

# CURRICULUM VITAE

Arika Ligmann-Zielinska, Ph.D.

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## Research Interests

<i>Theory</i>	Generative-Exploratory Modeling, Uncertainty, Coupled Human-Natural Systems
<i>Methods &amp; Tools</i>	Agent-Based Modeling; Sensitivity Analysis of Spatial Modeling; Spatial Decision Support
<i>Applications</i>	Land Use Change; Water Resources; Obesogenic Behaviors and Environments

## Academic Appointments

2008-current	Assistant Professor, Department of Geography (51%) & Environmental Science and Policy Program (49%), Michigan State University, East Lansing, Michigan, USA
2008-current	Adjunct Assistant Professor, Center for Global Change and Earth Observations, Michigan State University
2008	Instructor, Introduction to GIS, Department of Geography San Diego State University
2005-2007	Instructor, Advanced GIS: Spatial Analysis and Modeling, Department of Geography, San Diego State University
2007	Teaching Assistant, GIS Primer, Department of Geography, San Diego State University
2007	Teaching Assistant, Spatial Decision Support Methods, Department of Geography, San Diego State University
2004, 2006	Teaching Assistant, Intermediate GIS – GIS Applications, Department of Geography, San Diego State University
2003-2007	Research Associate, Department of Geography, San Diego State University, Project: <i>Participatory GIS for Transportation</i> , <a href="http://www.pgist.org">www.pgist.org</a>

## Education

PhD	2008	Geography, San Diego State University and University of California Santa Barbara
MS	1998	Geography, Adam Mickiewicz University in Poznan, Poland

## Honors, Awards, and Scholarships

2012	Faculty Initiatives Fund, College of Social Science, MSU
2011	Center for Advanced Study of International Development Travel Award, MSU
2006	Spatial Data Handling Scholarship, International Geographical Union, Commission on GIScience
2006	McFarland Geography Scholarship, San Diego State University
2005	Phi beta delta Honor Society for International Scholars, San Diego State University
2005	McFarland Geography Scholarship, San Diego State University
2005	Geography Dangermond Travel Award, University of California, Santa Barbara
1998	MS Honors Graduate in Geography, Adam Mickiewicz University in Poznan, Poland
1997-1998	Graduate Scholarship for Academic Excellence, Adam Mickiewicz University, Poznan, Poland
1995-1996	Undergraduate Scholarship for Academic Excellence, Adam Mickiewicz University, Poznan, Poland

## RESEARCH

### PUBLICATIONS

#### Refereed Publications

*Journal articles:* 13 (10: tier 1; 3: tier 2); first author: 8; sole author: 2.

*Total Peer Reviewed Publications:* 21

*Journal Ratings:* The Geography Department rates journals at three levels based on ISI and SJR ratings: Tier 1 - SJR Q1 or ISI equal to or greater than *The Annals of the AAG*; Tier 2 - SJR Q2 and Q3 or any ISI journal (not in the top group); Tier 3: SJR Q4 or any other unlisted journal.

#### Journal Articles

- 2014 **Ligmann-Zielinska A**, Jankowski P, *Spatially-explicit integrated uncertainty and sensitivity analysis of criteria weights in multicriteria land suitability evaluation*, *Environmental Modelling & Software*, 57, 235-247 (tier 1).
- 2013 **Ligmann-Zielinska A**, *Spatially-Explicit Sensitivity Analysis of an Agent-Based Model of Land Use Change*, *International Journal of Geographical Information Science, Special Issue on Land change modelling: moving beyond projections*, 27 (9), 1764-1781 (tier 1).
- 2013 Kramer DB, Zhang T, Cheruvellil K, **Ligmann-Zielinska A**, Soranno PA, *A multi-objective, return on investment analysis for freshwater conservation planning*, *Ecosystems*, 16 (5), 823-37 (tier 1).
- 2013 Wang N, Brown DG, An L, Yang S, **Ligmann-Zielinska A**, *Comparative performance of logistic regression and survival analysis for detecting spatial predictors of land-use change*, *International Journal of Geographical Information Science*, 27 (10), 1960-1982 (tier 1).
- 2012 Zhang T, Soranno PA, Spence Cheruvellil K, Kramer DB, Bremigan MT, **Ligmann-Zielinska A**, *Evaluating the effects of upstream lakes and wetlands on lake phosphorus concentrations using a spatially-explicit model*, *Landscape Ecology*, 27 (7), 1015-30 (tier 1).
- 2012 **Ligmann-Zielinska A**, Jankowski P, *Impact of proximity-adjusted preferences on rank-order stability in geographical multicriteria decision analysis*, *Journal of Geographical Systems*, 14 (2), 167-187 (tier 1).
- 2012 Pérez Vega A, Mas JF, **Ligmann-Zielinska A**, *Comparing Two Approaches to Land Use/Cover Change Modeling and Their Implications for the Assessment of Biodiversity Loss in a Deciduous Tropical Forest*, *Environmental Modelling & Software*, 29 (1), 11-23 (tier 1).
- 2010 **Ligmann-Zielinska A**, Sun L, *Applying time-dependent variance-based global sensitivity analysis to represent the dynamics of an agent-based model of land use change*, *International Journal of Geographical Information Science*, 24 (12), 1829-50 (tier 1).
- 2010 **Ligmann-Zielinska A**, Jankowski P, *Exploring Normative Scenarios of Land Use Development Decisions with an Agent-Based Simulation Laboratory*, *Computers, Environment and Urban Systems*, 34 (5), 409-23 (tier 2).
- 2009 **Ligmann-Zielinska A**, *The impact of risk-taking attitudes on a land use pattern: an agent-based model of residential development*, *Journal of Land Use Science*, 4 (4), 215-32 (tier 2).
- 2008 Jankowski P, **Ligmann-Zielinska A**, Swobodzinski M, *Choice Modeler: A Web-based Spatial Multiple Criteria Evaluation Tool*, *Transactions in GIS*, 12 (4), 541-61 (tier 2).
- 2008 **Ligmann-Zielinska A**, Church R, Jankowski P, *Spatial Optimization as a generative technique for sustainable multiobjective landuse allocation*, *International Journal of Geographical Information Science*, 22 (6), 601-22 (tier 1).
- 2007 **Ligmann-Zielinska A**, Jankowski P, *Agent-Based Models As Laboratories For Spatially Explicit Planning Policies*, *Environment and Planning B: Planning and Design*, 34 (2), 316-35 (tier 2).

