

## CURRICULUM VITAE

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### **Lisa A. Wainger**

*Research Professor*

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### **I. Education**

**B.S.** 1986 (with honors, Phi Beta Kappa), Earth Science, University of California, Santa Cruz.

**Ph.D.** 1997 Environmental and Ecological Economics (within Marine Estuarine Environmental Sciences), University of Maryland, College Park.

### **II. Professional Background**

1995–1998 *Assistant Research Scientist/Project Manager*, University of Maryland, Institute for Ecological Economics, Center for Environmental Science

1998–2004 *Assistant Research Scientist*, University of Maryland, Ctr for Environmental Science

1998–2007 *Project Manager*, King and Associates, Inc. Solomons, MD

2004–2006 *Associate Research Scientist*, Univ. of Maryland, Ctr for Environmental Science

2006–2013 *Research Associate Professor*, Univ. of Maryland, Ctr for Environmental Science

2008–2013 *Economics Advisor*, US EPA, ORD, Ecosystem Services Research Program

2013–present *Research Professor*, University of Maryland, Center for Environmental Science

### **III. Research**

#### **A. Areas of Professional Expertise**

- Integrated ecological and economic evaluation of policy/management options
- Ecosystem service trading, mitigation & offsets
- Mapping and valuation of ecosystem services
- Performance-based metrics for environmental restoration targeting
- Invasive species risk assessment
- GIS and spatial data statistical modeling

#### **B. Peer-Review Publications**

##### **Papers**

- Wainger, L. A., N. E. Harms, C. Magen, D. Liang, G. M. Nessler, A. M. McMurray, and A. F. Cofrancesco. 2018. Evidence-based economic analysis demonstrates that ecosystem service benefits of water hyacinth management greatly exceed research and control costs. e26617v1. PeerJ Inc. doi:10.7287/peerj.preprints.26617v1
- Olander, L.P., Johnston, R.J., Tallis, H., Kagan, J., Maguire, L.A., Polasky, S., Urban, D., Boyd, J., Wainger, L., Palmer, M., 2018. Benefit relevant indicators: Ecosystem services measures that link ecological and social outcomes. *Ecological Indicators* 85, 1262–1272. <https://doi.org/10.1016/j.ecolind.2017.12.001>

