



San Juan, Puerto Rico, USA | 22-27 January 2017

**AGU Chapman
Conference on
Extreme Climate
Event Impacts on
Aquatic
Biogeochemical Cycles
and Fluxes**

PROGRAM COMMITTEE

Conveners

Shreeram Inamdar

University of Delaware, USA

Bill McDowell

University of New Hampshire, USA

James Shanley

USGS, Vermont, USA

Elizabeth Minor

University of Minnesota, USA

Ji-Hyung Park

Ewha Womans University, Republic of Korea

Program Committee

Arthur Gold

University of Rhode Island, USA

Hjalmar Laudon

Swedish University of Agricultural Sciences

Sujay Kaushal

University of Maryland, USA

Rosemary Fanelli

University of Maryland, USA

Andrew Sharpley

University of Arkansas, USA

Margaret Palmer

University of Maryland, USA

Grizelle Gonzalez

International Institute of Tropical Forestry, Puerto Rico

THANK YOU TO OUR SPONSORS

The organizers of this Chapman Conference wish to acknowledge the generous support of the following:



United States Department of Agriculture
National Institute of Food and Agriculture



National CZO Network

Luquillo CZO

US Forest Service **International Institute of
Tropical Forestry**

Schedule for Chapman Conference Field Trip

Wednesday, 25 January

8:00 -9:00 am – Talks at the Marriott San Juan hotel in Ballrooms III-IV

Dr. Ariel Lugo Plenary talk. Introduction and overview of research and impact of extreme events on tropical urban and forest ecosystems. [15 minute talk followed by 5 minutes of questions and discussions]

Invited talk by Dr. Bill McDowell. Ecological research in tropical ecosystems and impacts of extreme climate events on stream chemistry and ecology. [15 minute talk with 5 minutes of questions/discussions]

Invited talk by Dr. Grizelle Gonzalez. Ecological and social aspects of tropical forest responses to climate change in the Luquillo Experimental Forest, PR [15 minute talk with 5 minutes of questions/discussions]

9:15 – 9:45 am – Drive from hotel to Río Piedras site

9:45 – 10:15 am – Visit to Urban site at Río Piedras

10:15 – 11:15 am – Travel to Sabana Field Research Station (El Yunque National Forest)

11:15 am – 12:00 pm: Lunch Break (Sabana Field Research Station, restroom stop)

12:00 – 12:20 pm – Travel to Bisley Experimental Watersheds

12:20 – 1:10 pm – Hike in and out Quebrada 1, Bisley Experimental Watersheds. Interpretative talk by Dr. Bill McDowell

1:10 – 1:20 pm – Drive to USGS gage at Río Mameyes; Stop at Río Mameyes.

1:20 - 1:40 pm – Interpretative talk by Dr. James Shanley

1:40 – 3:30 pm – Hike down Angelito Trail. The group will split in two groups near the bottom of the trail (and later switch). One interpretive talk by Dr. Tamara

Heartsill (by wooden bridge); Another interpretive talk by Dr. Omar Pérez-Reyes (by river pool, bottom of the trail)

3:30 pm – Drive to Yokahu Tower

4:00 pm – Arrival at Yokahu Tower

4:45 pm – **Drive back to San Juan Marriott.** To return not later than 6 pm.

Scientific Program

SUNDAY, 22 JANUARY

4:00 p.m.– 7:30 p.m.

Registration

Upper Pool Deck

6:00 p.m.– 7:30 p.m.

Ice Breaker Reception

Upper Pool Deck

MONDAY, 23 JANUARY

7:00 a.m.– 8:00 a.m.

Continental Breakfast

Ballroom III-IV

8:00 a.m.– 8:15 a.m.

Welcome and Overview

Presiding: Shreeram Inamdar

Ballroom III-IV

8:20 a.m.– 10:00 a.m.