#### Book Chapters

- 2013 Laura Schmitt Olabisi L, Blythe S, **Ligmann-Zielinska A**, Marquart-Pyatt S, *Modeling as a Tool for Cross-Disciplinary Communication in Solving Environmental Problems*, in: *Enhancing Communication & Collaboration in Interdisciplinary Research*, O'Rourke M, Crowley S, Eigenbrode S, Wulfhorst J, SAGE, 271-291.
- 2008 **Ligmann-Zielinska A**, Jankowski P, *A Framework for Sensitivity Analysis in Spatial Multiple Criteria Evaluation*, in: *GIScience 2008, LNCS 5266*, T.J. Cova et al. (Eds.), Springer-Verlag Berlin, 217-33
- 2006 **Ligmann-Zielinska A**, Church R, Jankowski P, (2006), *Development Density-Based Optimization Modeling of Sustainable Land Use Patterns*, in: *Progress in Spatial Data Handling, 12th International Symposium on Spatial Data Handling*, Springer-Verlag, 881-896.

**Conference Proceedings and Extended Abstracts**

- 2014 **Ligmann-Zielinska A**, Liu W, Kramer DB, Cheruvelil K, Soranno PA, Jankowski P, Salap S, *Multiscale Spatial Sensitivity Analysis for Agent-Based Modelling of Coupled Landscape and Aquatic Systems*, In: Ames, D.P., Quinn, N.W.T., Rizzoli, A.E. (Eds.), Proceedings of the 7th International Congress on Environmental Modelling and Software, June 15-19, San Diego, CA, USA. ISBN: 978-88-9035-744-2, <http://www.iemss.org/sites/iemss2014/proceedings.php>
- 2014 **Ligmann-Zielinska A**, *Yet another MAUP: how agent-based model sensitivity is space-dependent*, Proceedings 11th International Symposium on Spatial Accuracy Assessment in Natural Resources and Environmental Sciences, Michigan State University, East Lansing, Michigan, July 8-11, 2014, ISARA (<http://www.spatial-accuracy.org/>), pp.118-122
- 2012 **Ligmann-Zielinska A**, Jankowski P, Watkins J, *Spatial Uncertainty and Sensitivity Analysis for Multiple Criteria Land Suitability Evaluation*. Extended Abstract, 7th International Conference on Geographic Information Science, Columbus, OH, USA, September 18-21, 2012, [http://www.giscience.org/past/2012/proceedings/abstracts/giscience2012\\_paper\\_134.pdf](http://www.giscience.org/past/2012/proceedings/abstracts/giscience2012_paper_134.pdf)
- 2012 O'Neil G, **Ligmann-Zielinska A**, *Simulating the Impact of Agricultural Water Withdrawals on Fish Habitat*. Extended Abstract, Seventh International Conference on Geographic Information Science, Columbus, OH, U.S., September 18-21, 2012, [http://www.giscience.org/past/2012/proceedings/abstracts/giscience2012\\_paper\\_126.pdf](http://www.giscience.org/past/2012/proceedings/abstracts/giscience2012_paper_126.pdf)
- 2010 **Ligmann-Zielinska A**, Sun L, *Time Dependent Variance-Based Sensitivity Analysis of Development Aggregation Generated by Heterogeneous Land Use Agents*, Proceedings The 9th International Symposium on Spatial Accuracy Assessment in Natural Resources and Environmental Sciences, Publisher: University of Leicester, pp. 101-104
- 2004 Nyerges T, Brooks T, Drew Ch, Miles S, Rutherford GS, Boshart R, Isip J, Lowry M, Patrick M, Pittman R, Ramsey K, Wilson M, Wu J, Zhou G, Jankowski P, **Ligmann-Zielinska A**, Young R, Zhong T, Hendricksen Ch, *Participatory Modeling and Modeling Participation in Support of Transportation Improvement Decision Making*, 3rd International Conference on Geographic Information Science, University of Maryland, October 20-23, 2004

**Publications in Review or Revision****Journal Articles**

- Schmitt Olabisi L, Qi W, **Ligmann-Zielinska A**, *Modeling the Spread of Organic Technologies Among Smallholder Farmers*, Agricultural Systems (tier 1).
- Zhang T, Hua G, **Ligmann-Zielinska A**, *Visually-driven parallel solving of multi-objective land-use allocation problems: a case study in Chelan, Washington*, International Journal of Digital Earth (tier 1).
- Ligmann-Zielinska A**, Kramer D B, Spence Cheruvelil K, Soranno PA, *Using Uncertainty and Sensitivity Analyses in Socioecological Agent-Based Models to Improve Their Analytical and Policy Relevance*, PLOS ONE (tier 1).
- Du J, **Ligmann-Zielinska A**, *The Volatility of Data Space: Topology-Oriented Sensitivity Analysis*, Simulation Modelling Practice and Theory (tier 2).

**Other**

- Ligmann-Zielinska A**, Grady S, Mc-Whorter J, *The Impact of Urban Form on Weight Loss - Combining Spatial Agent-Based Model with Transtheoretical Model of Health Behavior Change*, Handbook of Applied System Science, Routledge (book chapter, [accepted pending revisions](#)).
- Ligmann-Zielinska A**, *'Can you dump it?' Using Variance-Based Sensitivity Analysis to Simplify an Agent-Based Model of Land Use Change*, in: GeoComputational Analysis and Modeling of Regional Systems, Eds. Thill J-C, Dragicevic S, Series: Advances in Geographic Information Science, Springer Verlag (book chapter).
- Ligmann-Zielinska A**, *Spatial Optimization*, The Wiley-AAG International Encyclopedia of Geography (invited encyclopedia entry).
- Jankowski P, **Ligmann-Zielinska A**, *A Framework for Spatiotemporal Sensitivity Analysis of Geographical Models*, The 8th International Conference on Geographic Information Science (extended abstract).
- Jankowski P, **Ligmann-Zielinska A**, *A Need for CyberGIS Infrastructure for Spatiotemporal Uncertainty and Sensitivity Analysis in Geographical Models*, CyberGIS'14, 2nd International Conference on CyberGIS and Geodesign (extended abstract - position paper).

**Book Under Contract**

- Ligmann-Zielinska A**, Jankowski P, *Sensitivity Analysis: A Spatiotemporal Approach*, Series: Advances in Geographic Information Science, contract #24629 from Springer Verlag, [expected publication date: 3rd quarter 2015](#) (research monograph).

