

MEHA JAIN

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EMPLOYMENT

- **University of Michigan, Assistant Professor**
School for Environment and Sustainability. September 2016 to present.

EDUCATION

- **Stanford University, Postdoctoral Fellow**
Department of Earth System Science. August 2014 to August 2016.
Advisor: David Lobell
- **Columbia University, Ph.D.**
Department of Ecology, Evolution, and Environmental Biology. September 2008 to July 2014.
Advisors: Ruth DeFries and Shahid Naeem
- **Princeton University, A.B., *cum laude***
Department of Ecology and Evolutionary Biology. September 2003 to May 2007.
Advisor: Daniel Rubenstein

PUBLICATIONS

⁺ denotes shared first authorship

Students I have advised are underlined

I was on maternity leave from January – April 2020.

Citations: 2290, h-index: 20; i10 index: 30 (Google Scholar, 5-20-21)

1. Ishtiaque, A., S. Singh, D.B. Lobell, B. Singh, R. Fishman, **M. Jain** (Submitted). Factors associated with early wheat sowing - an adaptation to warming temperatures - in India.
2. Bhattacharai, N*, A. Pollack*, D.B. Lobell, R. Fishman, B. Singh, A. Dar, **M. Jain** (In Revision). The impacts of groundwater depletion on agricultural production in India.
3. Rao, P.*, W. Zhou*, N. Bhattacharai, A.K. Srivastava, B. Singh, S. Poonia, D.B. Lobell, **M. Jain** (2021). [Using Sentinel-1, Sentinel-2, and Planet Imagery to Map Crop Type of Smallholder Farms](#). Remote Sensing. 13(10): 870
4. **Jain, M.**, R. Fishman, P. Mondal, G.L. Galford, N. Bhattacharai, S. Naeem, U. Lall, B. Singh, R.S. DeFries (2021). [Groundwater depletion will reduce cropping intensity in India](#). Science Advances. 7 (9): eabd2849
* Press: [CNN](#), [NPR](#), [The Hindu](#), [AAAS](#), [Michigan News](#), [Earther](#), [SciDev](#)
5. Liu, T., L.J. Mickley, S. Singh, **M. Jain**, R.S. DeFries, M.E. Marlier (2020). Crop residue burning practices across north India inferred from household survey data: bridging gaps in satellite observations. *Atmospheric Environment*.
6. Ricciardi, V., A. Wane, B.S. Sidhu, C. Goode, D. Solomon, E. McCullough, F. Diekmann, J. Porciello, **M. Jain**, N. Randall, Z. Mehrabi (2020). A scoping review of research funding for small-scale farmers in water scarce regions. *Nature Sustainability*. 3: 836-844. [Part of a Nature Collection on sustainable solutions to end hunger by the Ceres2030 team](#)