Defining Extreme Climate Events (ECE) and Measuring, Recording, and Sampling Their Impacts

Presiding: James Shanley

Convener(s): Shreeram Inamdar

Ballroom III-IV

- 8:20 a.m. –8:40 a.m. **Melinda Dianne Smith** | An ecological perspective on extreme climatic events (ECEs)
- 8:40 a.m. -9:00 a.m. **Douglas A Burns** | Expectations for Increases in the Magnitude and Frequency of Peakflows with Future Climate Change: the Need to Validate Study Approaches
- 9:00 a.m. –9:20 a.m. **Lindsey Rustad** | A New Framework for Understanding the Impacts of Extreme Climatic Events (ECE) on Terrestrial and Aquatic Ecosystems: Integrating a New Generation of ECE Experiments, ‘Smart’ Monitoring Technology, and Rapid Assessment Teams (RATS)
- 9:20 a.m. –9:40 a.m. **Cliff Dahm** | Extreme Water Quality Degradation Following Catastrophic Forest Fires
- 9:40 a.m. –10:00 a.m. **Francois Birgand** | Continuous water quality to capture all events: how good are the new sensors?
- 10:20 a.m.– 12:00 p.m. **Export, Transport, and Transformation of C, N, and P Through the Fluvial/Aquatic Network From the Source to the Sea**
Presiding: Ji-Hyung Park
Convener(s): Shreeram Inamdar, Hjalmar Laudon
Ballroom III-IV
- 10:20 a.m. -10:40 a.m. **Andrew C Wilcox** | Extreme Rainfall and Flooding in the Hyperarid Atacama Desert, Chile
- 10:40 a.m. –11:00 a.m. **Peter A Raymond** | Hydrologic events and watershed biogeochemistry: The Pulse Shunt Hypothesis
- 11:00 a.m. –11:20 a.m. **Nobuhito Ohte** | Effects of extreme events on nitrogen export from forested headwater catchments
- 11:20 a.m. –11:40 a.m. **Sarah Godsey** | Hydrologic Connectivity and Threshold Behavior Influences Nutrient Export from Arctic Hillslopes
- 11:40 a.m. –12:00 p.m. **Wilfred M Wollheim** | Changes in biogeochemical supply and demand during storm events alter the role of river networks in controlling downstream exports

12:00 p.m.– 1:30 p.m.

Lunch

Tuscanys

1:30 p.m.– 3:00 p.m.

Defining Extreme Climate Events (ECE) and Measuring, Recording, and Sampling Their Impacts Posters

Presiding: James Shanley

Convener(s): Shreeram Inamdar

Ballroom II

M-05

Daniel M Hanes | The “historic” Meramec River Basin Flood of 2015

M-06

Shreeram P Inamdar | How will large storms alter particulate organic matter exports and composition and impact water quality of receiving aquatic ecosystems?

M-07

Jian-Cheng Kang | Spatial and temporal distribution of Northwest Pacific tropical cyclone and its relationship with sea surface temperature

M-08

Alan Knapp | Precipitation Extremes Vary in Space and Time: Implications for Designing Experiments

M-09

Jonathan Morrison | Use of a Continuous Water-Quality Monitor to Examine Sediment and Nutrient Transport in the Lower Connecticut River during Tropical Storm Irene 2011.

M-10

Wilfred M Wollheim | Controls on Storm Event Transport of Nitrate and DOC Derived Using Sensor based Monitoring Approach.

M-13

James B Shanley | Biogeochemical response to extreme events at the five USGS WEBB watersheds

M-14

Kurt Solander | Characterizing shifts in historical streamflow extremes in the Colorado River Basin, USA

M-15

Terry Loecke | Using high-frequency in-situ stream nitrate concentration sensors to understand importance of extreme precipitation events in nitrogen loading

1:30 p.m.– 3:00 p.m.

Export, Transport, and Transformation of C, N, and P Through the Fluvial/Aquatic Network From the Source to the Sea Posters