## Published Software

- 2014 **Ligmann-Zielinska A**, *Integrated Uncertainty and Sensitivity Analysis (iUSA)* v1 in Python, a standalone package to calculate first order and total effect sensitivity indices for raster-based spatial multicriteria evaluation, available from <http://www.geo.msu.edu/~stsa/>
- 2014 **Ligmann-Zielinska A**, *Agent-Based Model of Residential Land Use Change (IDEAL)* v1 in Python, an agent-based model of residential choice based on the Ideal-point decision rule, submitted to <http://www.openabm.org/>
- 2014 Zhang T, **Ligmann-Zielinska A**, *Integrated Grid's Exporting and Delivery model (IGED)* v2 in ArcPy, a total phosphorus concentration lake model, available from <https://github.com/ArikaLZ/IGED/>

## Non- Refereed Publications

### Book Chapters

- 2012 Collier N, Johnston KM, **Ligmann-Zielinska A**, *Creating an Agent-Based Model using point agents*, in: Agent-Based Modeling in ArcGIS, Johnston K (Ed.), ESRI Press, e-book: <http://resources.arcgis.com/en/help/agent-analyst/>, pp. 31-79
- 2012 **Ligmann-Zielinska A**, *Changing attribute values of polygon agents*, in: Agent-Based Modeling in ArcGIS, Johnston K (Ed.), ESRI Press, e-book: <http://resources.arcgis.com/en/help/agent-analyst/>, pp. 81-111
- 2012 **Ligmann-Zielinska A**, *Not Quite Python*, in: Agent-Based Modeling in ArcGIS, Johnston K (Ed.), ESRI Press, e-book: <http://resources.arcgis.com/en/help/agent-analyst/>, pp.525-542

### Conference Proceedings

- 2005 **Ligmann-Zielinska A**, Church R, Jankowski P, *Sustainable Urban Land Use Allocation with Spatial Optimization*, Proceedings The 8th International Conference on Geocomputation, produced by: Xie Y., Brown D.G. Publisher: GeoComputation CD-ROM

### Book Entries

- 2010 **Ligmann-Zielinska A**, *Agent-Based Models*, invited encyclopedia entry, Encyclopedia of Geography, Warf B (Ed.), Sage Publications, Thousand Oaks, Sage Reference Online  
[http://www.sage-ereference.com/geography/Article\\_n14.html](http://www.sage-ereference.com/geography/Article_n14.html)
- 2005 **Ligmann-Zielinska A**, *Multi-Agent Simulation for Generating Land-Use Policy and Planning Scenarios*, ESRI Map Book Volume 20, ESRI Press

### Whitepapers

- 2011 **Ligmann-Zielinska A**, Jankowski P, *An Application of Sensitivity Analysis Framework for Spatial Multiple Criteria Evaluation to Habitat Restoration Site Selection*,  
<http://www.spatial.redlands.edu/sds/ontology/literature/>
- 2005 **Ligmann-Zielinska A**, Schelling GIS Agent Analyst Tutorial, University of Redlands, The Redlands Institute.  
**Ligmann-Zielinska A**, Agent Based Systems in Geosimulation, University of Redlands, The Redlands Institute.

## Citations

Google Scholar Citation Index **265**; h-index **10**; i10-index **10**, only cited publications are listed (Aug 5, 2014).

Authors	Title and Journal	Year	Cited By
<b>A Ligmann-Zielinska</b> , RL Church, P Jankowski	Spatial optimization as a generative technique for sustainable multiobjective land-use allocation, <i>International Journal of Geographical Information Science</i> 22 (6), 601-622	2008	62
<b>A Ligmann-Zielinska</b> , P Jankowski	Agent-based models as laboratories for spatially explicit planning policies, <i>Environment and Planning B: Planning and Design</i> 34 (2), 316	2007	41
<b>A Ligmann-Zielinska</b> , L Sun	Applying time-dependent variance-based global sensitivity analysis to represent the dynamics of an agent-based model of land use change, <i>International Journal of Geographical Information Science</i> 24 (12), 1829-1850	2010	28
<b>A Ligmann-Zielinska</b> , P Jankowski	Exploring normative scenarios of land use development decisions with an agent-based simulation laboratory, <i>Computers, Environment and Urban Systems</i> 34 (5), 409-423	2010	21
<b>A Ligmann-Zielinska</b> , P Jankowski	A framework for sensitivity analysis in spatial multiple criteria evaluation, <i>GIScience</i> 2008, LNCS 5266, T.J. Cova et al. (Eds.), Springer-Verlag, 217–33	2008	20
P Jankowski, <b>A Ligmann-Zielinska</b> , M Swobodzinski	Choice Modeler: A Web-based Spatial Multiple Criteria Evaluation Tool, <i>Transactions in GIS</i> 12 (4), 541-561	2008	18
A Pérez-Vega, JF Mas, <b>A Ligmann-Zielinska</b>	Comparing two approaches to land use/cover change modeling and their implications for the assessment of biodiversity loss in a deciduous tropical forest, <i>Environmental Modelling &amp; Software</i> 29 (1), 11-23	2012	18
<b>A Ligmann-Zielinska</b> , RL Church, P Jankowski	Sustainable Urban Land Use Allocation with Spatial Optimization, <i>Proceedings The 8th International Conference on Geocomputation</i>	2005	16
<b>A Ligmann-Zielinska</b>	The impact of risk-taking attitudes on a land use pattern: an agent-based model of residential development, <i>Journal of Land Use Science</i> 4 (4), 215-232	2009	16
<b>A Ligmann-Zielinska</b> , P Jankowski	Impact of proximity-adjusted preferences on rank-order stability in geographical multicriteria decision analysis, <i>Journal of geographical systems</i> 14 (2), 167-187	2012	10
N Wang, DG Brown, L An, S Yang, <b>A Ligmann-Zielinska</b>	Comparative performance of logistic regression and survival analysis for detecting spatial predictors of land-use change, <i>International Journal of Geographical Information Science</i> 27 (10), 1960-1982	2013	4
T Zhang, PA Soranno, KS Cheruvelil, DB Kramer, MT Bremigan, <b>A Ligmann-Zielinska</b>	Evaluating the effects of upstream lakes and wetlands on lake phosphorus concentrations using a spatially-explicit model, <i>Landscape ecology</i> 27 (7), 1015-1030	2012	4
<b>A Ligmann-Zielinska</b>	Spatially-explicit sensitivity analysis of an agent-based model of land use change <i>International Journal of Geographical Information Science</i> 27 (9), 1764-1781	2013	3
<b>A Ligmann-Zielinska</b> , R Church, P Jankowski	Development density-based optimization modeling of sustainable land use patterns, in: <i>Progress in Spatial Data Handling, 12th International Symposium on Spatial Data Handling</i> , Springer-Verlag, 881-896	2006	3
<b>A Ligmann-Zielinska</b> , P Jankowski, J Watkins	Spatial Uncertainty and Sensitivity Analysis for Multiple Criteria Land Suitability Evaluation, <i>GIScience 2012 : 7th International Conference on Geographic Information Science</i> , Columbus, OH.	2012	1