7. Newport, D., D.B. Lobell, B. Singh, A.K. Srivastava, P. Rao, M. Umashaanker, R.K. Malik, A. McDonald, **M. Jain** (2020). Factors Constraining Timely Sowing of Wheat as an Adaptation to Climate Change in Eastern India. *Weather, Climate, and Society*.
8. Tellman, E., S. Sesnie, N. Magliocca, E.A. Nielsen, J. Devine, K. McSweeney, **M. Jain**, D. Wrathall, K. Benessaiah, B. Aguilar-Gonzalez (2020). Illicit Drivers of Land Use Change: Narcotrafficking and Forest Loss in Central America. *Global Environmental Change*.
9. **Jain, M.**, D. Solomon, H. Capnerhurst, A. Arnold, A. Elliott, A. Kinzer, C. Knauss, M. Peters, B. Rolf, A. Weil, C. Weinstein (2020). How much can sustainable intensification increase yields across South Asia? A systematic review of the evidence. *Environmental Research Letters*.
10. Kubitza, C., V. Krishna, U. Schultess, **M. Jain** (2020). Estimating Adoption and Impacts of Agricultural Innovations using Satellite Data: A Scoping Review. *Agronomy for Sustainable Development*. 40:16
11. Singh, S., A.D. Jones, **M. Jain** (2020). Regional differences in agricultural and socioeconomic factors associated with farmer household dietary diversity in India. *PLOS ONE*. 15(4): e0231107.
12. Elmes, A., H. Alemohammad, R. Avery, K. Caylor, R. Eastman, L. Fishgold, M. Friedl, **M. Jain**, D. Kohli, J.C. Laso Bayas, D. Lunga, J. McCarty, R.G. Pontius Jr., A.B. Reinmann, J. Rogan, L. Song, H. Stoyanova, S. Ye, Z.F. Yi, L. Estes (2020). Accounting for training error in machine learning applied to Earth observations. *Remote Sensing*. 12 (6).
13. Paliwal, A., **M. Jain** (2020). The accuracy of self-report yield estimates and their ability to train remote sensing algorithms. *Frontiers in Sustainable Food Systems*. 4 (25).
14. **Jain, M.** (2020). The Benefits and Pitfalls of Using Satellite Data for Causal Inference. *Review of Environmental Economics and Policy*. 14(1). 157-169.
15. Singh, S., A.D. Jones, R.S. DeFries, **M. Jain** (2020). Implications of farmer livelihood transitions on intra-household dietary diversity in India. *Food Security*.
16. **Jain, M.**, B. Singh, P. Rao, A.K. Srivastava, S. Poonia, J. Blesh, G. Azzari, A.J. McDonald, D.B. Lobell (2019). The impacts of agricultural interventions can be doubled by using satellite data. *Nature Sustainability*. 2, 931-934. * Press: [Nature Sustainability News & Views](#), [Michigan News](#), [Outlook India](#), [India TV News](#), [Smithsonian Magazine](#)
17. Bhattacharai, N., K. Mallick, J. Stuart, B.D. Vishwakarma, R. Niraula, S. Sen, **M. Jain** (2019). An automated multi-model evapotranspiration mapping framework using remotely sensed and reanalysis data. *Remote Sensing of Environment*. 229: 69-92.
18. Liu, T., M.E. Marlier, A.N. Karambelas, **M. Jain**, S. Singh, M.K. Singh, R. Gautam, and R.S. DeFries (2019). Missing emissions from post-monsoon agricultural fires in northwestern India: regional limitations of MODIS burned area and active fire products. *Environmental Research Communications*. 1:1
19. Ramirez-Reyes, C., K.A. Brauman, R. Chaplin-Kramer, G.L. Galford, S. Adamo, C.B. Anderson, C. Anderson, G.R.H. Allington, K.J. Bagstad, M.T. Coe, A.F. Cord, L.E. Dee, R.K. Gould, **M. Jain**, V.A. Kowal, F. Muller-Karger, J. Norriss, P. Potapov, J. Qiu, J.T. Rieb, B.E. Robinson, L.H. Samberg, N. Singh, S.H. Szeto, B. Voight, M. Wright, K. Watson (2019). Reimagining the potential of Earth observations for ecosystem service assessments. *Science of the Total Environment*. 665: 1053-1063.

20. Vandermeer, J., A. Aga, J.E. Allgeier, C. Badgley, R. Baucom, J. Blesh, L. Fink Shapiro, L. Hoey, **M. Jain**, A.D. Jones, I. Perfecto, M.L. Wilson (2018). Feeding Prometheus: An Interdisciplinary Approach for Solving the Global Food Crisis. *Frontiers in Sustainable Food Systems*. 2(39).
21. Urban, D., K. Guan, **M. Jain** (2018). Estimating sowing dates from satellite data over the U.S. Midwest: a comparison of multiple sensors and metrics. *Remote Sensing of Environment*. 211: 400-412.
22. Bhattacharai, N., K. Mallick, N. Brunsell, G. Sun, **M. Jain** (2018). Regional evapotranspiration from an image-based implementation of the Surface Temperature Initiated Closure (STIC1.2) model and its validation across an aridity gradient in the conterminous US. *Hydrology and Earth System Sciences*. 22: 2311-2341.
*Selected as a 'Highlight Article' by the Editorial Board of HESS
23. Azzari, G., **M. Jain**, D.B. Lobell (2017). Towards Fine Resolution Global Maps of Crop Yields: Testing Multiple Methods and Sensors in Three Countries. *Remote Sensing of Environment*. 202: 129-141.
24. **Jain, M.**, B. Singh, A. Srivastava, R.K. Malik, A. McDonald, D.B. Lobell (2017). Using Satellite Data to Identify the Causes of and Potential Solutions for Yield Gaps in India's Wheat Belt. *Environmental Research Letters*. 12: 094011.
*Selected as a 'Featured Article' by the Editorial Board of ERL.
*Press: Scidev.net, University Record, Phys.org, Michigan News (English & Hindi), Environmental Research Web
25. D.B. Kramer, J. Hartter, A.E. Boag, **M. Jain**, K.J. Stevens, K.A. Nicholas, W. McConnell, J. Liu (2017). Top 40 Transformative Questions in Coupled Human and Natural Systems (CHANS) Research. *Ecology and Society*. 22(2): 4.
26. **Jain, M.**, P. Mondal, G.L. Galford, G. Fiske, R.S. DeFries (2017). An Automated Approach to Mapping Cropped Area of Smallholder Farms Across Large Scales. *Remote Sensing*. 9:566
27. **Jain, M.**, A. Srivastava, B. Singh, A. McDonald, K. Royal, M.C. Lisaius, D.B. Lobell (2016). Mapping Smallholder Wheat Yields and Sow Dates Using Microsatellite Data. *Remote Sensing*. 8(10): 860.
28. Mondal, P., **M. Jain**, M. Zukowski, G. Galford, R.S. DeFries (2016). Quantifying fluctuations in the winter cropped area in the Central Indian Highlands. *Regional Environmental Change*. 16: 69-82.
29. Feola, G., A.M. Lerner, **M. Jain**, M.J.F. Montefrio, K.A. Nicholas (2015). Researching Farmer Behavior in Climate Change Adaptation and Sustainable Agriculture: Lessons Learned From Five Case Studies. *Journal of Rural Studies*. 35: 74-84.
30. **Jain, M.**, S. Naeem, B. Orlove, V. Modi, R.S. DeFries (2015). Understanding the Causes and Consequences of Differential Decision-Making in Adaptation Research: Adapting to a Delayed Monsoon Onset in Gujarat, India. *Global Environmental Change*. 31: 98-109.
*Selected as one of the top papers in GEC that has advanced the frontiers of adaptation research over the past 10 years
31. Mondal, P., **M. Jain**, R.S. DeFries, G.L. Galford, C. Small (2015). Sensitivity of crop cover to climate variability: Insights from two Indian agro-ecoregions. *Journal of Environmental Management*. 148: 21-30.

