Mauricio Eduardo Arias, Ph.D.

Organismic and Evolutionary Biology Department, Harvard University, 26 Oxford Street, Cambridge, MA 02138 • (617) 961 2538 • mauricio.eduardo.arias@gmail.com

Research and Professional Interests

- Quantitative evaluation of effects of climate change and development in water ecosystems
- Sustainable management and development of large river basins in the Global South
- Integration of hydrology with ecological and social systems
- Modeling and field investigations of freshwater ecosystems at different spatial scales
- Evaluation of ecosystem services from wetlands
- Application of ecological engineering for pollution control, flood mitigation, and ecological restoration

Professional Training

Post-doctoral Fellowship, Sustainability Science Program, Harvard University, 2014-2015, project: *Tradeoffs between hydropower and river alterations in the Amazon*. Faculty host: Paul Moorcroft.

Ph.D., Civil and Natural Resources Engineering, University of Canterbury, Christchurch (New Zealand), 2013, title: *Impacts of hydrological alteration in the Mekong to the Tonle Sap Ecosystem.* Advisors: Tom A. Cochrane, Matti Kummu, Brian Caruso, Tim Killeen.

Master of Engineering, Environmental Engineering Sciences, Systems Ecology/Ecological Engineering Program, University of Florida, Gainesville (USA), 2007, GPA: 3.88/4.0, Research Project: *Characterization of suspended-sediments in a stormwater system during rainfall-runoff events.* Advisors: Mark T. Brown, John J. Sansalone.
Related courses: Wetland treatment Systems, Advanced Wetlands Ecology, Ecological Engineering, Wetlands Hydrology, Biogeochemistry of Wetlands, Stormwater Systems, Ecological and General Systems.

Bachelor of Science, Environmental Engineering Sciences, University of Florida, Gainesville (USA), 2006, GPA: 3.73/4.0. Magna Cum Laude , Minor in Anthropology, honors thesis: *Feasibility of Using Constructed Wetlands to Treat Municipal Wastewater in the Bogotá Savannah, Colombia.*

Research Experience

Post-doctoral Research Fellow in Sustainability Science, Harvard Kennedy School / Organismic and Evolutionary Biology Department, Harvard University, Sept. 2014 - present

- Engaged in a research initiative assessing the interplay between climate, deforestation, and hydropower in the hydrology of the Amazon Basin.

Research Associate, Department of Civil and Natural Resources Engineering, University of Canterbury, Aug. 2013 – Aug. 2014

- Coordinated research and performed numerical simulations to evaluate effects of hydropower and land use change on river water and sediment flows on a large transnational tributary of the Mekong River.

Research Assistant, Department of Civil and Natural Resources Engineering, University of Canterbury, Sept. 2009- Jul. 2013

- Engaged in the project *Mekong Flows: Modeling and Monitoring the Potential Impacts of Large-Scale Disruptions to the Hydrological Cycles of the Mekong River Basin on Biodiversity and Natural System*.

- Monitored and simulated changes in inundation, habitats and productivity of the Tonle Sap Lake in Cambodia as a response to hydrological changes caused by hydropower and climate change.
- Cooperated in the modeling of operations and hydrological impacts of a network of dams in the Mekong River and tributaries
- Led five field campaigns in the Tonle Sap Lake region in Cambodia
- Participated in several workshops in Cambodia, Lao, and the US related to water resources development, climate change, and ecological issues in the Mekong.

Graduate Research Assistant, H.T. Odum Center for Wetlands, University of Florida, Aug. 2006 – Dec. 2007

- Quantified stormwater flows and water quality parameters during rainfall-runoff events.
- Maintained a weather station from field and water stage recorders in a network of wet detention ponds.
- Analyzed stormwater quality parameters in the laboratory measurements.

Teaching Experience

Invited lecturer:

- Harvard Kennedy School: Water Resources Development and Management
- University of Canterbury: ENCN444 Water Infrastructure and Design, ENNR 320 Integrated Catchment Analysis, ENCN401 Engineering for Developing Communities., 2013.