## Grant Activity

**Funded Grants** (Total funded: \$1,467,593, external: \$1,206,193)

### External

- 2014-2018 **Ligmann-Zielinska A** (PI), Schmitt Olabisi L, Marquart-Pyatt S, Du J (collaborating institution – UTSA), Rivers L III (collaborating institution – NCSU) *IBSS: Participatory Ensemble Modeling to Study the Multiscale Social and Behavioral Dynamics of Food Security in Dryland West Africa*, National Science Foundation, Interdisciplinary Behavioral and Social Science (IBSS), Grant No SMA-1416730, \$630,887 (MSU), \$999,793 (total).
- 2013-2015 **Ligmann-Zielinska A** (PI), Kramer D, Jankowski P (collaborating institution – SDSU), *Collaborative Research: A Spatiotemporal Approach to Sensitivity Analysis in Human-Environment Systems Models*, National Science Foundation Geography and Spatial Sciences, Division of Behavioral and Cognitive Sciences, Grant No BCS-1263477, \$135,500 (MSU), \$200,000 (total).
- 2006 -2008 Jankowski P, **Ligmann-Zielinska A** (Co-PI), *Agent-based Exploratory Modeling of Sustainable Land Use Patterns Generated with Multiobjective Spatial Optimization*, National Science Foundation Doctoral Dissertation Research Improvement Grant No BCS-0623482, \$6,400.

### Internal

- 2011-2013 **Ligmann-Zielinska A** (PI), Bremigan MT, Spence Cheruvelil K, Kramer DB, Soranno PA, *Lakes as Complex Socio-Ecological Systems: Exploring the Causalities between Human Land Use Decisions and Landscape Limnological Processes to Inform Sustainable Water Conservation Policies*, Center for Water Sciences and Environmental Science and Policy Program, Michigan State University, \$49,900.
- 2010-2013 **Ligmann-Zielinska A** (Co-PI), Marquart-Pyatt S, Rivers L, Schmitt Olabisi L, *Conceptualization, development, and testing of an integrated spatially-explicit agent based and system dynamics model that explores climate change induced migration using the Dust Bowl as a test case study*, Environmental Faculty Fellows Program, Michigan State University, \$55,000.
- 2009-2010 Cheruvelil K, Bremigan M, Kramer DB, **Ligmann-Zielinska A** (Co-PI), Soranno PA, Webster , KE, *Understanding complex aquatic landscapes: Lakes as model systems for integrating ecology, economics, human behavior and policy*, Center for Water Sciences, Michigan State University, \$131,500.
- 2009-2010 Grady SC, Holzman C, **Ligmann-Zielinska A** (Co-PI), *Ingham County Infant Mortality GIS*, Office of the Vice President for Research, Michigan State University Families and Communities Together Coalition, 2009-2010, \$25,000.

## Grant Support Activities

- 2010-2011 Collaborator *Learning from Adaptable Water Systems*, Rose J (PI), National Science Foundation Division of Earth Sciences, Water Sustainability & Climate Grant No EAR-1039122.
- 2009-current Collaborator *Landscape Limnology Research Lab*, Department of Fisheries and Wildlife, MSU.
- 2009-2012 Collaborator: *High Performance Spatial Multiobjective Decision Visual Analysis*, Zhang T (PI), State Key Laboratory of Information Engineering, in Surveying, Mapping and Remote Sensing, Wuhan University, National Natural Science Foundation of China, Young Scholar Program.

## Presentations at Professional Meetings

- 2014 **Ligmann-Zielinska A**, *Yet another MAUP: how agent-based model sensitivity is space-dependent*, paper presented at the 11th International Symposium on Spatial Accuracy Assessment in Natural Resources and Environmental Sciences, July 8-11, 2014, Michigan State University, East Lansing, Michigan, USA.
- 2014 **Ligmann-Zielinska A**, *(Spatial) Sensitivity Analysis of an Integrated Agent-Based and Biophysical Model*, paper presented at the 8th Summer School on Sensitivity Analysis of Model Output (SAMO 2014), June 24-27, 2014, Ranco, Italy.
- 2014 **Ligmann-Zielinska A**, Liu W, Kramer D B, Cheruvelil K, Soranno P A, Jankowski P, Salap S, *Multiscale Spatial Sensitivity Analysis for Agent-Based Modelling of Coupled Landscape and Aquatic Systems*, paper presented at the 7th International Congress on Environmental Modelling and Software (iEMSs), June 15-19, 2014, San Diego, California, USA.
- 2013 **Ligmann-Zielinska A**, Mcwhorter J, *Agent-Based Modeling of Obesogenic Behaviors and Environments - Exploratory Analysis*, paper presented at AAG Annual Meeting, Los Angeles CA, April 9-13, 2013
- 2013 Jankowski P, **Ligmann-Zielinska A**, *Spatially-Explicit Uncertainty and Sensitivity Analysis of Criteria Weights in Land Suitability Evaluation*, paper presented at AAG Annual Meeting, Los Angeles CA, April 9-13, 2013

