# Lauren Cook, Ph.D, EIT





#### **EDUCATION**

2014 - 2018 Doctor of Philosophy

ADVISORS: CONSTANTINE SAMARAS, JEANNE M. VANBRIESEN Civil & Environmental Engineering Carnegie Mellon University

2011 - 2012 Master of Industrial Engineering

Energy and Economics Program
Institute Français du Petrole (IFP School)

2006 - 2010 Bachelor of Science

Civil & Environmental Eng., Water Resources University of Maryland

#### **EMPLOYMENT HISTORY**

CURRENT, SINCE APRIL 2021 (DUEBENDORF, SWITZERLAND)

Dept of Urban Water Management Swiss Federal Instit. of Aquatic Science & Tech. (Eawag) *Group Leader* 

On-going **interdisciplinary collaborations** with ecologists, biologists, landscape architects, and social scientists to improve multifunctionality of green stormwater infrastructure

Jan 2019—Mar 2021 (duebendorf, switzerland) Dept of Urban Water Management, Eawag **Post-doctoral Fellow** 

**Transdisciplinary collaboration** with ETH Zürich and industry specialists to gain expertise for experimental design on solar panels, green roof vegetation, energy balance modelling

AUG 2014–DEC 2018 (PITTSBURGH, USA) Dept of Civil & Environmental Eng., Carnegie Mellon Univ. **Doctoral Researcher** 

**Visiting researcher** at the National Center for Atmospheric Science **Interdisciplinary collaboration** with the RAND corporation

AUG 2012-AUG 2014 (NEWARK, DE, USA) Air Liquide Industrial Gases, Research & Development **Research Associate** 

Oral and written communication results of supply chain optimization model to a non-expert and international audience

MAY 2010–AUG 2010 (COLLEGE PARK, MD, USA) Dept of Civil & Environmental Eng., Univ. of Maryland *Water Resources Research Assistant* 

Supervisor: Professor Emeritus Richard McCuen

#### MAIN RESEARCH AREAS

Blue-green stormwater infrastructure; Climate resilience; Urban sustainability; Performance based design; Multifunctionality

#### AWARDED FUNDING AS PI

2022 SNSF Synergia Funding, 411,095 CHF No. CRSII5 213584

> PAPPUS: Plants and People in Urban Systems Primary Investigator

2021 SNSF Project Funding, 583'864 CHF No. 20002\_204790

> BETTER: Blending design and dEcision-making for mulTi-funcTional bluE-green infRastructure Primary Investigator

Blue-Green Biodiversity (BGB), 520'000 CHF
Joint Eawag-WSL Funding Initiative
Blue-Green Stormwater Infrastructure Meets
Biodiversity in the City [Benefit]

2019 Eawag Postdoctoral Fellowship, 2-year funding

Quantifying the co-benefits of distributed

stormwater and energy infrastructure

Post-doctoral researcher

## FELLOWSHIPS & AWARDS

Primary Investigator

2018 **Postdoctoral Fellowship Recipient**Swiss Fed. Instit. Aquatic Science & Tech. (Eawag)

2018 **3rd Place Student Presentation** *Universities Council on Water Resources Conference* 

2016 **Best Student Poster Award** 8th Annual Sustainability Conference, Pittsburgh

2016 Outstanding Teaching Assistant Award Carnegie Mellon Civil & Environ. Eng.

John and Claire Bertucci Fellowship
Carnegie Mellon Civil & Environ. Eng.

2014 Carnegie Mellon Deans Fellowship
Carnegie Mellon Civil & Environ. Eng

2012 - Tuck Foundation Scholarship

2013 Institute Français du Petrole (IFP School)

# COMPUTER & COMMUNICATION SKILLS

LANGUAGES	English (Native), French (Bilingual), German (Level B2), Spanish (Limited	SOFTWARE	SWMM, AutoCAD, Microstation, ArcGIS, Tableau, HECRAS, Microsoft Office, LATEX
	Working Proficiency), Mandarin (Basic)	MODELLING	Hydrologic simulation, Linear
COMPUTER	Python, MATLAB, Visual Basic	EXPERTISE	programming, Statistics & uncertainty
LANGUAGES	GAMS, LINGO, Command Line		

## **TEACHING ACTIVITIES**

## **Student Supervision**

Student	Department	University	Project Title	Duration
Yuxin Yin	Env. Engineering	EPFL	Evaluating the influence on microclimate of plant traits and assemblages in urban green space under current and future conditions	
Giovan Battista Cava- dini	Env. Engineering	ETH Zurich	Integrating Water, Heat and Biodiversity Performance of Blue-Green Infrastructure in Current and Future Climate	2022–2026
Kilian Perrelet	Ecology	Univ. Zurich	Using eDNA to reveal aquatic and terrestrial community dynamics in the urban matrix	2021-2025
Mayra Rodriguez	QUEX Institute	U. Exeter	Spatial interactions between green infrastructure, shallow groundwater, and combined sewers systems influence ur- ban drainage system resilience	