Teaching assistants' coordinator: environmental/ecological engineering cluster, University of Canterbury, 2013.

Teaching assistant: ENNR 407 Advanced Hydrology, ENNR 320 Integrated Catchment Analysis, ENCN401 Engineering for Developing Communities, ENCI 262 Surveying, Transport and GIS. University of Canterbury, 2010-2013.

Consulting Experience

Consultant, Conservation International**,** May-Jun 2010

- Quantified payment for ecosystem services from forested watersheds for sediment loading reduction to hydropower reservoirs in Cambodia.

Water Resources Engineer, Jones, Edmunds & Associates, Gainesville, FL (USA), Feb. 2007 – Mar. 2009

- Developed hydrological databases and hydraulic numerical models of regional-scale watersheds in Florida.
- Generated, managed and processed geographical and hydrological data in GIS databases.
- Proposed management solutions to flooding and pollution issues based on modeling efforts.
- Modeled hydraulics and monitored stormwater sediment loads during large storms to support the design of an 80-ha treatment wetland system.

Publications

Google Scholar: http://scholar.google.co.nz/citations?user=N808xGgAAAAJ&hl (h-index: 6; i10-index: 5)
Research Gate profile: https://www.researchgate.net/profile/Mauricio_Arias4/?ev=hdr_xprf

Peer-reviewed journal articles (n= 13)

Piman, T., Cochrane, T.A., **Arias, M.E.** Effect of Proposed Large Dams on Water Flows and Hydropower Production in the Sekong, Sesan and Srepok Rivers of the Mekong Basin. River Research and Applications (Accepted pending revisions).

Arias, M.E., Piman, T., Lauri, H., Cochrane, T.A., Kummu, M. (2014) Dams on Mekong tributaries as significant contributors of hydrological alterations to the Tonle Sap Floodplain in Cambodia. Hydrological and Earth System Sciences 18 5303–5315, DOI: 10.5194/hess-18-5303-2014.

Cochrane, T. A., **Arias, M. E.**, Piman, T. (2014) Historical impact of water infrastructure on water levels of the Mekong River and the Tonle Sap System. Hydrological and Earth System Sciences 18 4529-4541, DOI: 10.5194/hessd-18-4529-2014.

Arias, M.E., Cochrane, T.A., Kummu, M., Lauri, H., Koponen, J., Holtgrieve, G.W., Piman, T. (2014) Impacts of hydropower and climate change on drivers of ecological productivity of Southeast Asia's most important wetland. Ecological Modelling 272C 252-263, DOI: 10.1016/j.ecolmodel.2013.10.015.

Arias, M.E., Cochrane, T.A., Elliott,V. (2014) Modelling future changes of habitat and fauna of the Tonle Sap wetland of the Mekong. Environmental Conservation DOI: 10.1017/S0376892913000283.

Holtgrieve, G.W., **Arias, M.E.**, Irvine, K.N., Lamberts, D., Ward, E.J., Kummu, M., Koponen, J., Richey, J.E. (2013) Patterns of Ecosystem Metabolism in the Tonle Sap Lake, Cambodia with Links to Capture Fisheries. PLoS ONE 8(8): e71395. DOI:10.1371/journal.pone.0071395.

Arias, M.E., Cochrane, T.A., Norton, D., Killeen, T.J., Khon, P. (2013) The flood pulse as the underlying driver of vegetation in the largest wetland and fishery of the Mekong Basin. AMBIO 42 (7) 864-876, DOI: 10.1007/s13280-013-0424-4.

Arias, M.E., Brown, M.T., Sansalone, J. J. (2013) Characterization of stormwater suspended sediments and phosphorus in an urban catchment in Florida (USA). Journal of Environmental Engineering 2013.139:277-288.