- 2013 O'Neil G, **Ligmann-Zielinska A**, Using Regression-Based Sensitivity Analysis in Exploratory Modeling of Complex Spatial Systems: An Example of Simulating the Impact of Agricultural Water Withdrawals on Fish Habitat, paper presented at AAG Annual Meeting, Los Angeles CA, April 9-13, 2013
- 2013 **Ligmann-Zielinska A**, Bone C, Fernandez LE, Zellner M, Metcalf S, Brown D, *Land Systems Science Symposium: Panel on LUCC-ABM*, panelist AAG Annual Meeting, Los Angeles CA, April 9-13, 2013
- 2013 **Ligmann-Zielinska A**, Marquart-Pyatt S, Schmitt-Olabisi L, *Teaching Environmental Modeling at MSU A Proposed Modeling Certificate* Environmental Systems Modeling Symposium, MSU, February 12, 2013
- 2012 **Ligmann-Zielinska A**, Kramer DB, Spence Cheruvellil K, Soranno P, *Sensitivity analysis in agent-based models of socio-ecological systems: an example in agricultural land conservation for lake water quality improvement*. Abstract presented at 2012 Fall Meeting, American Geophysical Union, San Francisco, CA, 3-7 Dec, 2012
- 2012 Rivers L, Whitley C, Bryant S, Schmitt Olabisi L, Molen N, **Ligmann-Zielinska A**, Marquart-Pyatt S, *Mental model of the dust bowl migration*, Poster presented at Society for Risk Analysis 2012 Annual Meeting, San Francisco, CA, Dec 9-12, 2012
- 2012 Spence Cheruvellil K, Kramer DB, Zhang T, **Ligmann-Zielinska A**, Soranno P, Bremigan M, *Evaluating Alternative Strategies for Investments in Freshwater Conservation*. Abstract presented at 2012 Fall Meeting, American Geophysical Union, San Francisco, CA, 3-7 Dec, 2012
- 2012 **Ligmann-Zielinska A**, Jankowski P, Watkins J, *Spatial Uncertainty and Sensitivity Analysis for Multiple Criteria Land Suitability Evaluation*. Paper presented at 7<sup>th</sup> International Conference on Geographic Information Science, Columbus, OH, Sep 18-21, 2012
- 2012 O'Neil G, **Ligmann-Zielinska A**, *Simulating the Impact of Agricultural Water Withdrawals on Fish Habitat*. Poster presented at 7<sup>th</sup> International Conference on Geographic Information Science, Columbus, OH, Sep 18-21, 2012
- 2012 Schmitt Olabisi L, Wang Q, **Ligmann-Zielinska A**, *Food Security and Clean Water Under Climate Change: Smallholder Farmers in the Philippines*. World Water Week, Stockholm, August 29, 2012
- 2012 Schmitt Olabisi L, Wang Q, **Ligmann-Zielinska A**, *Promoting food security and ecological integrity: modelling smallholder organic adoption in the Philippines*. 4<sup>th</sup> International Ecosummit, Columbus, OH, October 4, 2012
- 2012 **Ligmann-Zielinska A**, Ling C, Kramer DB, Spence Cheruvellil K, Soranno PA, Bremigan MT, *How simple is too simple? Using Sensitivity Simulation for Factor Reduction in Agent-Based Modeling of Agricultural Land Conservation*, RGS-IBG Annual International Conference, Edinburgh UK, 3 - 5 July 2012
- 2011 Schmitt Olabisi L, Wang Q, **Ligmann-Zielinska A**, *Resilience under Climate Change: Smallholder Farmers in the Philippines*, Climate Change and Sustainability: Positioning MSU for the Future, November 14, 2011
- 2011 Zhang T, Soranno PA, Spence Cheruvellil K, Kramer DB, **Ligmann-Zielinska A**, Bremigan MT *Modeling lake phosphorus concentrations at catchment scale*, the 26th Annual Symposium of US Regional Association of the International Association for Landscape Ecology (US-IALE), Portland, Oregon, April 3-7, 2011
- 2011 **Ligmann-Zielinska A**, 'Using models to communicate difficult complex systems concepts', 6th Biennial Conference of United States Society for Ecological Economics, East Lansing MI, June 26-29, 2011
- 2011 **Ligmann-Zielinska A**, *Human Agency & CHANS Models*, MSU 2011 Modeling Symposium, March 29, 2011
- 2011 **Ligmann-Zielinska A**, *Spatiotemporal Sensitivity Analysis in Geographical Modeling: An Agent-Based Model Example*, AAG Annual Meeting, Seattle WA, April 12-16, 2011
- 2011 **Ligmann-Zielinska A**, *Design Principles for Agent-based Models of Land-use/Landcover change*, panelist, AAG Annual Meeting, Seattle WA, April 12-16, 2011
- 2010 **Ligmann-Zielinska A**, *Evaluating land use decision mechanisms using time-dependent global sensitivity analysis* Global Land Project Open Science Meeting 2010 – Land Systems, Global Change and Sustainability, Arizona State University, Tempe, Arizona USA, October 17-19, 2010
- 2010 **Ligmann-Zielinska A**, Sun L, *Applying Time Dependent Global Sensitivity Analysis to Represent the Dynamics of Land Use Change*, The 9th International Symposium on Spatial Accuracy Assessment in Natural Resources and Environmental Sciences, University of Leicester, Leicester UK, July 20-23, 2010
- 2010 **Ligmann-Zielinska A**, Marquart-Pyatt S, Schmitt Olabisi L, *Modeling: A tool for addressing the challenges of climate change*, poster presentation, Climate Change Vulnerabilities and Opportunities: Michigan and Beyond, Michigan State University, Michigan, USA, April 26-27, 2010
- 2010 **Ligmann-Zielinska A**, *Variance-Based Global Sensitivity Analysis of Decision Making Mechanisms in an Agent-Based Model of Land Use Change*, AAG Annual Meeting, Washington DC, April 14-18, 2010
- 2009 **Ligmann-Zielinska A**, "Can You Dump It?" *The Role of Time Variant Global Sensitivity Analysis in Agent-Based Model Parameterization*, US-International Association for Landscape Ecology meeting, Snowbird, Utah, April 12-16, 2009
- 2008 **Ligmann-Zielinska A**, Jankowski P, *A Framework for Sensitivity Analysis in Spatial Multiple Criteria Evaluation*, 5th International Conference on Geographic Information Science, Park City, Utah, September 23-26, 2008
- 2008 **Ligmann-Zielinska A**, *Generative Exploratory Modeling for Land Use Policy Analysis*, AAG Annual Meeting, Boston, April 15-19, 2008

