculty Advisory Group, Center for Jewish Life (2021-)

Committees

Faculty Advisory Committee, High Meadows Environmental Institute (formerly Princeton Environmental Institute) (1993-)

Innovation Fund for the Campus as a Lab, Office of the Dean of Research

Executive Committee of the Sustainable Energy (SE) Program, Andlinger Center (2019-25)

Advisory Committee, Electoral Innovation Lab (2021-)

Memberships

Research Community on Global Systemic Risk, PIIRS

Other

Faculty Fellows Program, Butler College

Participant, Princeton's Chapter of EWB (Engineers Without Borders) with SEADS (Sustainable Engineering and Development Scholars) Program

Coordinator, MBI-Princeton Institute Partner Program (2015-)

Princeton Director of Princeton University Partnership with Stockholm Resilience Centre and Potsdam Institute for Climate Impact Research, Resilience in Social and Environmental Systems Project

Director and Co-Organizer, Princeton University-Arizona State University Partnership, Dialogues in Complexity

Mentor, Climate and Environmental Sciences and Engineering Graduate Fellowship Program, HMEI (2023-)

EDITORIAL:

Editor-in-Chief/Managing Editor

Monographs in Population Biology (with Corina Tarnita and Rob Pringle), Princeton University Press (1992-)

Complexity Series (with co-editor Stephen Strogatz), Princeton University Press (1997-)

Princeton Series in Theoretical and Computational Biology, Princeton University Press (2003-)

Honorary Editor

Journal of Mathematical Biology (Co-Managing Ed. 1976-95; Advisory Ed., 1973-76; Honorary Ed. 1995-)

Bulletin for Mathematical Biology (1996-)

Theoretical Ecology (2006-)

Editor

Founding Associate Editor, Collective Intelligence (2020-)

Editorial Boards

Mathematical and Computer Modelling (1979-)

Applied Mathematics Letters (1987-)

Mathematical Biosciences (1987-)

Papers on Mathematical Ecology (1987-)

Faculty of 1000, Co-Section Head, Theoretical Ecology (2004-)

Journal of Biomathematics (Series B, English) (2006-)

Princeton University Press, Primers in Complexity (2007-)

Princeton University Press, Science Essential Series (2007-)

PNAS (2011-)
PeerJ (2012-)
Movement Ecology (2012-)
Experiments in Engagement (EiE), part of PNAS (2015-)
Advisory Boards
Mathematical Biosciences and Engineering (2004-)
Journal of Biological Dynamics (2006-)
Landscape Ecology (2006-)
PLoS Computational Biology (2007-)
Specialty Lead of Theoretical Biology, H1Connect (Formerly F1000Prime, then Faculty Opinions) (2013-)
Collective Intelligence (ACM and Sage) (2020-)
Ecology, Economy and Society (2021-)
Mathematical Biosciences (2023-)

SELECT OTHER CURRENT PROFESSIONAL ACTIVITIES
Academic Fellow, Boston Consulting Group

PUBLICATIONS
Google Scholar
https://scholar.google.com/citations?user=7PeekG0AAAAJ&hl=en

MyBibliography
http://www.ncbi.nlm.nih.gov/pubmed/?term=levin+s+a.

SELECT PUBLICATIONS

Flierl, G., Grünbaum, D., **Levin, S.A.**, and D. Olson. 1999. From individuals to aggregations: The interplay between behavior and physics. *Journal of Theoretical Biology* 196: 397–454.

Kempes. C.P., Follows, M.J., Smith, H., Graham, H., House, C.H., and **S.A. Levin**. 2021. Generalized stoichiometry and biogeochemistry for astrobiological applications. *Special Issue of Bulletin of Mathematical Biology in honor of Jim Murray* 83: 73.

Levin, S.A. 2003. Complex adaptive systems: Exploring the known, the unknown and the unknowable. *Bulletin of the American Mathematical Society* 40: 3–19.

Levin, S.A. 1992. The problem of pattern and scale in ecology. *Ecology* 73(6): 1943–1967. Reprinted in *Ecological Time Series*, eds. J. Steele and T. Powell, 277–326. New York: Chapman & Hall: 1995.