Cooperman M.S., S. Nam, **M. E. Arias**, T. Cochrane, V. Elliott, T. Hand, L. Hannah, G. Holtgrieve, L. Kaufman, A. Koening, J. Koponen, V. Kum, K. McCann, P. McIntyre, B. Min, C. Ou, N. Rooney, K. Rose, J. Sabo, K.O. Winemiller (2012) A watershed moment for the Mekong: New regulations may boost sustainability of the world's largest inland fishery. Cambodian Journal of Natural History December 2012.

Arias, M.E., Cochrane, T.A., Piman, T., Kummu, M., Caruso, B., Killeen, T.J. (2012) Quantifying changes in flooding and habitats in the Tonle Sap Lake (Cambodia) caused by water infrastructure development and climate change in the Mekong Basin. Journal of Environmental Management 112 53-66.

Piman, T., Cochrane, T.A., **Arias, M.E.**, Green, A., Dat, N.D. (2012) Assessment of Flow Changes from Hydropower Development and Operations in Sre Kong, Se San and Sre Pok Rivers of the Mekong Basin. Journal of Water Resources Planning and Management DOI: 10.1061/(ASCE)WR.1943-5452.0000286.

Arias, M.E., Cochrane, T.A., Lawrence, K., Killeen, T. J., and Farrell T.A. (2011) Paying the forest for electricity: A modelling framework to market forest management as payment for ecosystem services benefiting hydropower generation. Environmental Conservation 38 (4) 1-12.

Arias, M.E., M.T. Brown (2009) Feasibility of using constructed treatment wetlands for municipal wastewater in the Bogotá Savannah, Colombia**.** Ecological Engineering 35 (2009) 1070-1078.

Peer-reviewed conference proceedings (n=4)

Dang Duc, T., Cochrane, **Arias, M.E.,** Van, T.P.D., De Vries, T. (2015) Analysis of water level changes in the Mekong Floodplain impacted by flood prevention systems and upstream dams. Proceedings of the 36th IAHR World Congress, The Hague, Netherlands, June 28-July 3, 2015.

Arias, M.E., Cochrane, T.A., Caruso, B., Killeen, T.J., Kummu, M. (2011) A landscape approach to assess impacts of hydrological changes to vegetation communities of the Tonle Sap Floodplain. Proceedings of the 34th IAHR World Congress, Brisbane, Australia, June 27-July 1, 2011.

Cochrane, T.A., **Arias, M.E.**, Teasley, R.L. and Killeen, T.J. (2010) Simulated changes in water flows of the Mekong River from potential dam development and operations on the Se San and Sre Pok tributaries. Montreal, Canada: IWA World Water Congress and Exhibition (IWA 2010), 19-24 Sep 2010.

Arias, M.E., Brown, M.T. (2009) Feasibility of Treatment Wetlands for Municipal Wastewater in Colombia: Emergy Evaluation of Treatment Alternatives. In: Brown, M.T., S. Sweeney, D.E. Campbell, S. Huang, E. Ortega, T. Rydberg, D. Tilley and S. Ulgiati (eds). 2009 Emergy Synthesis 5: Theory and applications of the emergy methodology. Proceedings of the 4th Biennial Emergy Conference. Center for Environmental Policy, University of Florida, Gainesville. 483 pp.

Book Chapters

Piman, T., Cochrane, T.A., **Arias, M.E.**, Dat, N.D., Vonnarart, O. (2015) Managing Hydropower under Climate Change in the Mekong Tributaries. In S. Shrestha (Ed.), Managing Water Resources under Climate Uncertainty: Examples from Asia, Europe, Latin America, and Australia. Springer Water.

In preparation

Parolin, P., Ferreira, L.V., Piedade, M. T. F., Nunes da Cunha, C., Wittmann, F., Arias, M. E. Flood tolerant trees in lowland tropical regions. Chapter in book edited by Guillermo Goldstein

Arias, M.E., Wittmann, P., Parolin, P., Murray-Hudson, M. A., Cochrane, T.A. Interactions between flooding and upland disturbance drives species diversity in large river floodplains (Invited paper under review for Hydrobiologia).