- Wainger LA, Secor D, Gurbisz C, Kemp M, Glibert PM, Richkus J, Barber M. 2017. Resilience indicators support valuation of estuarine ecosystem restoration under climate change. *Ecosystem Health and Sustainability*. <http://onlinelibrary.wiley.com/doi/10.1002/ehs2.1268/full>
- Wainger, L., A. McMurray, M. Paolisso, K. J. Johnson, and B. Needelman. 2017. Coastal Community Values for Marsh-Dependent Socioecological Services Revealed through a Systematic Qualitative Approach. *Agricultural and Resource Economics Review* 46: 1–27.
- Olander, L., S. Polasky, J. S. Kagan, R. J. Johnston, L. Wainger, D. Saah, L. Maguire, J. Boyd, D. Yoskowitz. 2017. So you want your research to be relevant? Building the bridge between ecosystem services research and practice. *Ecosystem Services* 26: 170–182.
- Wainger L, Yu H, Gazenski K, Boynton W. 2016. The relative influence of local and regional environmental drivers of algal biomass (chlorophyll-a) varies by estuarine location. *Estuarine, Coastal and Shelf Science* 178:65–76.
- Nesslage GM, Wainger LA, Harms NE, Cofrancesco AF. 2016. Quantifying the population response of invasive water hyacinth, *Eichhornia crassipes*. *Biological Invasions* 18:2107–2115.
- O’Leary CA, Perry E, Bayard A, Wainger L, Boynton WR. 2016. Linking innovative measurement technologies (ConMon and Dataflow© systems) for high-resolution temporal and spatial dissolved oxygen criteria assessment. *Environmental Monitoring and Assessment* 188:543.
- Richkus J, Wainger LA, Barber MC. 2016. Pathogen reduction co-benefits of nutrient best management practices. *PeerJ* 4:e2713.
- Johnston, R. and L. Wainger. 2015. Benefit Transfer for Ecosystem Service Valuation: An Introduction to Theory and Methods. Chapter 12 In: *Handbook of Environmental Benefit Transfer* (R. Johnston, J. Rolfe, R. Rosenberger, and R. Brouwer, eds.). Springer.
- Mazzotta, M., L. Wainger, S. Sifleet, J. T. Petty, and B. Rashleigh. 2015. Benefit transfer with limited data: An application to recreational fishing losses from surface mining. *Ecological Economics* 119:384–398.
- Munns, W. R., A. W. Rea, M. J. Mazzotta, L. A. Wainger, and K. Saterson. 2015. Toward a standard lexicon for ecosystem services. *Integrated Environmental Assessment and Management* 11:666–673.
- Costanza, R. K. Chichakly, V. Dale, S. Farber, D. Finnigan, K. Grigg, and 12 co-authors. 2014. Simulation games that integrate research, entertainment, and learning around ecosystem services. *Ecosystem Services* 10:195–201.
- Koch, B. J., C. M. Febria, M. Gevrey, L. A. Wainger, and M. A. Palmer. 2014. Nitrogen Removal by Stormwater Management Structures: A Data Synthesis. *JAWRA Journal of the American Water Resources Association* 50:1594–1607.
- Lookingbill, T. R., E. S. Minor, J. R. Ferrari, N. Bukach & L. A. Wainger. 2014. Using Risk of Reinvasion to Prioritize Invasive Plant Species Management. *Natural Areas Journal*. 34(3):268–281.
- Wainger, L. A., and Shortle, J.S. 2013. Local Innovations in Water Protection: Experiments with Economic Incentives. *Choices: The Magazine of Food, Farm & Resource Issues* 28.
- Wainger, L. A., G. Van Houtven, R. Loomis, J. Messer, R. Beach, and M. Deerhake. 2013. Tradeoffs among Ecosystem Services, Performance Certainty, and Cost-efficiency in Implementation of the Chesapeake Bay Total Maximum Daily Load. *Agricultural and Resource Economics Review* 42:196–224.
- Boynton, W. R., C. L. S. Hodgkins, C. A. O’Leary, E. M. Bailey, A. R. Bayard, and L. A. Wainger. 2013. Multi-decade Responses of a Tidal Creek System to Nutrient Load Reductions: Mattawoman Creek, Maryland USA. *Estuaries and Coasts*:1–17.
- Setterfield, S. A., N. A. Rossiter-Rachor, M. M. Douglas, L. Wainger, A. M. Petty, P. Barrow, I. J. Shepherd, and K. B. Ferdinands. 2013. Adding Fuel to the Fire: The Impacts of Non-Native Grass Invasion on Fire Management at a Regional Scale. *PLoS ONE* 8:e59144.
- Wainger, L. A. 2012. Opportunities for Reducing Total Maximum Daily Load (TMDL) Compliance Costs: Lessons from the Chesapeake Bay. *Environmental Science & Technology* 46:9256–9265.

- Suarez-Rubio, M., T. Lookingbill, and L. Wainger. 2012. Modeling exurban development near Washington, DC, USA: comparison of a pattern-based model and a spatially-explicit econometric model. *Landscape Ecology* 27:1045–1061.
- Tallis, H., S. Lester, M. Ruckelshaus, M. Plummer, K. McLeod, A. Guerry, S. Andelman, M.R Caldwell, M. Conte, S. Copps, D. Fox, R. Fujita, S. D Gaines, G. Gelfenbaum, B. Gold, P. Kareiva, C. Kim, K. Lee, M. Papenfus, S. Redman, B. Silliman, L. Wainger, C. White. 2012. New Metrics for Managing and Sustaining the Ocean's Bounty. *Marine Policy* 36:303-306.
- Wainger, L., and M. Mazzotta. 2011. Realizing the Potential of Ecosystem Services: A Framework for Relating Ecological Changes to Economic Benefits. *Environmental Management* 48:710-733.