Levin, S.A., Anderies, J.M., Adger, N., Barrett, S. Bennett, E.M., Cardenas, J.C., Carpenter, S.R., Crépin, A.-S., Ehrlich, P., Fischer, J., Folke, C., Kautsky, N., Kling, C., Nyborg, K., Polasky, S., Scheffer, M., Segerson, K., Shogren, J., van den Bergh, J., Walker, B., Weber, E.U., and J. Wilen. 2021. Governance in the face of extreme events: Lessons from evolutionary processes for structuring interventions, and the need to go beyond. *Ecosystems*: doi:10.1007/s10021-021-00680-2.

Levin, S.A., and A.W. Lo, eds. 2021. *PNAS Special Feature on Evolutionary Models of Financial Markets. PNAS* 118(26). Available from: https://www.pnas.org/content/118/26.

Levin, S.A., Milner, H.V., and C. Perrings, eds. 2021. *PNAS Special Feature on Political Polarization. PNAS* 118(50). Available from: https://www.pnas.org/content/118/50.

Morris, D.H., Rossine, F.W., Plotkin, J.B., and **S.A. Levin**. 2021. Optimal, near-optimal, and robust epidemic control. *Communications Physics* 4(1): 1–8.

Okubo, A. and **S.A. Levin**, eds. 2001. *Diffusion and Ecological Problems: Modern Perspectives. Interdisciplinary Applied Mathematics,* Vol. 14. New York, NY: Springer.

Patterson, D.D., **Levin, S.A.**, Staver, A.C., and J.D. Touboul. 2020. Probabilistic foundations of the spatial mean-field models in ecology and applications. *SIAM Journal on Applied Dynamical Systems* 19(4): 2682–2719.

Romano, R., and **S. Levin.** 2021. Sunsetting as an adaptive strategy. *PNAS Special Feature on Evolutionary Models of Financial Markets. PNAS* 118(26): e2015258118.

Saad-Roy, C.M., Grenfell, B.T., **Levin, S.A.**, Pellis, L., Stage, H.B., van den Driessche, P., and N.S. Wingreen. 2021. Superinfection and the evolution of an initial asymptomatic stage. *Royal Society Open Science* 8: 202212.

Saad-Roy, C.M., Grenfell, B.T., **Levin, S.A.**, van den Driessche, P., and N.S. Wingreen. 2021. Evolution of an asymptomatic first stage of infection in a heterogeneous population. *Journal of the Royal Society Interface* 18(179): 20210175.

Saad-Roy, C.M., Morris, S.E., Metcalf, C.J.E., Mina, M.J., Baker, R.E., Farrar, J., Holmes, E.C., Pybus, O.G., Rambaut, A., Graham, A.L., **Levin, S.A.**, Grenfell, B.T., and C.E. Wagner. 2021. Epidemiological and evolutionary considerations of SARS-CoV-2 vaccine dosing regimes. *Science:* 372(6540): 363–370.

Saad-Roy, C.M., Wagner, C.E., Baker, R.E., Morris, S.E., Farrar, J., Graham, A.L., **Levin, S.A.**, Metcalf, C.E., and B.T. Grenfell. 2020. Immune life-history, vaccination and the dynamics of SARS-CoV-2 over the next five years. *Science* 10: 1126.

Saad-Roy, C.M., Wingreen, N.S., **Levin, S.A.**, and B.T. Grenfell. 2020. Dynamics in a simple evolutionary-epidemiological model for the evolution of an initial asymptomatic infection stage. *PNAS* 117(21): 11541–11550.

Touboul, J.D., Staver, A.C., and **S.A. Levin**. 2018. On the complex dynamics of savanna landscapes. *PNAS* 115(7): E1336–E1345.

Wagner, C.E., Saad-Roy, C.M., Morris, S.E., Baker, R.E., Mina, M.J., Farrar, J., Holmes, E.C., Pybus, O.G., Graham, A.L., Emanuel, E.J., **Levin, S.A.**, Metcalf, C.J.E., and B.T. Grenfell. 2021. Vaccine nationalism and the dynamics and control of SARS-CoV-2. *Science* 373(6562): doi: 10.1126/science.abj7364.

Xu, L., Patterson, D., Staver, A.C., **Levin, S.A.**, and J. Wang. 2021. Unifying deterministic and stochastic ecological dynamics via a landscape-flux approach. *PNAS* 118(24): e2103779118.