Uncertainty and variability in Sediment Loads in the Sesan, Srepok and Sekong Rivers of the Mekong Basin.

Mitigating Water, Sediment and Forest Cover Changes through Sustainable Hydropower Development in River Basins at Risk.

The role of land cover change and vegetation dynamics in the hydrological transition across a large river basin in Eastern Amazonia.

Tradeoffs between hydrological alterations and electricity generation in the Amazon

Professional presentations

1. Sustainability of the Amazon: Tradeoffs Between Environmental Change, Hydropower and River Alterations. Brazil Studies Program Seminar, Harvard University, April 30th, 2015 (Invited).

2. Interactions among Climate, Development and Ecology of Large Rivers. Job seminar, Colorado State University, March 30th, 2015.

3. Uncertainty and variability in sediment loads in the largest tributary of the Mekong Basin using the Soil and Water Assessment Tool. American Geophysical Union Fall Meeting, San Francisco, USA, December 15-19 2014 (oral presentation).

4. Altman, I., **Arias, M.E.**, Gopal, S., Kaufman, L. Freshwater, Floods, Fish, and the Future of a Nation. Panel seminar at the Pardee Center for the Study of the Longer Range Future, Boston University, October 22, 2014 (Invited).

5. Coupling SWAT with land cover and hydropower models for sustainable development in the Mekong Basin. Pernambuco, Brazil: International SWAT Conference, 30 Jul-1 Aug 2014 (oral presentation).

6. Flooding and upland disturbance drive species richness in large river floodplains. Manaus, Brazil: International Conference on the Status and Future of the World's Large Rivers, 21-25 Jul 2014 (oral presentation).

7. Holtgrieve, G. W., **Arias, M. E.**, Chheng, P., Floods, fish, and people: Connecting biogeochemical fluxes to aquatic ecosystem functions and people, American Geophysical Union Fall Meeting, San Francisco, USA, December 9-13 2013 (invited oral presentation).

8. Cochrane, T.A., **Arias, M. E.**, Piman, T. , Analysis of historical impacts of water resources development on water levels of the Mekong River, American Geophysical Union Fall Meeting, San Francisco, USA, December 9-13 2013 (invited oral presentation).

9. Impacts of Hydrological Alterations to the Tonle Sap Ecosystem of the Mekong River Basin, American Geophysical Union Fall Meeting, San Francisco, USA, December 9-13 2013 (poster presentation).

10. Piman, T., Cochrane, T.A., **Arias, M. E.**, Modelling the impact of large dams on flows and hydropower production of the Sekong, Sesan, and Srepok Rivers in the Mekong Basin, American Geophysical Union Fall Meeting, San Francisco, USA, December 9-13 2013 (posted presentation).

11. Cochrane, T. A., **Arias, M. E.**, Elliot, V., Optimizing conservation efforts by modeling the spatial impact of hydrological changes on wetland fauna habitat: a case study of the Tonle Sap. 26th International Congress for Conservation Biology, Baltimore, USA, July 21-25, 2013 (invited oral presentation).

12. Farrell, T., **Arias, M. E.**, Paying the forest for electricity: a modelling framework to market forest conservation as payment for ecosystem services benefiting hydropower generation. Mekong Environmental Symposium, Ho Chi Minh City, Vietnam, March 5-7 2013 (oral presentation).

13. Piman, T., **Arias, M.E.**, The flood pulse as the underlying driver of vegetation in the Tonle Sap. Mekong Environmental Symposium, Ho Chi Minh City, Vietnam, March 5-7 2013 (oral presentation).

14. Impacts of Hydrology and Habitat Changes on the Primary Production of the Tonle Sap, Southeast Asia's Largest Lake. 4th International Ecosummit 2012, Columbus, Ohio, USA, October 1-5 2012 (oral presentation).

15. Impacts of hydrology and habitat changes on the primary production of Southeast Asia's largest lake. IWA World Congress on Water, Climate, and Energy, Dublin, Ireland, May 13-18 2012 (oral presentation).