### Peer-Reviewed Technical Reports

- McGee, B., M. Bryer, J. Davis-Martin, L. Wainger, R. Batiuk, J. Greiner, S. Newbold, K. Saunders, S. Phillips, R. Dixon. 2017. *Quantifying Ecosystem Services and Co-Benefits of Nutrient and Sediment Pollutant Reducing BMPs*. STAC Publication Number 17-008, Edgewater, MD. 37 p.
- Wainger, L., and D. Ervin. 2017. *Synthesis Chapter-The Valuation of Ecosystem Services from Farms and Forests: Informing a Systematic Approach to Quantifying Benefits of Conservation Programs*. The Council on Food, Agriculture & Resource Economics and USDA Office of Ecosystem Markets. <http://www.cfare.org/UserFiles/file/SynthesisChapter-TheValuationofEcosystemServicesfromFarmsandForests.pdf>.
- Wainger, L., Loomis, J., Johnston, R.J., Hansen, L., Carlisle, D., Lawrence, D., Gollehon, N., Duriancik, L., Schwarz, G., Ribaud, M., Gala, C., 2017. *Chapter 2: Ecosystem Service Benefits Generated by Improved Water Quality from Conservation Practices*. The Council on Food, Agriculture & Resource Economics and USDA OEM, Washington, DC. Available online.
- Davis-Martin, J., Devereux, O., Batiuk, R., Hobbs, B., Wainger, L., Dixon, R., 2017. Cracking the WIP: Designing an Optimization Engine to Guide Efficient Bay Implementation. STAC Publication Number 17-004. STAC, Edgewater, MD.
- Wainger, L. A., A. McMurray, H. R. Griscom, E. O. Murray, J. A. Cushing, C. Theiling and S. Komlos. (in press). *A Proposed Ecosystem Services Analysis Framework for the US Army Corps of Engineers*. USACE ERDC Technical Report.
- Murray, E. O., G. F. Mendoza, L. Wainger, H. Griscom, and J. Cushing. (in press). *Ecosystem Goods and Services (EGS) Models and Tools: A Synthesis Report of information in the EGS Model and Tools Catalog*. US Army Corps of Engineers, Engineer Research and Development Center.
- Wainger, L., and D. Ervin. 2017. *Synthesis Chapter-The Valuation of Ecosystem Services from Farms and Forests: Informing a Systematic Approach to Quantifying Benefits of Conservation Programs*. The Council on Food, Agriculture & Resource Economics and USDA Office of Ecosystem Markets. <http://www.cfare.org/UserFiles/file/SynthesisChapter-TheValuationofEcosystemServicesfromFarmsandForests.pdf>.
- Wainger, L., J. Loomis, R.J. Johnston, L. Hansen, D. Carlisle, D. Lawrence, N. Gollehon, et al. 2017. *Chapter 2: Ecosystem Service Benefits Generated by Improved Water Quality from Conservation Practices*. Washington, DC: The Council on Food, Agriculture & Resource Economics and USDA Office of Ecosystem Markets. <http://www.cfare.org/UserFiles/file/Chapter2-EcosystemServiceBenefitsGeneratedbyImprovedWaterQualityfromConservationPractices.pdf>.
- Olander, Lydia, Robert J. Johnston, Heather Tallis, Jimmy Kagan, Lynn Maguire, Steve Polasky, Dean Urban, James Boyd, Lisa Wainger, and Margaret Palmer. 2015. *Best Practices for Integrating Ecosystem Services into Federal Decision Making*. Durham: National Ecosystem Services Partnership, Duke University. doi:10.13016/M2CH07.
- Wainger, L. A., and C. Magen. 2015. *EnviroAtlas Use Case: Opportunities for improving water quality and related ecosystem services from cost-effective targeting of manure transportation subsidies*. For US EPA Office of Research and Development. <http://www.epa.gov/enviroatlas/enviroatlas-use-cases>.

