



World Conference on Natural Resource Modeling

Resource Modeling Association

June 8-12, 2025

Kathmandu, Nepal

Organizers:

[Dr. Keshav Bhattarai](#), University of Central Missouri, USA

[Dr. Harihar Khanal](#), Embry-Riddle Aeronautical University, USA

[Dr. Huma Neupane](#), Tribhuvan University, Nepal

[Dr. Umesh Rajopadhyaya](#), Kathmandu University, Nepal

[Dr. Naveen Vaidya](#), San Diego State University, USA

Local Hosts:

[Dr. Huma Neupane](#), Tribhuvan University, Nepal

[Dr. Umesh Rajopadhyaya](#), Kathmandu University, Nepal

Conference date: June 8-12, 2025

Workshop date: Sunday, June 8, 2025

Conference Venue: [Mountain Vista Retreat](#), Nagarkot, Nepal

Workshop: Mathematical Tools and Applications in Natural Disaster Management

Date/Time: 8:30 AM – 4:45 PM, June 8, 2025

Objective

To familiarize participants with mathematical tools used in natural resource modeling through hands-on experience.

Target Audience

Researchers and students interested in computational mathematical modeling.

Instructors

- Professor Keshav Bhattarai, University of Central Missouri, USA
- Professor Harihar Khanal, Embry-Riddle Aeronautical University, USA
- Professor Naveen Vaidya, San Diego State University, USA
- Professor Hari Kandel, Lake Superior State University, USA
- Dr. Bidur Devkota, Embry-Riddle Aeronautical University, USA
- Dr. Ramesh Timsina, Tribhuvan University, Nepal

Approach

This workshop introduces participants to:

- Key Concepts and Models
 - Dynamic modeling and optimization
- Data Integration Tools
 - Python for data processing and numerical modeling
 - QGIS for spatial data visualization and mapping
- Applications
 - Natural disaster modeling with a focus on landslide mitigation strategies.

Interactive Activities

Participants will engage in:

- Hands-on practice with Python and QGIS for modeling and visualization
- Group discussions on interdisciplinary applications
- Summary session focusing on integrated modeling and future directions

Workshop Agenda

Time	Activity
8:30 AM – 9:00 AM	Registration and Networking Participants check in, receive materials, and engage in informal introductions.
9:00 AM – 12:00 PM	Session 1: Opening and Basics Overview of mathematical modeling. 10:30 – 10:45 AM: Coffee Break Interactive Q&A.
12:00 PM – 1:30 PM	Lunch Break
1:30 PM – 3:00 PM	Session 2: Soil-Water Dynamics and Slope Stability Lecture and hands-on: Richards equation, infiltration modeling, and strategy optimization.
3:00 PM – 3:15 PM	Tea Break
3:15 PM – 4:45 PM	Session 3: QGIS and Landslide Modeling Application-focused session using QGIS to analyze landslide risks.

Conclusion

This workshop equips participants with practical skills in mathematical modeling and geospatial analysis, with a focus on real-world applications in natural disaster management.

Field Trip and Reception — June 9, 2025

All times are Nepali Time (GMT +5:45)

Exciting Opportunity to Explore the Rich Heritage of Kathmandu and Its Surroundings!

Join us for an unforgettable journey to Kathmandu, Nepal's vibrant capital, where history, culture, and tradition come together. This tour will guide you through UNESCO World Heritage Sites that have shaped the city's historical and cultural legacy.

Tour Highlights

- Visit iconic sites such as Boudhanath Stupa, Hanuman Dhoka, Patan Durbar Square, Bhaktapur Durbar Square, Changunarayan, and more.
- Explore ancient temples, palaces, and monuments, each with a fascinating history.
- Gain a deeper understanding of Kathmandu's rich heritage with expert guides.

Itinerary

- The bus departs from the hotel after breakfast at 7:30 AM.
- We will enjoy lunch and a light afternoon snack in Kathmandu.
- The tour will conclude with our return to the hotel in time for the conference reception by 6:00 PM.

Available Seats

Only 25 spots are available! Don't miss this chance to immerse yourself in Kathmandu's history.

Registration and Cost

Charge: US\$75 (includes cost associated with tour, lunch, light snack, and all site visit fees)

Register Now: Secure your spot as soon as possible!

For more details, please contact:

Email: Dr. Huma Neupane <huma.neupane@pakc.tu.edu.np>

Phone: (WhatsApp/Viber) 977 98570 10224

5:15–5:45 PM RMA Board Meeting, Horizon Hall

6:00 PM Reception, Skyline Restaurant

CONFERENCE PRESENTATIONS DAY 1

June 10, 2025

8:30-9:00 AM Breakfast. Skyline Restaurant

9:00 AM Welcome Speech.