Presiding: Ji-Hyung Park

Convener(s): Hjalmar Laudon, Shreeram Inamdar

Ballroom II

- M-18 **Morvarid Azizian** | *Direct and Indirect Effects of Extreme Climate Events on Nitrate Processing by Streams*
- M-21 **Jacob D Hosen** | Testing the Pulse-Shunt Hypothesis: In Situ Data Reveal Hydrological Extremes and Scaling Controls on Carbon Uptake in a River Network.
- M-23 **Erin R Johnson** | POM Pulses: Characterizing the physical and chemical properties of particulate organic matter (POM) mobilized by large storm events and its influence on receiving fluvial systems
- M-24 **Diana L Karwan** | Water and Material Sources and Pathways During Extreme and Non-Extreme Events in White Clay Creek, Pennsylvania, USA
- M-25 **Amanda Knobloch** | The Effects of Winter Storm Cato on the Composition and Flux of Carbon at the Marsh-Estuarine Interface
- M-26 **Lauren Koenig** | Response of metabolism and fluvial carbon flux to anomalous low flows in New Hampshire streams
- M-27 **Erin R Johnson** | After the Storm: Assessing the Content, Transformation, and Fate of Nitrogen in Floodplain Sediments in Aquatic Ecosystems
- M-28 **Ken'ichi Osaka** | The influence of extreme storms on nitrogen export from mountain forest watershed
- M-29 **Donald S Ross** | Changes in Near-Stream Soil Phosphorus Resulting from Extreme-Event Driven Erosion
- M-30 **Richard Douglas Rowland** | Large storms and particulate organic matter (POM) export: Changes in particle size, composition and source

- M-31 **JohnFranco Saraceno** | High-frequency dissolved organic matter quality variations during “Super Storm” Sandy
- M-32 **Daniel Scott** | Comparing the Resiliency of Organic Carbon Storage in Two Mountain River Basins to Extreme Disturbance
- M-33 **Peng Shang** | Hydrological effects on dissolved organic matter export from a temperate forested watershed across timescales from minute to season
- M-34 **Byungman Yoon** | Extent of Dissolved Organic Matter Lability and Prevalence of Priming Effect in Connecticut River: Implication of Precipitation Event, Seasonality, and Land Cover
- M-35 **Shaowu Bao** | Water and Nutrients Exports during an Extreme Flooding Event in South Carolina
- 3:00 p.m.– 7:00 p.m. **Free Time and Dinner**
- 7:00 p.m.– 8:30 p.m. **Defining Extreme Climate Events (ECE) and Measuring, Recording, and Sampling Their Impacts Breakout Session**
Presiding: James Shanley
Ballroom I
- 7:00 p.m.– 8:30 p.m. **Export, Transport, and Transformation of C, N, and P Through the Fluvial/Aquatic Network From the Source to the Sea Breakout Session**
Presiding: Ji-Hyung Park
Ballroom III-IV

TUESDAY, 24 JANUARY

- 7:00 a.m.– 8:00 a.m. **Continental Breakfast**
Ballroom III-IV
- 8:20 a.m.– 10:00 a.m. **Long Term Impacts and Recovery of Ecosystems; Lessons From Past Extreme Events**

Presiding: William McDowell

Convener(s): James Shanley

Ballroom III-IV

- 8:20 a.m. –8:40 a.m. **Peter Groffman** | Shooting at a moving target: Evaluating ecosystem response to extreme events in a changing world
- 8:40 a.m. –9:00 a.m. **Charles T Driscoll** | Response of soil and streamwater of watersheds in the Great Smoky Mountains National Park to fire disturbance.
- 9:00 a.m. –9:20 a.m. **Robert M Hirsch** | Exploring the hypothesis of a “flood-reset” of the sediment and nutrient delivery in some Eastern U.S. watersheds
- 9:20 a.m. –9:40 a.m. **Karen C Rice** | Riverine Discharges to Chesapeake Bay: Analysis of Long-Term (1927-2014) Records and Implications for Future Flows in the Chesapeake Bay Basin
- 9:40 a.m. -10:00 a.m. **Rodrigo Vargas** | Ecological implications of hurricane disturbances: immediate responses, resiliency, and recovery
- 10:20 a.m.– 12:00 p.m. **Changes in Aquatic Ecosystem Structure, Functions, and Services**
Presiding: Elizabeth Minor
Convener(s): William McDowell
Ballroom III-IV
- 10:20 a.m. –10:40 a.m. **Hans W. Paerl** | Impacts of tropical cyclones on North Carolina estuarine and coastal carbon and nitrogen dynamics: Implications for biogeochemical cycling and water quality in a stormier and warmer world
- 10:40 a.m. -11:00 a.m. **Robert Thomas Hensley** | Episodic Flow Reversals as a Driver of Ecosystem Change in Florida’s Springs
- 11:00 a.m. –11:20 a.m. **Jinjun Kan** | Storm Events Restructured Microbial Community and Their Biogeochemical Potentials
- 11:20 a.m. –11:40 a.m. **Cristina D. Takacs-Vesbach** | An Extreme Flood Event Marks a State Change in an Antarctic Aquatic Ecosystem