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- 2008 **Ligmann-Zielinska A**, *An agent-based model of residential development: testing the influence of risk-taking attitudes on land configuration*, 1st Annual Student Research Symposium (SRS), San Diego State University, San Diego, February 29 and March 1, 2008
- 2007 Jankowski P, **Ligmann-Zielinska A**, *A Framework for Sensitivity Analysis in Multiple Criteria Spatial Decision Making*, AAG Annual Meeting, San Francisco, April 17-21, 2007
- 2007 **Ligmann-Zielinska A**, *The impact of risk-taking attitudes on urban land-use pattern: results from an experiment*, AAG Annual Meeting, San Francisco, April 17-21, 2007
- 2006 **Ligmann-Zielinska A**, Church R, Jankowski P, *Development Density-Based Optimization Modeling of Sustainable Land Use Patterns*, 12th International Symposium on Spatial Data Handling in Vienna, Austria, July 10-14, 2006
- 2006 **Ligmann-Zielinska A**, Church R, Jankowski P, *Density-Based Design Constraint for Compact and Contiguous Land Allocation*, AAG Annual Meeting, Chicago, March 07-11, 2006
- 2005 **Ligmann-Zielinska A**, Church R, Jankowski P, *Sustainable Urban Land Use Allocation with Spatial Optimization*, University of Michigan, Eastern Michigan University, Ann Arbor, August 1-3, 2005
- 2005 **Ligmann-Zielinska A**, Jankowski P, *Land Use Based Community Growth Forecasting Using Agent Based Modeling*, Denver, April 5-9, 2005
- 2004 Nyerges T, Brooks T, Drew Ch, Miles S, Rutherford GS, Boshart R, Isip J, Lowry M, Patrick M, Pittman R, Ramsey K, Wilson M, Wu J, Zhou G, Jankowski P, **Ligmann-Zielinska A**, Young R, Zhong T, Hendricksen Ch, *Participatory Modeling and Modeling Participation in Support of Transportation Improvement Decision Making*, 3rd International Conference on Geographic Information Science, University of Maryland, October 20-23, 2004
- 2004 **Ligmann-Zielinska A**, *Multi-Agent Simulation for Generating Land-Use Policy and Planning Scenarios*, poster presentation, ESRI International User Conference, San Diego, August 9-13, 2004



# TEACHING

## Courses

SIRS scale (1 - excellent, 2 - very good, 3 - good, 4 - fair, 5 - poor)

ESP800            *Introduction to Environmental Science and Policy (team teaching with Wei Zhang)*  
Spring 2014        9 students, general SIRS score 2.44

ESP891            *Introduction to Modeling for Environmental and Social Systems (online)*  
Fall 2013            9 students, no SIRS score

GEO 325            *Geographic Information Systems*  
Fall 2012            36 students, mean SIRS score 2.18  
Fall 2011            43 students, mean SIRS score 1.98  
Fall 2010            32 students, mean SIRS score 1.93

ISS 310            *People and Environment*  
Spring 2010        24 students, mean SIRS score 1.65  
Fall 2009            25 students, mean SIRS score 1.94  
Spring 2009        24 students, mean SIRS score 2.00

GEO 869            *Geosimulation*  
Spring 2014        7 students, mean SIRS score 1.41  
Spring 2013        11 students, mean SIRS score 1.32  
Spring 2011        10 students, mean SIRS score 1.28

GEO 874            *Seminar in Geographic Information Science*  
Spring 2013        7 students, mean SIRS score 1.25  
Spring 2012        7 students, mean SIRS score 1.38

GEO 890            *Advanced Readings in Geography Topic: Human-Environment Modeling*  
Spring 2010        10 students, mean SIRS score 1.38  
Spring 2009        11 students, mean SIRS score 1.38

## Teaching Support Activities

- 2014                ESP800 Introduction to Environmental Science and Policy (team-teaching with Wei Zhang)
- Lecture notes
  - Journal article reviews
  - Grant proposal writing session
- 2012-13            GEO 874 Seminar in Geographic Information Science – Spatial Decision Support Systems
- Lecture notes
  - Reflection essays and laboratory exercises on spatial multicriteria decision analysis
- 2010-14            Modeling Environmental and Social Systems (MESS), Certificate as part of the Environmental Science and Policy Curriculum
- ESP 850: Introduction to Environmental and Social Systems Modeling
  - ESP 890: Modeling Environmental and Social Systems
- 2008-12            GEO 869 Geosimulation
- Various agent-based models in Python Programming Language
  - Laboratory exercises for spatially-explicit modeling in Agent Analyst for ArcGIS 9.x

- 2010-12 GEO 325 Geographic Information Systems
- Lecture notes
  - Laboratory exercises (Model Builder in ArcGIS, multicriteria evaluation custom tools in ArcGIS)
- 2008-10 ISS 310 People and Environment
- Google Earth tutorial and exercises
  - Active learning projects (data analysis, critical thinking, visual learning, role-playing debates)
- 2004-07 Intermediate and Advanced GIS (San Diego State University), 2004-2007
- Scripting exercises for spatial analysis using Model Builder and the Geoprocessor Programming Environment in ArcGIS 9.x
  - Tools and extensions: ArcGIS 9.2 Bayes Model, Dempster-Shafer Model (IDRISI)
  - Laboratory exercises for applied spatial statistics, exploratory spatial data analysis, and designing geodatabases using computer-aided software engineering tools
- 2005-07 Spatial Decision Support (San Diego State University)
- Models and exercises: bi-objective land allocation model with LINGO, multicriteria decision analysis with CommonGIS
  - Tools: global and spatial sensitivity analysis in Python and ArcGIS 9 & 10

## Advising

### *Graduate Advisor: Current*

Wei Liu Ph.D., Department of Geography, MSU

Nicholas Molen, M.S., Department of Geography, MSU

### *Graduate Committee Member: Current*

Jeanette Eckert, Ph.D., Geography, MSU (*modeling urban food systems*)

Mathew Lautenberger, Ph.D, Department of Community Sustainability, MSU (*agent-based modeling of agricultural systems*)

Wenda Nofera, Ph.D, School of Planning, Design and Construction, MSU (*agent-based modeling*)

Ryan Qi Wang, Ph.D., Department of Civil and Environmental Engineering, Virginia Tech (*agent-based modeling of hurricane evacuation*)

### *Graduate Committee Member: Completed*

2014 Jason Matney, M.S., Geography, MSU (*spatial analysis and modeling*)

2013 Lahouti, Ali, M.S., School of Planning, Design and Construction, MSU, (*agent-based modeling*)

2013 Heather, Moore, Ph.D., School of Planning, Design and Construction, MSU, (*agent-based modeling*)

2013 Chamberlin, Jordan, Ph.D., Department of Agricultural, Food, and Resource Economics, MSU (*spatial analysis*)

2012 Desai, Ankur, M.S., School of Planning, Design and Construction, MSU, (*agent-based modeling*)

2012 Jing, Du, Ph.D., School of Planning, Design and Construction, MSU, (*agent-based modeling*)

### *Visiting Scholar Advisor: Completed*

2013 Katarzyna Giełda-Pinas, PhD Student, Faculty of Geographical and Geological Sciences, Adam Mickiewicz University, Poznan, Poland, project title: *Developing an integrated agent-based model of forest land cover change and lake water quality* (spring 2013)