32. Mondal, P., **M. Jain**, A.W. Robertson, G.L. Galford, C. Small, R.S. DeFries (2014). Winter crop sensitivity to inter-annual climate variability in central India. *Climatic Change*. 126: 61-76.
33. Wood, S., A. Jina, **M. Jain**, P. Kristjansson, R.S. DeFries (2014). Smallholder farmer cropping decisions related to climate variability across multiple regions. *Global Environmental Change*. 25: 163-172. **Selected as one of the top papers in GEC that has advanced the frontiers of adaptation research over the past 10 years*
34. **Jain, M.**, Y. Lim, J.A. Arce-Nazario, M. Uriarte (2014). Perceptual and socio-demographic factors associated with household water treatment in rural Puerto Rico. *PLoS ONE*. 9(2): 1-8.
35. **Jain, M.**, D.F.B. Flynn, C.M. Prager, G.M. Hart, C.M. DeVan, F.S. Ahrestani, M.I. Palmer, D.E. Bunker, J.M.H. Knops, C.F. Jouseau, and S. Naeem (2014). The importance of rare species: A trait based assessment of the potential for rare species to contribute to ecosystem function in tall-grass prairies. *Ecology and Evolution*. 4(1): 104-112.
36. **Jain, M.**, P. Mondal, R.S. DeFries, C. Small, G.L. Galford (2013). Mapping cropping intensity of smallholder farms – a comparison of methods using multiple sensors. *Remote Sensing of Environment*. 134: 210-223.
37. Balvanera, P., M. Uriarte, L. Almeida-Lenero, A. Altesor, F. DeClerck, T. Gardner, J. Hall, A. Lara, P. Lateralra, M. Pena-Claros, D.M.S. Matos, L.P. Romero-Duque, A.L. Vogl, L.F. Arreola, A.P. Caro-Borrero, F. Gallego, **M. Jain**, C. Little, R. de Oliveira Xavier, J.M. Paruelo, J.E. Peinado, L. Poorter, N. Ascarrunz, F. Correa, M.B. Cunha-Santino, A.P. Hernandez-Sanchez, M. Vallejos (2012). Ecosystem Services Research in Latin America: The state of the art. *Ecosystem Services*. 2: 56-70.
38. C.B. Yackulic*, M. Fagan*, **M. Jain***, A. Jina, Y. Lim, M. Marlier, R. Muscarella, P. Adame, R.S. DeFries, M. Uriarte (2011). Biophysical and Socioeconomic Factors Associated with Forest Transitions at Multiple Spatial and Temporal Scales. *Ecology and Society*. 16(3): 15.
39. Odadi, W., **M. Jain**, S. Van Wieren, H.T. Prins, D.I. Rubenstein (2011). Facilitation between bovids and equids on an African savanna. *Evolutionary Ecology Research*. 13:237-252.
40. Flynn, DFP. N. Mirotchnick, **M. Jain**, M.I. Palmer, S. Naeem (2011). Functional and phylogenetic diversity as predictors of biodiversity-ecosystem-function relationships. *Ecology*. 92(8): 1573-1581.1
41. Forbes, T., V. Goss, **M. Jain**, P.C. Burns (2007). Structure Determination and Infrared Spectroscopy of K(UO₂)(SO₄)(OH)(H₂O) and K(UO₂)(SO₄)(OH). *Inorganic Chemistry*. 26(18):7163-7168