Prof. Achyut Prasad Wagle, Vice Chancellor, Kathmandu University

Prof. Khadga Bahadur K.C., Vice Chancellor, Tribhuvan University

9:20 AM Logistics: Drs. Huma Neupane and Umesh Rajopadhyaya

9:25 AM Horizon Hall. Keynote speaker: Professor Naveen Vaidya

Introduction by Professor Matt Holden, RMA Vice President

TITLE: Way to Fight Globally Rising Dengue: Mathematical Modeling Perspectives

Approximately 4 billion people, or about half of the world's population, live in areas with a risk of dengue infection. The recent evolutionary adaptation of dengue-transmitting mosquitoes to colder regions, such as the Himalayas of Nepal, has raised severe public health concerns about dengue pandemics, demanding urgent responses. This has led to the WHO's launch of the Global Strategic Preparedness, Readiness, and Response Plan (SPRP) to tackle dengue.

In this talk, Professor Vaidya demonstrates how mathematical modeling and machine-learning approaches can be valuable tools for designing optimal strategies to prevent and control dengue. In particular, he will present data-driven mathematical models of climate-influenced dengue transmission, computations of dengue reproduction numbers, math-model-informed neural networks (MINN), and healthcare accessibility in Nepalese communities.

Research results offer critical insights into the role of climate change in shifting the distribution of dengue-transmitting mosquitoes and related epidemics in colder regions. They also help establish an evidence-based framework for formulating policy-design models to allocate healthcare facilities for preventing and managing dengue outbreaks.

10:25-11:55 AM Paper Session

Day I, A: Sustainability and Ecosystem Models

Location: Summit Hall

Moderator: John Hearne, RMIT, Australia

- 1. How to Reduce "The Tragedy of the Commons" in the Imperfect World**
By Agnieszka Wiszniewska-Matyszek and Rajani Singh
- 2. Robust Sustainability**
By Michel De Lara and Luc Doyen
- 3. Calibrating Ecosystem Models When Data Is Scarce: Leveraging Non-Empirical Information**
By Sarah Vollert
- 4. Spatially Linking Communities to Ecosystem Service Models**
By Brian E. Robinson

12-1:15 PM lunch provided. Japanese Restaurant

1:30-2:30 PM Summit Hall. Keynote Speaker II

Emerging Scholar Keynote Speaker

Dr. Maria Kleshnina, Queensland University of Technology

Introduction by Dr. Huma Neupane, Tribhuvan University, Nepal

TITLE: Evolutionary Game Theory for Better Environmental Decisions

In this talk, Dr. Maria Kleshnina explores how game-theoretic models and evolutionary theory can enhance environmental policymaking. She highlights the importance of incorporating stakeholders' strategic behavior and ecosystems' adaptive responses to management interventions into policy design.

Drawing on advances in evolutionary biology, she presents a mathematical framework that integrates both ecological and social system dynamics. This framework enables policymakers to anticipate and address evolving challenges, identifying interventions that provide long-term benefits—even amidst rapid ecological and behavioral changes.

By focusing on the equilibria of managed systems, her approach yields actionable insights for shaping viable policy interventions. Ultimately, it offers a compelling new lens for designing robust conservation strategies that navigate the complexities of human–ecological evolution and support sustainable natural resource management.

2:45-4:15 PM Panel Discussion Session

Panel Discussion Title: Resilience-Based Management for Socio-Ecological Systems

Panelists: Luc Doyen, Keshav Bhattarai, Naveen Vaidya, and Michel De Lara

Moderator: Luc Doyen

This panel session aims to provide key insights into the resilience-based management of social-ecological systems (SESs) related to forest, farming, and fishing activities, focusing on quantitative methods, modeling, criteria, strategies, and tools. To achieve this, the panel will concentrate on three topics: definitions of resilience, strategies for resilience, and tools (economic, conservation biology, ...) for operationalizing resilience.

4:30-5:30 PM Paper Session

Day I, B: Ecosystem Dynamics and Resource Management

Location: Summit Hall

Moderator: Michel De Lara, Institut Polytechnique de Paris, France

1. **Unveiling the Crucial Role of Non-Stationarity in Ecological Dynamics**
By Cazelles Bernard
2. **Are the Concepts of Density-Dependence, Carrying Capacity, and Equilibrium Relevant for the African Buffalo?**
By John Hearne
3. **Making Decisions for Ecosystems in a Changing Environment**
By Luz V. Pascal

6:00 PM Dinner (on your own)

CONFERENCE PRESENTATIONS DAY 2

June 11, 2025

8:30-9:00 AM Breakfast. Japanese Restaurant

9:00-10:00 AM Summit Hall. Keynote Speaker II: Professor Kate Helmstedt, Queensland University of Technology.

Introduction by Professor John Hearne, Editor, Natural Resource Modeling. RMIT, Australia.

TITLE: Mathematics for Protecting Biodiversity in Messy Human-Ecological Systems

Abstract: Ecosystems are dynamic and complex, and we often have limited or patchy data about them. At the same time, humans complicate efforts to protect biodiversity, posing significant threats to natural systems while acting as both beneficiaries and protectors of nature. As a result, managing biodiversity is a complicated, uncertain decision science problem. But biodiversity conservation cannot wait until we have resolved all uncertainties – critically threatened ecosystems need urgent management. Ever-evolving new decision-science frameworks rooted in operations research and ecological modelling allow us to take uncertainty, people, and dynamics into account when planning ecosystem management. Here I'll demonstrate these new frameworks with a focus on Great Barrier Reef, Antarctica, and natural disasters case studies.

