

# Jaideep Joshi

Researcher in eco-evolutionary theory, plant ecophysiology, vegetation modelling, and high-performance computing

## Education

PhD, Indian Institute of Science, Bengaluru, India (2018)

Thesis title: Spatial and coevolutionary dynamics of cooperation

Thesis supervisor: Vishwesh Guttal

Bachelor of Technology, Indian Institute of Technology

Bombay, Mumbai, India (2011)

BTech (with Honours) in Electrical Engineering, with Minor in Environmental Science, GPA: 8.8/10.0

## Experience

International Institute for Applied Systems Analysis,

Laxenburg, Austria

Research Scholar, Advancing Systems Analysis Program (ASA) 01.08.2021 - 30.09.2022

Marie Skłodowska-Curie Individual Fellow, ASA 01.08.2019 - 31.07.2021

Indian Institute of Science, Bengaluru, India

Research Associate, Divecha Centre for Climate Change 01.02.2018 - 15.05.2019

Research Associate, Centre for Ecological Sciences (CES) 24.05.2017 - 31.01.2018

PhD Student, CES 01.08.2012 - 23.05.2017

Project Assistant, CES 01.02.2012 - 31.07.2012

Ecofirst Services Pvt. Ltd., Mumbai, India

Senior Executive 30.06.2011 - 31.12.2011

IBM Software Labs, Bengaluru, India

Extreme Blue Technology Intern 12.05.2010 - 23.07.2010



## Current Positions

Advanced Postdoc,  
University of Bern,  
Bern, Switzerland  
(since 01.10.2022)

Guest Research  
Scholar,  
International Institute  
for Applied Systems  
Analysis,  
Laxenburg, Austria  
(since 01.10.2022)

Visiting Researcher,  
Okinawa Institute of  
Science and Technology  
Graduate University,  
Okinawa, Japan  
(offered to start  
01.02.2023)

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## Research Funding Received

Research funding from the IIASA Strategic Initiatives Program 2022

EUR 260,000 for two years

*Role:* Co-PI for project *RESIST*, together with Dr. Florian Hofhansl, IIASA

GPU Grant from NVIDIA Corporation 2020

Funding in the form of one Titan-V GPU worth EUR 3,300

*Role:* Co-author and co-proposer of the grant application

Research funding from the European Commission under the Horizon 2020 research and innovation program 2019

EUR 186,167 for two years

*Role:* Marie Skłodowska-Curie Individual Fellow leading the project *Plant-FATE*, under the supervision of Dr. Ulf Dieckmann

Stipend and travel grant from TIFAC, Govt of India 2015

EUR 3900 for three months

*Role:* Young Scientists Summer Program Fellow at IIASA, Austria

Funding from Indian Space Research Organization and IIT Bombay 2007

INR 1.5 crore (~EUR 186,000)

*Role:* Member of the founding team and head, Attitude Determination and Controls Subsystem of *Pratham*, IIT Bombay's Student Satellite Program

## Other Funding Received

Travel grant from the Center for Tropical Forest Science 2017

All expenses covered to attend the ForestGEO workshop at San Juan, Puerto Rico

Travel grant from the International Society of Behavioral Ecology 2014

\$2500 to attend the ISBE2014 conference at New York, USA

Travel grant from the Society for Study of Evolution 2014

\$1800 to attend the Evolution2014 conference at North Carolina, USA

Travel grant from Department of Science and Technology, Govt of India 2013

Approx. \$1000 to attend workshop on Inclusive fitness and Game theory held at Arolla, Switzerland

## Fellowships and Awards

<b>Marie Skłodowska-Curie Actions Individual Fellowship</b>	2019
from the European Commission with a perfect evaluation score of 5.0/5.0	
<b>Young Scientists Summer Program (YSSP) Fellowship</b>	2015
from the International Institute for Applied Systems Analysis, Laxenburg Austria	
<b>Undergraduate Research Awards I and II</b>	2010, 2011
at the Indian Institute of Technology, Bombay, India	

## Mentoring and Supervision

<b>Undergraduate students (2)</b>	2021 - 2022
Co-supervised semester projects at BITS Goa, India	
<b>PhD Students (3)</b>	2021 - 2022
Co-supervised for part of their PhD at IIASA, Austria, and OIST, Japan	
<b>Project Assistants (2)</b>	2017 - 2018
Co-supervised for 1 year each at IISc, India	