- Wainger, L. A., R. J. Johnston, K. J. Bagstad, C. F. Casey, and T. Vegh. 2014. *Social Impact Analysis: Monetary Valuation*. In: *The Federal Resource Management and Ecosystem Services Guidebook* (Olander, L. et al. eds.). National Ecosystem Services Partnership, Nicholas School of the Environment, Duke University. <https://nespguidebook.com/assessment-framework/monetary-valuation/>.
- Olander, L. et al. 2015. *The Federal Resource Management and Ecosystem Services Guidebook*. (revised in 2015). <https://nespguidebook.com>
- Ribaudo, M., C. Abdalla, K. Stephenson, and L. Wainger. 2014. *Critical Issues in Implementing Nutrient Trading Programs in the Chesapeake Bay Watershed*. STAC Workshop Report. Chesapeake Research Consortium, Annapolis, MD.
- Murray, E., J. Cushing, L. Wainger, and D. Tazik. 2013a. *Incorporating Ecosystem Goods and Services in Environmental Planning – Definitions, Classification and Operational Approaches*. Technical Report, USACE ERDC.
- Murray, E., J. Cushing, L. Wainger, and D. Tazik. 2013b. *Incorporating Ecosystem Goods and Services in Environmental Planning – Definitions, Classification and Operational Approaches*. Technical Note, USACE ERDC.
- Tazik, D., E. Murray, J. Cushing, and L. Wainger. 2013. *Incorporating Ecosystem Goods and Services in Environmental Planning: A Literature Review of Definitions, Classification and Operational Approaches*. Technical Report, USACE ERDC.
- Wainger, L.A., T. Lookingbill, and E. Minor. 2012. *To Weed or Not to Weed? An Economic Decision Support Tool for National Capital Region Parks*. Prepared for: National Park Service, Center for Urban Ecology. Cooperative agreement #: NPS: H399060006, UMCES 075-25595.
- Wainger, Lisa A., Jay J. Messer, Mary C. Barber, Robert M. Wolcott and Andrew L. Almeter. 2012. *Lowering Barriers to Achieving Multiple Environmental Goals in the Chesapeake Bay*. U.S. Environmental Protection Agency (US EPA) Ecosystem Services Research Program (ESRP). <https://www.epa.gov/eco-research/ecosystem-services>
- Wainger, L.A. and A.R. Bayard. 2012. *Spatial Analysis of Water Quality Conditions and Drivers*, Chapter 4, in Ecosystem Processes Component (EPC). Maryland Chesapeake Bay Water Quality Monitoring Program, Level 1 report No. 29. In draft.
- Wainger, L. and M. Barber. 2011. *Innovations Suggested by Case Studies*. Chapter 1 in: *Lowering Barriers to Achieving Multiple Environmental Goals in the Chesapeake Bay*: EPA ORD Report. <http://www.epa.gov/research/ecoscience/eco-services.htm>
- U.S. EPA 2011. *An Optimization Approach to Evaluate the Role of Ecosystem Services in Chesapeake Bay Restoration Strategies*. US EPA/600/R-11/001
- Luckenbach, M., L. Wainger, S. Bell, M. Fonseca, K. Heck, H. Neckles, M. Smart, C. Pickerell, and D. Weller. 2011. *Evaluation of the Effectiveness of SAV Restoration Approaches in the Chesapeake Bay* (CRC# STAC 11-03). STAC.
- Paolisso, M., E. Van Dolah, T.W. Hartley, L.A. Wainger, J. Pease, D. Lipton, S. Julius. 2011. *Integrating Social Science Research into Chesapeake Bay Restoration* (CRC# STAC 11-05). STAC.
- Wainger, L.A. and A.R. Bayard. 2011. *Spatial Analysis of Water Quality Conditions*, Chapter 4, in Ecosystem Processes Component (EPC). Maryland Chesapeake Bay Water Quality Monitoring Program, Level 1 report No. 28. Ref. No. [UMCES] CBL 11-024. [UMCES Technical Series No. TS-620-11-CBL].

### **Other Reports, Discussion Papers, Online Products, and Draft Manuscripts**

- Wainger LA, Helcoski R, Farge K, Espinola B, Green GT. *submitted* (in revision). Evidence of our shared value for nature.
- Wainger, L.A. and Jessica Fox, and 19 co-authors. (submitted). *Injecting Better Science into Voluntary Corporate Biodiversity Conservation*. (Results of a SESYNC workshop).

- Wainger LA, Gazenski K, Waldrop A, Basenback N, Filoso S, Siskey M. 2017. A systematic review of reviews to support the Biodiversity Metric Advancement Workgroup (BMAW). UMCES Tech Report. DOI: 10.13140/RG.2.2.20262.73284.
- US EPA Chesapeake Bay Program. Environmental Finance Symposium Report Action Team. 2017. *The Path Forward: Chesapeake Bay Program Response to Chesapeake Bay Environmental Finance Symposium Recommendations and Final Report*.  
[https://www.chesapeakebay.net/who/group/environmental\\_finance\\_symposium\\_report\\_action\\_team](https://www.chesapeakebay.net/who/group/environmental_finance_symposium_report_action_team)
- Kennedy, C. and L.A. Wainger 2016. Evaluation of Ecosystem Services of SAV in the Chesapeake Bay. Chapter 11 in Technical Synthesis III. Maryland DNR and US EPA Chesapeake Bay Program Office.
- EcoScarcity Database. Data and tools relevant to assessing the scarcity of ecosystem goods and services that are derived from biodiversity and high quality habitat  
<http://waingerlab.cbl.umces.edu/ecoscarcity/>
- Wainger, Lisa, Anna McMurray, Nathan Harms, Al Cofrancesco, (in press). A framework for assessing economic benefits of invasive aquatic plant management in Louisiana. Information Exchange Bulletin. USACE ERDC Environmental Lab.
- Needelman B, Paolisso M, Land S, Leishnam P, Baldwin A, Johnson K, Wainger L, McMurray A, Dindinger J. 2015. Integrating Socio -Ecological Research and Collaborative Learning to Promote Marsh and Community Resilience A Final Report Submitted to the National Estuarine Research Reserve System Science Collaborative. Available from <http://www.nerra.org/projects/enhancing-resilience-on-marylands-deal-island/>.
- Mazzotta, M. J., and L. A. Wainger. 2014. *Economic theory and methods for developing non-monetary ecosystem service benefit indicators*. US EPA ORD.
- Wainger, L., S. Sifleet, D. Shafer and S. Bourne. 2013b. *Ecosystem service benefits of USACE ecological restoration projects in the coastal Northeast: Hurricane Sandy case study*. Draft Report. Vicksburg, MS: U.S. Army Engineer and Research Development Center.