FELLOWSHIPS AND GRANTS

- NASA (\$183,278). Commercial SmallSat Data Analysis. August 2021 to January 2023
PI: **M. Jain**. Collaborator: J. Chamberlin. Postdoc: A. Paliwal
- NASA (\$448,693). Land-Cover and Land-Use Change (LCLUC) Program. January 2021 to 2024.
PI: **M. Jain**. Co-PIs: V. Krishna, A. Lerner, N. Bhattarai.
- NASA (\$725,457). Land-Cover and Land-Use Change (LCLUC) Program. January 2020 to 2023.
PI: J. Gray. Co-PIs: **M. Jain**, A. Agrawal. Collaborators: B. Singh.

- **USDA** (\$500,000). Agriculture and Food Research Initiative. August 2019 to 2022.
PI: K. Adkins. Co-PIs: I. Perfecto, **M. Jain**, J. Vandermeer
- **USDA** (\$500,000). Agriculture and Food Research Initiative. May 2019 to 2022.
PI: J. Blesh. Co-PIs: **M. Jain**, A. Reimer, J. Doll
- **NASA** (\$751,707). Land-Cover and Land-Use Change (LCLUC) Program. March 2017 to 2021.
PI: **M. Jain**. Co-PIs: D. Lobell, R. Fishman. Collaborators: A. Chhatre, B. Singh.
- **NASA** (\$262,612). New Investigator Program (Early Career Award) in Earth Science Grant. September 2016 – 2020.
PI: **M. Jain**. Collaborators: D. Lobell, R. Fishman, A. Chhatre, B. Singh.
- **National Science Foundation** Sustainability Postdoctoral Fellowship (SEES; \$487,020). August 2014 –2018.
PI: **M. Jain**. Mentors: D. Lobell, R. Fishman.
- **Google Earth Engine Research Award** (\$62,867). Summer 2014-2015.
PIs: G. Galford, R.S. DeFries. Co-PIs: **M. Jain**, G. Fiske, P. Mondal
- **National Science Foundation** Doctoral Dissertation Improvement Grant (DDIG; \$14,488). Spring 2013 to Fall 2015.
- **CHANS (Coupled Human and Natural Systems) Fellow** (\$1000). NSF CHANS-Net 2012.
- **National Science Foundation** Graduate Research Fellowship (NSF GRF; \$150,000). Fall 2009 to 2012.
- **National Geographic** Young Explorers Grant (\$5,000). Fall 2011
- **Advanced Consortium on Cooperation, Conflict, and Complexity** Fellow (\$3,000). Fall 2011
- **NASA** Land Cover and Land Use Change Grant (\$751,000) Summer 2011 to 2014.
PIs: R.S. DeFries, C. Small, G. Galford; Collaborator: M. Lal, **M. Jain**
- **Compton Foundation** Fellowship (\$36,000). Fall 2007 to 2008.

TEACHING

- Natural Resource Statistics (EAS 538) – Core graduate-level introductory statistics and R programming class. Nominated for the ‘Outstanding Teacher’ award by students for every year of teaching (2017-19). 42 students (2017); 81 students (2018), 80 students (2019), 94 students (2019)
- Global Environmental Change and Sustainable Food Systems (EAS 639) – Graduate course on the impacts of global environmental change on food systems and potential sustainable intensification strategies. 10 students (2018), 8 students (2019)
- Introduction to R (EAS 639) – Graduate workshop that introduces students to R project software. 60 students (2019)

PROFESSIONAL SERVICE AND SKILLS

- **Skills:** Software: Fluent in R, ENVI, Google Earth Engine, ArcGIS, QGIS, Amazon Cluster Computing, Google Cloud Computing, and APSIM Crop Modeling. Versed in Python, IDL, and NetLogo. Languages: Fluent - Hindi, Conversational - Gujarati, French.
- **Reviewer:** Nature, Nature Sustainability, Nature Communications, Nature Food, Science Advances, Proceedings of the National Academy of Sciences, Scientific Reports, Global