### *Independent Study Projects: Current*

Brandon Beasley, Applied Statistics in Geography, Summer 2014

### *Independent Study Projects: Completed*

Eva Sabolcik, Lake Quality Modeling and Agent-Based Modeling of Farmland Conservation: Exploratory Analysis, Spring 2014

Matt Roberts, Multicriteria Evaluation for Habitat Suitability of White-tailed Deer, Spring 2012

Jessica Watkins, Sensitivity Analysis in Spatial Multicriteria Evaluation, Fall 2011-Spring 2012

### *Post-Doctoral Research Advisor: Completed*

Dr. Azucena Pérez Vega, Visiting Post-doctoral Research Fellow, Universidad Nacional Autónoma de México, project title: Priority areas for the conservation of biodiversity through geospatial methods in the State of Colima, Mexico, summer 2009

**MS-GIS Exit Examination Committee**

2014 Jason Piwarski, Jacob Hemingway, Ben Silvernail

2013 Travis Perkins

**Students Funded**

Wei Liu, PhD Student Research Assistantship, MSU, 2013-2015

Jeremy McWhorter, MS Student Research Assistantship, MSU, 2013

Glenn O'Neil, PhD Student Conference Travel, Department of Geography, MSU, 2012, 2013

Chenxiao Ling, Postgraduate Research Assistantship, Department of Geography, MSU, 2011-2012

Nicholas Molen, MS Student Research Assistantship, Department of Geography, MSU, 2010-2012

Claire Anna Forgacs, Undergraduate Student Assistantship, Department of Geography, MSU, 2010

Libo Sun, MS Student Assistantship, Department of Statistics and Probability, MSU, 2009

## SERVICE & OUTREACH

### Editorial Board Member

2012-current Computers Environment and Urban Systems, Journal

### Reviewing

#### Journals

2014 Cartography and Geographic Information Science (1), Computers, Environment, and Urban Systems (2), Social Science & Medicine (1), Environmental Modelling & Software (2), PLOS ONE (1), Complexity (2)

2013 Environment and Planning B: Planning and Design (2), Computers, Environment, and Urban Systems (3), International Journal of Geographical Information Science (1), Environmental Modelling & Software (1), Social Science & Medicine (1), Transactions in GIS (1)

2012 Journal of Geographical Systems (2), Computers, Environment, and Urban Systems (2), Environment and Planning B: Planning and Design (1), Environment and Planning A (1), International Journal of Geographical Information Science (1), International Journal of Geo-Information (1)

2011 International Journal of Digital Earth (1), Ecology & Society (2), Ecological Modelling (1), International Journal of Geographical Information Science (1), Computers, Environment, and Urban Systems (4), Environmental Modelling & Software (2), Journal of Geographical Systems (1)

2010 Journal of Land Use Science (1), Journal of Geographical Systems (1), International Journal of Geographical Information Science (4), Computers, Environment, and Urban Systems (4)

2009 Computers, Environment, and Urban Systems (4)

2008 Risk Analysis (1), Tourism Management (2), Environmental Modelling & Software (1)

2007 Computers, Environment, and Urban Systems (1)

#### Research Project Proposals

2012 Research Council of Canada Social Sciences and Humanities (1)

2011 Geography and Spatial Sciences (BCS), National Science Foundation (1)

2009-2010 Competitive Discretionary Funding Program, Michigan State University (2)

#### Other

2014 Reviewer (2 papers), 7th International Congress on Environmental Modelling and Software (iEMSs), June 15-19, 2014 San Diego, California, USA

Reviewer (5 papers), 11th International Symposium on Spatial Accuracy Assessment in Natural Resources and Environmental Sciences, July 8-11, 2014, Michigan State University, East Lansing, Michigan, USA

Book chapter considered for publication in Computational Approaches for Urban Environments, Springer

2009 Book chapter considered for publication in Urban Remote Sensing: Monitoring, Synthesis and Modeling in the Urban Environment, Wiley

External reviewer PhD thesis, Integrating Complexity Science and Artificial Intelligence: GIS, Agents and Reinforcement Learning for Modeling Forest Cover Change, Bone C, Department of Geography, Simon Fraser University

#### Professional Organization Memberships

2005-current Association of American Geographers

2009-current Spatial Decision Support Consortium: <http://www.spatial.redlands.edu/sds/>

2009-current Center for Water Sciences, Michigan State University, <http://cws.msu.edu/index.html>

2012-2013 American Geophysical Union

2009-2011 Agent-Based Modeling Help Group, Michigan State University

2005-2007 Urban and Regional Information Systems Association

2004-2005 Women in Science and Engineering, University of California, Santa Barbara

**Invited Presentations**

- 2011 Ligmann-Zielinska A, 'Shaken & Stirred Spatial Thinker How to do Agent-Based Computational Modeling within the realm of Geography?' Center for Advanced Modeling in the Social, Behavioral and Health Sciences, Johns Hopkins University, Baltimore, December 20, 2011
- 2010 Ligmann-Zielinska A, 'Variance-Based Global Sensitivity Analysis of Land Use Spatiotemporal Dynamics', Geography Colloquia Series, Michigan State University, November 12, 2010  
Ligmann-Zielinska A, 'Spatiotemporal Sensitivity Analysis of An Agent-Based Model of Land Use Change', colloquium presenter, Department of Geography, San Diego State University, October 15, 2010
- 2009 Ligmann-Zielinska A, 'Variance-Based Global Sensitivity Analysis of Land Use Change Models', oral presentation, Center for Systems Integration and Sustainability, Michigan State University, October 23, 2009  
Ligmann-Zielinska A, 'Complex spatial systems and agent-based modeling in a nutshell', Meet ESPP's newest hires oral presentation, Environmental Science and Policy Program, Michigan State University, March 27, 2009, <http://espp.msu.edu/news/blog/?p=127>
- 2008 Ligmann-Zielinska A, 'Modeling human-environmental systems - a social geographer's perspective', colloquium presenter, Kellogg Biological Station, Michigan State University, October 31, 2008
- 2006 Ligmann-Zielinska A, 'Spatial optimization and multiagent modeling for generating sustainable land use alternatives', colloquium presenter, Adam Mickiewicz University, Department of Geography and Geology, Poznan, Poland, June 13, 2006