- 11:40 a.m. –12:00 p.m. **Laurel Larsen** | Effects of Extreme Drought on the Organic Carbon Dynamics and Hydroecology of Intermittent, Salmon-bearing Streams
- 12:00 p.m.– 1:30 p.m. **Lunch**
Tuscanys
- 1:30 p.m.– 3:00 p.m. **Long Term Impacts and Recovery of Ecosystems; Lessons From past Extreme Events Posters**
Presiding: William McDowell
Convener(s): James Shanley
Ballroom II
- T-01 **Sheila F Murphy** | Windward/leeward rainfall gradients in the Luquillo Mountains, Puerto Rico, and implications for water resources and biogeochemical fluxes
- T-02 **Brent D Newman** | Effects of Drought on the Chemistry and Isotopic Composition of Soil Waters in Tropical Forests of Puerto Rico
- T-03 **Nicolas Perdrial** | Can the mineralogical signature of suspended sediments inform on the dynamics and resilience of river systems impacted by extreme climate events at Luquillo, Puerto Rico?
- T-04 **Sandra Petrakis** | Influence of experimental extreme water pulses on greenhouse gas emissions from soils
- T-05 **Bianca Rodriguez-Cardona** | Major Wildfires Affect Stream Carbon and Nutrient Concentrations in Permafrost Dominated Basins in The Central Siberian Plateau
- T-07 **Rolf Vieten** | The Impact of Hurricane Bertha on Seepage Water in Cueva Larga, Puerto Rico
- T-09 **William H McDowell** | Impacts of Catastrophic Hurricanes on Stream Chemistry in Tropical Montane Forests are Long-Lasting, Context Dependent, and Vary by Critical Zone Architecture

- T-10 **Tammy A Newcomer Johnson** | Dams and ECEs: Sink or Source of Nutrients?
- T-11 **Noah Van Hartesveldt** | Potential new avenues for expediting recovery of long-dead *Acropora palmata* skeletons.
- T-13 **Jesse Clark Vermaire** | The impact of climate-driven increases in wildfire intensity on metal deposition to lakes and peatlands in the North Slave Region, NWT, Canada.
- T-15 **Sheila F Murphy** | High-Intensity Rain Storm Connects Hillslopes to Channels in a Steep Semi-Arid Catchment
- 1:30 p.m.– 3:00 p.m. **Changes in Aquatic Ecosystem Structure, Functions, and Services Posters**
Presiding: Elizabeth Minor
Convener(s): William McDowell
Ballroom II
- T-17 **Ellen M Cooney** | Impact of Extreme Rain Events on Lake Superior's Biogeochemistry
- T-18 **Emily Santos** | CHARACTERIZING THE ORGANIC MATTER IN SURFACE SEDIMENTS FROM THE SAN JUAN BAY ESTUARY
- T-20 **Carmen Aguilar** | The Great Midwest Flood of 2008 Reflected in Great Lake Michigan Biogeochemistry and Phytoplankton Sequences: Resurgence of Diatoms Provided Beneficial Consequences for a Ravaged Great Lake Food Web
- T-21 **Karthik Balaguru** | Impact of Hurricanes on Coastal Biogeochemistry in the Gulf of Mexico
- T-22 **Russell Lee Cuhel** | The Massive Upwelling of 2015 Reflected in Great Lake Michigan Biogeochemistry and Phytoplankton Sequences: Resurgence of Diatoms Provided Beneficial Consequences for a Ravaged Great Lake Food Web
- T-23 **Joseph Salisbury** | Perturbation and Recovery of Sea Surface pCO₂ During Extreme Events.