Change Biology, Global Environmental Change, Environmental Research Letters, Remote Sensing of Environment, Ecology Letters, Geophysical Research Letters, Remote Sensing, Ecology and Society, Journal of Development Economics, International Journal of Remote Sensing, Regional Environmental Change, Human Ecology, World Development, Climate and Development

- **Member:** American Geophysical Union (AGU), American Association of Geographers (AAG)

SELECT PRESENTATIONS AND WORKSHOPS

- **Indiana University, Department of Geography.** Invited Seminar (2021).
- **Boston College, Department of Earth & Environmental Sciences.** Invited Seminar (2021).
- **International Water Management Institute (IWMI).** Invited Presentation. SoLar Webinar (2021).
- **Clark University, Department of Geography.** Invited Seminar (2021).
- **Columbia University International Research Institute for Climate and Society (IRI).** Invited Seminar (2020)
- **NASA Land Cover Land Use Change Conference** (Rockville & Gaithersburg, MD, Virtual). Oral Presentation (Invited, 2018, 2020); Attendee (2017, 2019); Poster (2012, 2013).
- **Standing Panel on Impact Assessment (SPIA) Workshop on Remote Sensing** (Virtual/UC Santa Barbara). Oral Presentation (Invited, 2020)
- **Global Land Project** (Berlin, Germany & Bern, Switzerland). Oral Presentation (2014, 2019).
- **Yale School of the Environment** (New Haven, CT). Invited Seminar (2018).
- **Bill and Melinda Gates Foundation Grand Challenges Meeting** (Berlin, Germany). Sponsored Attendee (2018).
- **University of Chicago, Energy Policy Institute (EPIC; Chicago, IL).** Invited Seminar (2018).
- **American Geophysical Union** (San Francisco, CA, New Orleans, LA, Washington D.C.). Oral Presentation (Invited 2013, 2017 – 2 presentations, 2018 – 2 presentations, 2019 - invited but declined due to maternity leave); Poster Presentation (2012, 2014, 2015).
- **Workshop on Linking Ecosystem Services & Earth Observations** (Minneapolis, MN & Stanford, CA). Attendee (Invited, 2017-2018). NASA funded workshop led by the Natural Capital Project to identify how ecosystem services can be mapped using earth observations.
- **NASA South/Southeast Asian Research Initiative** (New Delhi, India). Oral Presentation (Invited 2017). Invited to participate in workshop between NASA-funded scientists and Indian government about mapping Indian agriculture.
- **Earth Science Young Leader** (New Orleans, LA). Selected to participate in meeting with the NASA Science Mission Directorate Associate Administrator about how NASA can best promote early career faculty (2017).

- **Association of Environmental and Resource Economists** (Pittsburgh, PA). Oral Presentation (Invited, 2017). Invited to give presentation to economists about the benefits of using remote sensing data for research on land cover and land use change.
- **Google Earth Engine Summit** (Mountain View, CA). Attendee (2017, 2016). Oral Presentation (Invited 2015).
- **American Association of Geographers** (Multiple Locations). Oral Presentation (Invited 2017; 2012)
- **National Socio-Economic Synthesis Center Workshop** (SESYNC; Annapolis, MD). Observing Rural Development from Space. Attendee (Invited, 2017). Workshop on how to use satellite data to map rural development in Mozambique.
- **Toward Sustainable Groundwater in Agriculture** (San Francisco, CA). Oral Presentation (2016).
- **Conference on Global Food Security** (Ithaca, NY). Oral Presentation (2015).

SELECT PUBLISHED DATA PRODUCTS, REPORTS, AND BOOK CHAPTERS

- **Jain, M.**, Singh B (2019). Toward an Evergreen Revolution: Sustainable Intensification in Smallholder Farming. In *A Better Planet*, edited by Daniel Esty and Indy Burke. Yale University Press.
- **Jain, M.**, P. Mondal, G. L. Galford, G. Fiske, and R. S. DeFries. 2017. India Annual Winter Cropped Area, 2001-2016. Palisades, NY: NASA Socioeconomic Data and Applications Center (SEDAC). <https://doi.org/10.7927/H47D2S3W>.
- **Jain, M.** (2013). Indian Farmers Cope with Climate Change and Falling Water Tables. Water Currents. [*National Geographic News Watch*](#).
- Naeem, S., P. Olmsted, J. Sircely, **M. Jain**, S. Smukler, C. Ingram (2010). Ecosystem services: A Primer for Biodiversity Conservation. Natural Resources Management and Development Portal. USAID.