16. Overview of Mekong's hydrological models of climate change and hydropower development and their impacts on the Tonle Sap. Adapting to Environmental Change in the Tonle Sap Lake and Floodplain: Enhancing Resilience of Ecosystems and Communities workshop organized by Conservation International. Phnom Penh, Cambodia, January 12-13, 2012 (invited oral presentation).

17. Fish, Mud, Thorns, and Rice: Field Survey of Floodplain Habitats in the Tonle Sap, Cambodia. 25th International Congress for Conservation Biology, Auckland, New Zealand, December 5-9, 2011 (oral presentation).

18. A landscape approach to assess impacts of hydrological changes to vegetation communities of the Tonle Sap Floodplain. 34th IAHR World Congress, Brisbane, Australia, June 27-July 1, 2011 (oral presentation).

19. Mekong Flows: Modelling hydrological and ecological changes in the Lower Mekong Basin. UC Development network symposium, University of Canterbury, February 2011 (oral presentation).

20. Modelling future change of flooding and vegetation communities of the Tonle Sap Lake Floodplain. UC postgraduate showcase, University of Canterbury, September 2010 (oral presentation).

21. Characterization of Stormwater Pollution Loads: Implications for Design and Management of Ecologically-Engineered Systems. Eighth Annual American Ecological Engineering Meeting, June 11-23, 2008, Blacksburg, VA (oral presentation).

22. Characterization of Suspended-Sediments in a Closed-Basin Stormwater System during Rainfall-Runoff Events**.** First UF Water Institute Symposium, February 27, 2008, Gainesville, FL (poster presentation).

23. Feasibility of Treatment Wetlands for Municipal Wastewater in Colombia: Emergy Evaluation of Treatment Alternatives**.** Fifth Biennial Emergy Conference, January 31, 2008, Gainesville, FL (poster presentation).

24. Feasibility of Using Constructed Wetlands to Treat Municipal Wastewater in the Bogotá Savannah, Colombia. Seventh Annual American Ecological Engineering Meeting, May 21-25, 2007, Manhattan, KS (oral presentation).

25. G. C. Kini, **M.E. Arias**, D. Bennett, T. Liermann, S. Shrawan Singh, J. Senent, S. Stefansen, J.J. Sansalone. Orange County Utilities Northwest Water Reclamation Facility: Expansion Design. *WEFTEC 2006*, October 23, 2006, Dallas, TX (oral presentation).

26. G. C. Kini, **M.E. Arias**, D. Bennett, T. Liermann, S. Shrawan Singh, J. Senent, S. Stefansen, J.J. Sansalone. Orange County Utilities Northwest Water Reclamation Facility: Expansion Design. *Florida Water Resources Conference*, April 9-12, 2006, Orlando, FL (oral presentation).

Research Grants

- *Managing pressures from the development of dams, land use conversion, and climate change on riverine ecosystems of the Mekong's Tonle Sap basins* (US$390K), 2016-2017. Letter of Inquiry requested by the MacArthur Foundation. Engaged as Co-PI.
- *Ecosystem Services, Hydropower, Flood Control and Irrigation: Optimizing the Economic Benefits of the Rositas Multiple-Use Dam and Reservoir Project on the Río Grande in Santa Cruz, Bolivia* (484K), 2016-2017. Submitted to the Tinker Foundation. PI: Tim Killeen. Engaged in proposal writing and co-leading the modeling team.
- *Linking current and future hydrologic change to fisheries, nutrition, and livelihoods in the Lower Mekong Basin*. Submitted to the National Science Foundation Water Sustainability and Climate Program. PI's: John Sabo (Arizona State University) and Gordon Holtgrieve (University of Washington). Involved in proposal writing. Not awarded but ranked as highly competitive.
- *Critical Basin at Risk: Assessing and managing ecosystem pressures from development and climate change in the 3S basin* (US$260K), 2013-2015. Awarded by the John D. and Catherine T. MacArthur Foundation. PI: Tom Cochrane. Engaged in proposal writing, annual reporting, project coordination and research implementation.
- *River at Risk: Modeling and monitoring the potential impacts from large-scale disruptions to the hydrological cycles of the Mekong River Basin* (US$300K), 2010-2013. Awarded by the Critical Ecosystems Partnership Fund. PI: Tom Cochrane. Involved in proposal writing, annual reporting, research implementation and communication.