- T-24 **Angelia Seyfferth** | Impacts of a Hurricane-Induced Storm Surge on Trace-Metal Cycling in a Spatially Heterogeneous Estuary
- T-25 **Asim Zia** | Combined Temperature and Precipitation Variability May Increase the Frequency of Harmful Algal Blooms in Lake Champlain, 1992-2100
- T-28 **Minjin Lee** | Increased climate variability and extremes amplify risks of coastal hypoxia worldwide: Implications of enhanced basin memory effects on river dissolved nitrogen in the GFDL Earth system modeling framework
- T-29 **Andrew W Schroth** | Iron speciation and provenance during high flow events from catchments to receiving
- T-30 **Chun-Mao Tseng** | Changjiang floods enhance the CO₂ uptake of the East China Sea
- T-32 **John R White** | Estuarine ecosystem dynamics during a climate-influenced, early-season Mississippi River flood diversion
- T-33 **Scott Andres** | Meteorological Forcing of the Biogeochemistry of the Murderkill River and Estuary (Delaware, USA) Determined by High Frequency Continuous Monitoring
- 3:00 p.m.– 7:00 p.m. **Free Time and Dinner**
- 7:00 p.m.– 8:30 p.m. **Long Term Impacts and Recovery of Ecosystems; Lessons From Past Extreme Events Breakout Sessions**
Presiding: William McDowell
Ballroom I
- 7:00 p.m.– 8:30 p.m. **Changes in Aquatic Ecosystem Structure, Functions, and Services Breakout Session**
Presiding: Elizabeth Minor
Ballroom III-IV

WEDNESDAY, 25 JANUARY

7:00 a.m.– 8:00 a.m.

Continental Breakfast

Ballroom III-IV

THURSDAY, 26 JANUARY

8:20 a.m.– 10:00 a.m.

Differences in ECE Impacts Across Forested, Agricultural and Urban Landscapes

Presiding: Sujay Kaushal

Convener(s): Arthur Gold, Andrew Sharpley

Ballroom III-IV

8:20 a.m. –8:40 a.m.

Marguerite A. Xenopoulos | Disentangling the Effects of Agriculture Land Use on the Export of Nutrients and Carbon During Flooding Events

8:40 a.m. –9:00 a.m.

Susana Bernal | *Being used to it: impacts of seasonal extreme climate events on C and N cycling in Mediterranean catchments*

9:00 a.m. –9:20 a.m.

Philippe Vidon | Climate Variability and Gas Fluxes in Agricultural Riparian Zones

9:20 a.m. –9:40 a.m.

Eran W Hood | Climate-driven changes in organic carbon export from coastal temperate rainforest watersheds

9:40 a.m. –10:00 a.m.

Amy J Burgin | Weather Whiplash in Agricultural Regions Drives Deterioration of Water Quality

10:20 a.m.– 12:00 p.m.

Watershed Management Practices and Aquatic Restoration Strategies to Mitigate Impacts of Extreme Climate Events

Presiding: Margaret Palmer

Convener(s): Arthur Gold, Rosemary Fanelli

Ballroom III-IV

10:20 a.m. –10:40 a.m.

Nancy B Grimm | Designing Social-Ecological-Technological Systems (SETS) to Build Resilience to Extreme Weather-Related Events in Urban Environments

- 10:40 a.m. –11:00 a.m. **Ellen Wohl** | Building Carbon Storage and Resilience to Extreme Climate Events into River Management
- 11:00 a.m. –11:20 a.m. **Emily S Bernhardt** | Fast and slow responses of coastal freshwater ecosystems to salt water intrusion events
- 11:20 a.m. –11:40 a.m. **Jennifer Leah Tank** | Watershed-Scale Conservation, Through Changing Land Cover, Reduces Nutrient Export From Agroecosystems Even Under Changing Hydrology.
- 11:40 a.m. –12:00 p.m. **Andrew N Sharpley** | Conservation strategies and nutrient and sediment reduction in agricultural watersheds in light of Extreme Climate Events
- 12:00 p.m.– 1:30 p.m. **Lunch**
Tuscanys
- 1:30 p.m.– 3:00 p.m. **Differences in ECE Impacts Across Forested, Agricultural and Urban Landscapes Posters**
Presiding: Sujay Kaushal
Convener(s): Arthur Gold, Andrew Sharpley
Ballroom II
- R-01 **Yuehan Lu** | Storm Event Exports of Dissolved Nutrients in a Large Agricultural River Basin in Arid Northwestern China
- R-02 **Rosemary M Fanelli** | Quantifying nutrient fluxes and composition during extreme climate events in the Susquehanna River: Application for continuous water quality monitoring
- R-04 **Young-II Moon** | Climate change and urban flood damage in Korea
- R-05 **Hem K. Pokharel** | Simulating Hydrology and Water Quality to Predict Stream Discharge, Nitrate Loads Under Climate Change Scenarios in Maidford River Basin, Rhode Island Using SWAT Model
- R-06 **Kelly Addy** | Nutrient and Carbon Loading from Forested, Urban, and Agricultural Watersheds during Extreme Climatic Events