## Teaching

Teaching assistant for a course on Mathematical Ecology, Indian Institute of Science (two batches).	2013, 2014
Conducted informal basic mathematics tutorials for PhD students, Indian Institute of Science	2012 - 2013

## Institutional Responsibilities and Academic Service

<b>Co-organized</b> an international Future Earth Workshop on “Data and tools for climate resilience planning”, with participants from the USA, Sri Lanka, Nepal, Bhutan, Bangladesh, and Myanmar	2018
<b>Co-coordinated</b> the work of seven PIs involved in the ‘Forests and Biodiversity’ Chapter of India’s 3 <sup>rd</sup> National Communication to the UNFCCC	2017 - 2019
<b>Volunteered</b> in the organization of the Students Conference on Conservation Science (Bangalore), headed the food committee	2013 - 2015
<b>Served as Secretary</b> of the Ecology Students Society, Indian Institute of Science, Bangalore, India. Role: organization of departmental events, workshops, and invited seminars.	2013

## Presentations in International Conferences

Mathematical Models in Ecology and Evolution, Reading, UK (invited)	2022
EGU General Assembly Conference, Vienna, Austria	2020 - 2022
IUCN-NABARD Workshop on the “Role of Forest Ecosystems in Meeting Sustainable Development Goals in South Asia”, Goa, India (invited)	2019
Young Scientists Workshop on Effect of Climate Change on Biodiversity, Peradeniya, Sri Lanka (invited)	2017
CTFS-ForestGEO Workshop, San Juan, Puerto Rico	2017
Mathematical Models in Ecology and Evolution, London, UK	2017
Evolution 2014, North Carolina, USA	2014
International Society for Behavioral Ecology Conference 2014, New York, USA	2014
Animal Behavior Society Conference, Princeton, USA	2014
Workshop on Inclusive Fitness and Game Theory, Arolla, Switzerland	2013

## Reviewing Activities

Reviewer for Nature Plants, New Phytologist, Tropical Ecology, Current Science

## Public Engagement / Media Coverage

<a href="#">Times of India</a>	2 hot, too soon
<a href="#">Economic Times</a>	A multi-model boost for climate change research in India
<a href="#">Deccan Herald</a>	Mercury rising
<a href="#">Nature India blog</a>	Two degrees of concern
<a href="#">Research Matters</a>	New study in mobility may prove helpful in understanding metastasis of tumour cells
<a href="#">Horizon Magazine</a>	Protecting forests on the front line of the climate-change battle ( <a href="#">article</a> and <a href="#">video</a> )

## Languages

English	●●●●●●
Marathi	●●●●●●
Hindi	●●●●●○
Sanskrit	●●●●○○
Kannada	●●○○○○
German	●○○○○○

## Skills

C/C++, CUDA, OpenGL  
R, MATLAB, Python  
LATEX  
Tensorflow  
Android Studio  
Maya, Photoshop

## Interests

Figure drawing and portrait painting  
Indian Philosophy  
Kalaripayattu (an ancient Indian martial art form)

 @tantric.tiger

 Tantric Tiger Art

## Major International Collaborations

- RESIST** Through the RESIST project that I am co-leading, we are collaborating with leading researchers from India, Israel, Brazil, and the UK, for model development and case studies in diverse biomes across these countries.
- Amazon-FACE** Ongoing collaboration with Dr David Lapola, Universidade Estadual de Campinas, Brazil, PI for the Amazon-FACE project. We are contributing predictions of productivity and diversity under ambient and elevated CO<sub>2</sub> for the Model Intercomparison Project (MIP) within Amazon-FACE.
- LEMONTREE** Ongoing collaboration with Prof. Sandy Harrison, University of Reading, UK, and Prof. Iain Colin Prentice, Imperial College London, UK. I am contributing hydraulically explicit optimality-based models of photosynthesis and transpiration.
- REALM** Ongoing collaboration with Prof. Iain Colin Prentice, Imperial College London, UK. I am contributing optimality-based models of photosynthesis, xylem hydraulics, and plant dimensional relationships.
- Virtual Rainforest** Ongoing collaboration with Prof. Robert Ewers, Imperial College London, UK. The project involves developing a systems model for simulating rainforest dynamics, for which I am contributing our Plant-FATE eco-evolutionary vegetation model (EVM) as the vegetation module.
- ForestGEO** Ongoing collaboration with researchers from the ForestGEO Network, for calibrating and applying the Plant-FATE EVM to the ForestGEO sites.