#### **D. Recent Invited Seminars and Presentations**

- February 1, 2018. *Spatial economic information needs of decision makers*. University of Copenhagen, Dept of Food and Resource Economics.
- January 5, 2018. *Promoting joint ecological and economic modeling*. Preparatory talk for STAC workshop Modeling Beyond 2025. <https://youtu.be/AufCZImff-Y>
- November 6, 2017. Resilience indicators support valuation of estuarine ecosystem restoration under climate change. Coastal and Estuarine Research Foundation, Newport, RI.
- June 29, 2017. *Valuation of ecosystem services available from farms and forests: Developing reliable approaches for federal agencies*. National Ecosystem Service Partnership webinar (national audience).
- March 28, 2017. *Setting the Context: Ecosystem Service Analysis*. Ecosystem Services Valuation workshop (STAC).
- March 23, 2017. Valuation of ecosystem services available from farms and forests: A valuation framework based on the best available science. Council on Food, Agriculture and Resource Economics webinar.
- March 20, 2017. Effective Use of Economic Valuation. Capitol Hill briefing sponsored by the Agricultural & Applied Economics Association.
- Feb 23, 2017. *Valuation of ecosystem services available from farms and forests: Developing reliable approaches for federal agencies*. W3133 Economics workshop Benefits and Costs of Natural Resources Policies Affecting Ecosystem Services on Public and Private Lands. Carlsbad, CA.
- December 8, 2016. *Crucial Elements of a Systematic Reporting System for Ecosystem Service Valuation*. A Community on Ecosystem Services (ACES) 2016 Conference. December 5-9, 2016. Jacksonville, Florida.

December 7, 2016. *More than the Sum of Its Parts: Spatial Agglomeration and Network Effects on Ecosystem Service Benefits*. A Community on Ecosystem Services (ACES) 2016 Conference. December 5-9, 2016. Jacksonville, Florida.

December 6, 2016. *Limitations of Ecosystem Services Classification Systems and Rationale for Flexible Design*. A Community on Ecosystem Services (ACES) 2016 Conference. December 5-9, 2016. Jacksonville, Florida.

## **V. Outreach and Service**

### Federal/State/Local Government and Non-Governmental Organizations

**Ecosystem Management and Working Group (ESMWG)** of the NOAA Scientific Advisory Board. 2018-present.

**Chesapeake Bay Program Scientific and Technical Advisory Committee (STAC)**, 2007 – present

Past Chair as of Sept. 2017

Chair September 2015-2017

Water Quality Trading subcommittee

Social Sciences Subcommittee

**National Academies of Sciences**. Invited speaker/participant.

*Rising to Coastal Challenges: Social Science Perspectives on Research Needs for Responding to Rising Seas*. December 6, 2017.

*Workshop on landscape approaches and multi-resource analysis for sustainable natural resource management*. June 2, 2015.

**Council on Food, Agricultural and Resource Economics (C-FARE), 2015-2017**

Invited Co-Lead Editor of multi-investigator program that will produce a report on the topic of:

Valuation of prioritized ecosystem services that are enhanced by USDA programs.

**BayStat Program Scientific Advisory Panel, 2015-present.**

**Hughes Center for Agro-Ecology Research Advisory Committee, 2015 - present.**

**Maryland Water Quality Trading Advisory Committee, 2016 - present.**

**National Ecosystem Services Partnership – FRMES, 2012-2016.** Co-organizer of economics section, in collaboration with faculty from Duke Nicholas School of the Environment. Developing technical guidance for federal agencies to use in decision-making related to ecosystem services.

**White House Council on Environmental Quality.**

Ecosystem Services in NEPA. Invited Presenter. May 12, 2016

Interagency Guidelines on Ecosystem Services. Invited Presenter. November 12, 2013.

### International Government Agencies and Consortia

**BONUS** - the joint Baltic Sea research and development program. Reviewer 1/2018