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Karen Noiva

EDUCATION

MIT | Cambridge, MA

Ph.D. in Architecture: Building Technology
2018 | GPA: 4.9/5.0
Thesis: International Comparative Analysis of Urban Water Systems

M.S. in Architecture: Building Technology
2011 | GPA: 4.8/5.0
Thesis: Modeling the Water Consumption of Singapore Using System Dynamics

B.S. in Mechanical Engineering
2008 | GPA: 4.8/5.0
Concentration in Sustainability Science

COURSEWORK

GRADUATE

System Dynamics
Statistical Learning and Data Mining
Computational Science and Engineering
Time Series Analysis
Socioeconomic Impact Analysis
Infrastructure Economics
Finance
Risk and Decision Analysis
Engineering Systems Analysis
Spatial Analysis
Geographic Information Systems
Surface Hydrology
Water Resources Management

UNDERGRADUATE

Solid State Chemistry
Design and Manufacturing
Dynamics and Control
Measurement and Instrumentation
Mechanics of Materials
Product Engineering
Thermal Fluids Engineering
Desalination
Design for Development
Sustainability Science

LANGUAGES

English (native) • French • Chinese (Mandarin) • Portuguese • Spanish

EXPERIENCE

UNIVERSITY OF ARIZONA, TUCSON | Mel & Enid Zuckerman College of Public Health | Research Scientist
2018 – Present | Cambridge, MA

- Process, clean, and analyze user data from video game for mining safety training as well as data from self-assessment questionnaires and personality indices.
- Perform exploratory data analysis of heterogenous data through clustering and other model-based methods.
- Apply machine learning to create predictive models of performance.
- Identify key performance indicators and identify patterns across training cohorts using a variety of quantitative statistical methods.
- Develop visualizations and dashboards to help practitioners interpret and navigate complex heterogeneous data.

MIT | Urban Metabolism Group | Research Assistant
2011 – 2018 | Cambridge, MA

- Developed a new algorithmic approach and open-source tools (in R and Python) for quantitative comparison of sustainability of urban water systems.
- Identified six types of cities from 142 international cases with statistical clustering.
- Used typology to guide selection of "similar but different" cases, Singapore and Los Angeles, for comparison with ANOVA, time-series, and spatial analysis.
- Identified similar policy resistance to conservation efforts, highlighting an unexpected opportunity for policy exchange.
- Developed a new integrated urban water management model using Vensim/Excel.
- Calibrated feedback model with 60 years of historical data from Singapore.
- Forecasted demand, supply, and infrastructure finance under changing population, affluence, economic growth, and alternative water sources.
- Found that Singapore is unlikely to meet its 2060 demand through conservation alone and should augment existing conservation policies by raising water tariffs to combat the growth in residential water demand associated with rising affluence.

IBM | Graduate Research Intern
2013 | Nairobi, Kenya

Completed three projects at the Nairobi Research Lab before its opening in Fall 2013 (whereas other intern groups completed only one of three projects):

- Created a Monte Carlo model of water demand and simulated future water stress in Nairobi under uncertain precipitation and population growth.
- Led user interface and system architecture design of a mobile app for FlashCast, a local mobile advertising business.
- Led design and implementation of a $150 prototype weather station (1/10 the cost of commercial products) and led a week-long STEM workshop for high-school students to explore the use of home-grown hardware in education markets.

PROGRAMMING/SOFTWARE SKILLS

R • Python • LaTeX • ArcGIS/GRASS GIS/QGIS • HTML/CSS/Markdown • SQL • Vensim • Matlab • GAMS • PowerPoint • Word • Excel • Photoshop • Illustrator

LEADERSHIP

NSF | RCN Sustainable Cities | Student Workshop Organizer
Spring 2014 | Phoenix, AZ
- Created and organized an interdisciplinary workshop for graduate students from ten institutions.

MIT | Sustainability Summit | Panel Organizer
2014 | Cambridge, MA
- Organized panel on infrastructure financing and urban resilience for hundreds of researchers and practitioners.

Sub-Saharan Africa Bicycle Tour | Co-organizer
Spring 2009 | Africa
- Co-organized a bicycle tour across Africa, cycling 3,600 miles through South Africa, Botswana, Zambia, Malawi, and Tanzania.

MIT | Urban Recycling Club, Bexley Hall | Co-Organizer
2006 – 2008 | Cambridge, MA
- Co-organizer of an informal MIT group for those interested in exploring waste streams.
- Collected used cooking oil from local restaurants to fuel a Ford F-250 truck to take participants to harvest edible food from dumpsters at various supermarkets in Middlesex County.
- Proceeds were distributed to residents at the dormitory and Food Not Bombs.

MIT | 2.009: The Product Engineering Process | Team Integrator
Fall 2007 | Cambridge, MA
- Led a team of 16 mechanical engineering students in the senior capstone project.
- Developed a bicycle-powered nut grinder for small-business owners in Ghana.
- Responsibilities included defining project goals, organizing tasks and deliverables, managing communication, and representing our team to stakeholders and course staff

Continental United States Bicycle Tour | Co-organizer
Summer 2007 | North America
- Co-organized a bicycle tour across North America, cycling 3,700 miles across thirteen states: Oregon, Washington, Idaho, Montana, South Dakota, Iowa, Illinois, Indiana, Ohio, Pennsylvania, Maryland, West Virginia, and Virginia.

MIT | Women's Independent Living Group | Various positions
2004 – 2007 | Cambridge, MA
- House manager, membership coordinator, food steward, and computer chair at various times for 40-member living group.

PUBLICATIONS

[1] Karen Noiva, John E. Fernández, and James L. Wescoat. "Cluster Analysis of Urban Water Supply and Demand: Toward Large-Scale Comparative Sustainability Planning". In: *Sustainable Cities and Society* 27 (2016), pp. 484–496.

[2] Karen Marie Noiva. "International Comparative Analysis of Urban Water Systems". Ph.D. thesis. MIT, 2017.

[3] Karen Noiva Welling. "Modeling the Water Consumption of Singapore Using System Dynamics". S.M. thesis. MIT, 2011.

[4] Matthias Wörlen, Bettina Wanschura, Herbert Dreiseitl, Manfred Moldaschi, James L. Wescoat, Jr., and Karen Noiva. *Strengthening Blue-Green in Our Cities: Enhancing Blue-Green and Social Performance in High Density Urban Environments: Final Report*. Rambøll Foundation, 2016.

COMMUNITY SERVICE

2012 – 2014	MIT	Graduate Women's Group	Mentored undergraduate and graduate women
2011 – 2013	MIT	IDEAS Global Challenge	Mentored teams on innovation for rapidly developing markets
Spring 2008	MIT	2.007	Mentored mechanical engineering undergraduates on design and engineering for the annual robot competition
2004 – 2007	MIT	Medlinks	First-responder and student health liaison