**Invited Lectures**

- 2014 Agent-based Modeling of Coupled Human-Natural Systems, Modeling Natural Resource Systems (ACR 851), MSU, April 2014  
Formulating Research Problems, Research Design in Geography (GEO 886), MSU, February 2014
- 2013 Can sensitivity analysis steer the implementation of Agent-Based Models of CHANS? Example in Agricultural Land Conservation, Coupled Human and Natural Systems (CHANS): Key Issues and Research Frontiers (FW 893-002, taught by Jianguo Liu), MSU, November, 2013  
Sensitivity Analysis of Spatial Models, GEOG 569: GIS Workshop taught by Robert Aguirre, Department of Geography, University of Washington, live online lecture, May 2013  
An Agent-based Model of Residential Development, Modeling Natural Resource Systems (ACR 851), MSU, April 2013
- 2012 An Agent-based Model of Residential Development, Modeling Natural Resource Systems (ACR 851), MSU, April 2012
- 2011 Cultural and Economic Geography of Poland, Geography of Europe (GEO336), MSU, November 2011
- 2010 An Agent-based Model of Residential Development: Testing the Influence of Risk-taking Attitudes on Land Configuration, Selected Topics in Agriculture, Community and Recreation: Natural Resources Systems (ACR 891), MSU, November 2010
- 2008 Exploring Normative Scenarios of Land-Use Development Decisions with an Agent-Based Simulation Laboratory, School of Natural Resources and Environment, GIS and Landscape Modeling graduate seminar by Dr. Dan Brown, University of Michigan, November 2008  
Vector Spatial Analysis, Introduction to Geographic Information (GEO 221), MSU, November 2008  
Urban Sustainability and Environmental Concerns, China and Globalization (GEO 890 Section 2), MSU, November 2008

**Service and Ad Hoc Committees**

- 2014-2016 Faculty Advisory Council, ESPP
- 2014-current Faculty Participant, ESP Graduate Certificate Program, Water and Global Commerce: Engineering Sustainable Solutions
- 2013-current Faculty Participant, ESP Graduate Certificate Program, Modeling for Environmental and Social Systems
- 2013-2014 Search Committee Member, GIS and Remote Sensing Position, Department of Geography, MSU
- 2010-2013 Graduate Awards, Department of Geography
- 2009-2013 Graduate Admissions, Department of Geography
- 2010-2011 Search Committee Member, Soil Physics and Unsaturated Hydrology Position, a joint appointment between The Departments of Crop and Soil Sciences and ESPP, MSU
- 2010-2012 Member, Systems Thinking Core Competency Team, MSU Sustainability Undergraduate Specialization
- 2009 Recruiting Fellowship, Environmental Science & Policy Program, MSU
- 2008-2009 Program Advisory Group, Environmental Science & Policy Program, MSU
- 2008-2009 Search Committee Member, Environmental Sociology Position, a joint appointment between The Department of Sociology and ESPP, MSU
- 2008 Geographic Information Science, Department of Geography

## Conferences

- 2014 Scientific Committee Member, Spatial Accuracy 2014, International Conference, MSU, East Lansing, MI, July 8-11 2014
- 2013 Session co-organizer: 'Uncertainty and Sensitivity Analysis in Spatial Modeling', AAG Annual Meeting, Los Angeles CA, April 9-13, 2013
- 2011 Session co-organizer: two paper sessions entitled 'Perspectives on Complex Spatio-Temporal Systems', AAG Annual Meeting, Seattle WA, April 12-16, 2011
- 2010 Session co-organizer: two paper sessions entitled 'Geocomputation', 57th Annual North American Meetings of the Regional Science Association International, Denver CO, November 10-13, 2010  
Session lead organizer: seven paper sessions entitled 'Perspectives on Geographic Complexity', AAG Annual Meeting, Washington DC, April 14-18, 2010
- 2007 Session co-organizer: Sensitivity Analysis in Collaborative Spatial Decision Support Systems, AAG Annual Meeting, San Francisco CA, April 20, 2007

## Other Activities including Workshops

- 2008-current Contributor: Spatial Decision Support Consortium
- 2013 Paper Judge, 3rd Annual Geography Graduate Student Presentation Competition, Department of Geography, MSU, Feb 2013
- 2012 Co-organizer, Distinguished Lecture by Robert Glennon, Center for Water Sciences, MSU, October 10, 2012  
Paper Judge, 2nd Annual Geography Graduate Student Presentation Competition, Department of Geography, MSU, Feb 2012  
Workshop Developer Assistant, 'Colloquium to Theory and Quantitative Methods in Geography', University of Hamburg, Hamburg, February 23-25, 2012
- 2011 Workshop organizer and presenter: 'Introduction to Spatial Sensitivity Analysis', The Redlands Institute, University of Redlands, July 27-28, 2011
- 2010 Presenter: Agent Analyst, part of a mini-workshop series 'Comparing Current ABM Platforms', Agent Based Modeling Help Group, MSU, November 5, 2010  
Lead organizer: mini-workshop series entitled 'Comparing Current ABM Platforms', Agent Based Modeling Help Group, MSU
- 2009-11 Co-manager: Agent-Based Modeling Help Group, Michigan State University
- 2009 External examiner: Ph.D. thesis defense committee, thesis entitled 'Integrating Complexity Science and Artificial Intelligence: GIS, Agents and Reinforcement Learning for Modeling Forest Cover Change' by Christopher Bone, Department of Geography, Simon Fraser University, July 20, 2009  
Session moderator: Spatial Analysis and Landscapes (I), US-IALE Conference, Snowbird, UT, April 13, 2009  
Presenter: Time Management, Professional Development Series, Department of Geography, Michigan State University, co-presented with Dr. Antoinette WinklerPrins, February 20, 2009
- 2006-07 Doctoral Student Representative: Department of Geography, SDSU
- 2006 Workshop organizer and presenter: Writing Proposals for NSF Doctoral Dissertation Research Improvement Grants, Department of Geography, SDSU, September 21, 2006  
Workshop organizer and presenter: Spatial statistics for hypothesis testing, Adam Mickiewicz University, Department of Geography and Geology, Poznan, Poland, June 10-12, 2006