Student Mentoring

- Bikesh Shrestha, PhD student, University of Canterbury, co-supervisor, 2014-present.
- Thanh Dang Duc, PhD student, University of Canterbury, co-supervisor, 2014-present.
- Ting Powell and Hui Liew, undergraduate project, University of Canterbury, co-supervisor, 2014.
- Richard Cryer and Weiran Chou, undergraduate project, University of Canterbury, co-supervisor, 2014.

Skills

Computer knowledge:

- Geographic Information Systems and remote sensing: ArcGIS 10, ENVI, and MFWorks.
- Hydrology/hydraulic/hydrodynamic modeling: 3D EIA, HEC-ResSim, HEC-HMS, HEC-RAS, SWAT, ICPR, and PONDS.
- Programming and numerical analysis: R, CANOCO, AutoCAD, Matlab, Microsoft Excel, Visual Basic, CANOCO.

Languages:	Speaking	Reading	Writing
Spanish	Mother tongue	Mother tongue	Mother tongue
English	Fluent	Fluent	Fluent
Portuguese	Fluent	Fluent	Good

Professional Service

Journal reviewer (n=26): Ecological Engineering (8), Ecological Modelling (3), Science of the Total Environment (3), Global Environmental Change (1), Journal of Environmental Management (1), ASCE Journal of Water Resources Planning and Management (2), ASCE Journal of Hydrologic Engineering (1), Wetlands Ecology and Management (1), Environmental Monitoring and Assessment (1), Environmental Earth Sciences (1), International Journal of Water Sciences (1), Journal of Asian Earth Sciences (1), Urban Water (1), Biotropica (1).

Session chair, Progress, Challenges, and Opportunities for Water and Environmental Research in China and Southeast Asia, American Geophysical Union Meeting, San Francisco 2013.

Featured in documentary film *Hydropower in Cambodia: Impacts and Alternatives*.

Session moderator, International Congress for Conservation Biology, Auckland (NZ), 2011.

Volunteer, Solar Park Pond Ecological Enhancement Project (Gainesville, USA), 2007-08.

Volunteer Intern, WWF Yangtze River wetlands restoration program (Wuhan, China), 2004.

Volunteer Park-Ranger, Chingaza National Park (Colombia), June – August 2003.

Fellowships, scholarships, and awards

Scholarships

- Giorgio Ruffolo Post-doctoral Research Fellowship, Harvard University, 2014-2016 (US$108K).
- University of Canterbury International Doctoral Student Scholarship, 2009-2012 (US$82K).
- Critical Ecosystems Partnership Fund supplementary scholarship, 2010-2012 (US$ 33K).
- Norman Casey Scholarship. University of Florida, 2006.
- Environmental Engineering Alumni Scholarship. University of Florida, 2005.
- Engineering Dean's Scholarship. University of Florida, 2005.
- Minority Transfer Student Scholarship. August 2003.
- Herencia Latina Scholarship. January 2003.

Awards

- 1st Place, Water Environment Federation National Student Design Competition, 2006.
- 1st Place, Florida Water Environment Association Student Design Competition, 2006.
- University Scholar, University of Florida, 2005.
- US National Dean's List 2004.

Certificates

- State of Florida Engineering Intern (2006).
- University of Florida Graduate certificate in Ecological Engineering (2007).

Affiliations

American Geophysical Union (2013-), International Association of Hydrological Sciences (2011-2013), American Ecological Engineering Society (2007-2008), Water Environment Federation (2003-2008), Florida Water Environment Association (2003-2008), American Water Resources Association (2003-2007).