10-11:30 AM Paper Session

Day II, A: Wildlife Conservation and Fisheries
Location: Horizon Hall Moderator: Brian Robinson, McGill University
1. Incorporating Migratory Species Movement Decisions into Conservation Economic Policy Analysis <i>By Alfredo Cisneros-Pineda</i> 2. Should We Expand Protected Areas to Save Threatened Species? <i>By Matt Holden</i> 3. Monitoring the Socioeconomic Impacts of New Jersey's Offshore Wind Development on Recreational Fisheries Economy <i>By Pankaj Lal, Aditi Ranjan, Meghann Smith, and Trang Luong</i> 4. Towards Planning Conservation in a Changing Environment <i>By Tace Stewart and Kate Helmstedt</i>

12-1:15 PM Lunch Provided. Japanese Restaurant

1:30-3:30 PM Paper Session

Day II, B: Water Systems, Pollution, and Climate Modeling

Location: Horizon Hall

Moderator: Matt Holden, University of Western Australia

1. **Dynamic River Pollution Control Model with Legacy Stock**
By Yuzhi Yang
2. **Optimizing Resource Allocation in Network Systems: Case Studies in Gas and Water Supply**
By Sergei Schreider
3. **Reservoir Capacity Optimization Under Climate Change: Integrating Sedimentation and Water Resource Management**
By Yuan Niu, Farhed Shah, Rocky Talchabhadel
4. **Towards an Ideal Theoretical Model for the Water-Energy-Food Nexus**
By Wei Li, Philip J. Ward, Lia van Wesenbeeck

3:45- 4:25 PM Emerging Scholar Keynote Runner-Up: Dr. Nicole Barbour. Adaptive Management of Human-Wildlife Conflicts

4:30-5:00 PM Editor's Presentation- Natural Resource Modeling. By John Hearne, RMIT, Australia. Horizon Hall

6:00 PM DINNER AND AWARDS (provided). Skyline Restaurant

CONFERENCE PRESENTATIONS DAY 3

June 12, 2025

8:30 – 9:00 AM Breakfast. Japanese Restaurant

9:00-10:00 AM Summit Hall. Keynote Speaker III: Professor Craig Landry, University of Georgia, USA

Introduction by Dr. Luc Doyen

TITLE: Adaptation to Climate Change: Lessons from the United States Coastal Zone

Abstract: Modern economies are complex, coupled human-natural systems involving nonlinear feedbacks between natural (bio-geo-chemical-physical) processes and human (institutional and behavioral) responses across space and time. Global trends in climate change and their manifestation at local levels are particularly evident in the coastal zone, producing both chronic (accelerating long-term beach erosion) and acute (storm surge flooding and hurricane force winds) impacts. As such, the coastal economy is akin to the coalmine canary that may portend potential complications and calamities related to climate change. This talk reviews and synthesizes recent research on (mal)adaptation in the US coastal zone, with an eye towards lessons learned and potential research topics on adaptation in other parts of the world.

10:10 -11:40 AM Paper Session

Day III, A: Climate Change and Environmental Justice
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Location: Summit Hall

Moderator: <i>Jarosław Socha, University of Agriculture in Krakow, Poland</i>

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| <ol style="list-style-type: none">1. Natural Wealth Tracking Reveals Climate Damages Obscured by Institutional Responses
<i>By Ranjit Bawa</i>2. Optimal CO₂ Prices and Environmental Justice
<i>By Gazi Uddin and John Stranlund</i>3. Assessing the Ability to Meet Basic Needs Under Mitigation Pathways
<i>By Keith Williges, Thomas Pözlner, Daniel Petz, Lukas Meyer</i>4. Parameter Identifiability in a Complex Dynamic Model of Climate Change Effects on Algal Blooms
<i>By Eliza Domann</i> |
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12:00-1:30 PM Lunch. Japanese Restaurant

1:30-3:30 PM Paper Session

Day III, B: Waste Utilization, Forestry, and Conservation

Location: Summit Hall

Moderator: Umesh Rajopadhyaya, Kathmandu University

- 1. Optimizing Poultry Litter Transport Using GIS-Based Network Analysis**
By Keshav Bhattarai and Krishna P Paudel
- 2. Higher Site Productivity and Stand Age Enhance Forest Susceptibility to Drought-Induced Mortality**
By Jarosław Socha, University of Agriculture in Krakow, Poland
- 3. Understanding NDVI Variability in Scots Pine Stands: The Role of Stand Age and Site Productivity**
By Luiza Tymieńska-Czabańska, University of Agriculture in Krakow, Poland
- 4. Rainfall-Induced Landslide Hazards in the Mid-hills of Nepal**
By Harihar Khanal, Amine Nelubow, Keshav Bhattarai, Hari Kandel, Bidur Devkota, and Ramesh Timsina

4:00- 4:30 PM WCNRM 2026 in South Africa. Presentation by Matt Holden, University of Queensland