- R-07 **Danny Croghan** | Characterising Organic Matter composition during extreme events in-stream and within terrestrial sources in a small, urban, headwater catchment in Birmingham, UK.
- R-08 **Shahan Haq** | Controls on River Salinization and its Relationship to Nitrogen
- R-09 **Hewley A Imbuzeiro** | Simulating drought impacts on energy balance in an Amazonian rainforest
- R-10 **Sujay Kaushal** | The impact of extreme storms on water quality in human-dominated watersheds
- R-11 **Ethan Kyzivat** | Characterizing storm event riverine dissolved organic carbon through ramped temperature oxidation
- R-12 **Henry Finnie Wilson** | Landform and Agricultural Management Characteristics Influencing C, N, P Export With Extreme Rainfall Driven Flows in the Assiniboine River Watershed
- R-13 **Alessandra Marzadri** | Droughts and Nitrous Oxide Emissions in Agricultural and Forested Watersheds.
- R-15 **Molly Welsh** | Changes in riparian and stream hydrology and biogeochemistry following storms in an agricultural watershed
- R-16 **Kathryn E Clark** | Impacts of extreme climate events - droughts and hurricanes - on carbon and nitrogen in streams draining the Luquillo Mountains in Puerto Rico
- R-18 **Ashley A Coble** | Evaluating the role of large-scale fires on nutrient uptake in Arctic streams underlain with permafrost
- R-30 **Sara McMillan** | Stormwater biogeochemistry in urban stream networks

1:30 p.m.– 3:00 p.m.

Watershed Management Practices and Aquatic Restoration Strategies to Mitigate Impacts of Extreme Climate Events Posters

Presiding: Margaret Palmer

Convener(s): Arthur Gold, Rosemary Fanelli

Ballroom II

- R-19 **Michael R Williams** | Stream Restoration Performance and its Contribution to the Chesapeake Bay TMDL: Challenges Posed by Climate Change in Urban Areas
- R-21 **Jud W Harvey** | Importance of Fine Sediment Dynamics in Ecological Alterations of Urban Headwater Streams
- R-22 **Ehab A Meselhe** | Development and application of a Biophysical-Surge-Wave Model
- R-23 **Francesca Messina** | Coastal Eco-morphological Real-time Forecasting (CERF) System
- R-24 **Durelle Scott** | The Role of Floodplains through River Corridors: How will increasing reconnection alter downstream export?
- R-25 **Amy T Hansen** | The Potential of Wetlands to Contain Agricultural Nitrate Under Extreme Streamflow Events
- R-26 **Christina (Naomi) Tague** | Why subsurface features matter for managing forests, water and fire in the face of increasing drought frequency and severity
- R-28 **Xuesong Zhang** | Implications of future changes in climate extreme events for aquatic biogeochemical cycles and associated ecosystem services of the St. Croix National Scenic Riverway
- R-29 **Zachary E Kayler** | Potential landscape and nutrient constraints on tropical forest biogeochemical resilience

3:00 p.m.– 7:00 p.m.

Free Time and Dinner

7:00 p.m.– 8:30 p.m.

Differences in ECE Impacts Across Forested, Agricultural and Urban Landscapes Breakout Session

Presiding: Sujay Kaushal

Ballroom I

7:00 p.m.– 8:30 p.m.

Watershed Management Practices and Aquatic Restoration Strategies to Mitigate Impacts of Extreme Climate Events Breakout Session

Presiding: Margaret Palmer

Ballroom III-IV

FRIDAY, 27 JANUARY

7:00 a.m.– 8:00 a.m.

Continental Breakfast

Ballroom III-IV

8:00 a.m.– 8:30 a.m.

Closing Remarks, Comments and General Discussion

Presiding: Shreeram Inamdar

Convener(s): William McDowell, James Shanley

Ballroom III-IV

8:30 a.m.– 10:00 a.m.

Breakout Group Presentations

Presiding: Shreeram Inamdar

Ballroom III-IV

10:30 a.m.– 12:00 p.m.

Breakout Group Presentations II

Presiding: Shreeram Inamdar

Ballroom III-IV

12:00 p.m.– 1:30 p.m.

Lunch

Tuscanys