## Publications

1. Franklin, O., Fransson, P., Hofhansl, F., & **Joshi, J.** (2022). Optimal balancing of xylem efficiency and safety explains plant vulnerability to drought. bioRxiv, 10.1101/2022.05.16.491812. **Contribution:** *Conceptual development of the model and model analyses; co-corresponding author.*
2. **Joshi, J.**, Stocker, B. D., Hofhansl, F., Zhou, S., Dieckmann, U., & Prentice, I. C. (2022). Towards a unified theory of plant photosynthesis and hydraulics. Nature Plants, in press, 10.1038/s41477-022-01244-5.
3. **Joshi, J.**, & Sukumar, R. (2021). Improving prediction and assessment of global fires using multilayer neural networks. Scientific Reports, 11(1), 3295. <https://doi.org/10.1038/s41598-021-81233-4>.
4. Harrison, S. P., Prentice, I. C., Bloomfield K. J., Dong, N., Forkel, M., Forrest, M., Ningthoujam, R. K., Pellegrini, A., Shen, Y., Baudena, M., Cardoso, A. W., Huss, J. C., **Joshi, J.**, Oliveras, I., Pausas, J. G., Simpson, K. J. (2021) Understanding and modelling wildfire regimes: an ecological perspective. Environmental Research Letters, 16(12), 125008. **Contribution:** *contributed text explaining the resistance-resilience tradeoff axis and related plant strategies.*
5. Harrison, S. P., Cramer, W., Franklin, O., Prentice, I. C., Wang, H., Brännström, Å., de Boer, H., Dieckmann, U., **Joshi, J.**, Keenan, T. F., Lavergne, A., Manzoni, S., Mengoli, G., Morfopoulos, C., Peñuelas, J., Pietsch, S., Rebel, K. T., Ryu, Y., Smith, N. G., Stocker, B. D., Wright, I. J. (2021). Eco-evolutionary optimality as a means to improve vegetation and land-surface models. New Phytologist, 231(6), 2125–2141. **Contribution:** *contributed text explaining the use of eco-evolutionary principles beyond the leaf level, in the context of evolutionary dynamics and frequency dependent selection.*
6. **Joshi, J.**, Brännström, Å., & Dieckmann, U. (2020) The emergence of social inequality in the spatial harvesting of ecological public goods. PLoS Computational Biology, 16(1), e1007483.
7. **Joshi, J.**, & Guttal, V. (2018). Demographic noise and cost of greenbeard can facilitate greenbeard cooperation. Evolution 72 (12), 2595-2607.
8. **Joshi, J.**, Couzin, I. D., Levin, S. A., & Guttal, V. (2017). Mobility can promote the evolution of cooperation via emergent self-assortment dynamics. PLOS Computational Biology, 13(9), p.e1005732.
9. Chaturvedi, R. K., Kulkarni, A., Karyakarte, Y., **Joshi, J.**, & Bala, G. (2014). Glacial mass balance changes in the Karakoram and Himalaya based on CMIP5 multi-model climate projections. Climatic Change, 123(2), 315-328. **Contribution:** *Provided multi-model climate change projections for the study area.*
10. Bala, G., **Joshi, J.**, Chaturvedi, R. K., Gangamani, H. V., Hashimoto, H., & Nemani, R. (2013). Trends and variability of AVHRR-derived NPP in India. Remote Sensing, 5(2), 810-829. **Contribution:** *Assembled data and performed the analysis.*
11. Chaturvedi, R. K., **Joshi, J.**, Jayaraman, M., Bala, G., & Ravindranath, N. H. (2012). Multi-model climate change projections for India under representative concentration pathways. Current Science, 103(7), 791-802. **Contribution:** *Assembled data and performed the analysis.*
12. Kulakarni, T., & **Joshi, J.** (2013). The Language of Logic: Navyanyāya Perspectives. Manipal University Press.
13. Mulay, S. S., **Joshi, J.**, Chati, Y. S., Unhelkar, V. V., Bandyopadhyay, S., Tamaskar, S., Bommanahal, M., Talnikar, C., Kumar, A. & Hablani, H. B., (2012). Attitude determination and control of *Pratham*, Indian Institute of Technology Bombay's first student satellite. Advances in the Astronautical Sciences, 145, 1509-1528. **Contribution:** *Designed and simulated the control system, supervised the implementation.*

Citations: 539

Google Scholar: <https://bit.ly/2ULN456>