#### **MSc Students**

Student	Degree	University	Project Title	Duration
Lina Hassoun	Thesis	ETH Zurich	Integrating green and cool roof choices into rooftop solar en-	2023
			ergy modeling across varied climates and future scenarios	
Ruixin Lu	Project	ETH Zurich	The effect of vegetation type on multifunctional green roof	2023
			performance	
Taiqi Lian	Thesis	ETH Zurich	Performance of stochastic rainfall generators with hydrologic	2022
-			simulation models	
Bettina Maurer	Thesis	ETH Zurich	Decision Analysis of Green and Cool Roofs	2021-2022
Dawar Muktar Qureshi	Thesis	TU Dresden	Adequacy of urban water Infrastructure under climate	2021 - 2022
			change	
Giovan Battista Cavadini	Thesis	ETH Zurich	Evaluating potential efficiency gains in rooftop solar panels	2019-2020
			placed on green roofs	
Ines Malot	Project	ETH Zurich   Ecole	Does vegetation influence the hydrologic performance of	2020
	,	de Mines de Paris	green roofs?	

### Research Staff

Name	Role	Project	Funding	Duration
Trang Nguyen	Post-doctoral researcher	BETTER	SNF Project	2021-2023
Andreas Dietzel	Post-doctoral researcher	Benefit	BGB Initiative	2021-2023
Noemi Buri	Research Assistant	PAPPUS	SNF Synergia	2022 - 2024
Louise Gogibu	Intern	Benefit	SWW Department	2023
Simon Sennhauser	Civil Servant	Benefit	SWW Department	2023
Ramun Bar	Civil Servant	Living Lab Bern	SWW Department	2022
Patrick Stettler	Civil Servant/ Research Assistant	Future Rainfall	SWW Department	2021-2022

## **Teaching Assistant Experience**

JAN 2018—MAY 2018 (PITTSBURGH, USA)

Dept of Civil & Environmental Engineering, Carnegie Mellon University

Teaching Assistant, Climate Change Adaptation, Prof. Constantine Samaras 💆 @csamaras

## Dept of Civil & Environmental Engineering, Carnegie Mellon University

## Teaching Assistant, Water Resource System Engineering, Prof. and President Emeritus Jared Cohon

Presentation Tackling Diverse Student Backgrounds Before, During, and After Class at the 2016 Teaching & Learning Summit, CMU

MAY 2010-DEC 2010 (PITTSBURGH, USA)

Dept of Civil & Environmental Engineering, University of Maryland

# Course Assistant, Simulation & Design of Experiments, Prof. Steven Gabriel

### **Guest Lectures**

University	Department	Course	Hours	Years
Villanova Univ.	Surface Water Hydrology	3	2023	
ETH Zurich	Integrated Building Systems	Indoor Environment, Resources & Safety (066-0420-00L)	9	2020-2022
Villanova Univ.	Civil & Environmental Eng.	Data Analysis for Engineers	3	2021
Marmara Univ.	Civil & Environmental Eng.	Special Topics in Environmental Engineering	I	2021
Carnegie Mellon	Civil & Environmental Eng.	Intro to Civil & Enviro. Eng. (12-100)	3	2017, 2018
Carnegie Mellon	Civil & Environmental Eng.	Climate Change Adaptation (12-749)	2	2016, 2018
Carnegie Mellon	Civil & Environmental Eng.	Intro to Sustainable Eng. (12-712)	3	2016, 2017
Carnegie Mellon	Information Systems	IT & Environmental Sustainability (67-353)	I	2017
Carnegie Mellon	Civil & Environmental Eng.	Water Resource Systems Engineering (12-657)	20	2015-2017

## Training and Leadership

2019	Leadership in Academia Training	2016	Bias Busters Training
	Fix the Leaky Pipeline Program, ETH Zürich		College of Engineering, Carnegie Mellon University
2017	Future Faculty Program Completion		,
	Eberly Center for Teaching Excellence, Carnegie Mellon University		

## OUTREACH, SERVICE, AND KNOWLEDGE TRANSFER

## **Committees and Professional Memberships**

202I-	Advisory Board, Fachplan Regenwasser im Siedlungsraum, Entsorgung + Recycling, Stadt Zurich
2021-	Leadership team member, European Infrastructure and Climate Network (ICNet Europe)
2019-2021	Board Member, Eawag Postdoctoral Association (EPSA), Eawag
2017-2018	Advisory Board, RAND Corporation Pittsburgh Pilot Study on Resilient Stormwater Infrastructure
2016-2021	Member, Infrastructure and Climate Network (ICNet)
2016-2019	Member, American Geophysical Union (AGU)
2016-2018	Board Member, Environmental & Water Resources Institute (EWRI) Graduate Student Chapter, Carnegie Mellon
2015-2018	Member, American Society of Civil Engineers (ASCE)
2014-2016	Civil & Environmental Engineering Department Representative, Graduate Student Association, Carnegie Mellon

## Organization of Conferences and Workshops

2017	Conference Organiser, Teaching and Learning Summit
	Carnegie Mellon University, Pittsburgh, USA
2015–2016	Co Program Organiser, SUCCEED Summer Prog. for High School Students and Teachers
	Carnegie Mellon University, Pittsburgh, USA

#### **Invited Seminars and Presentations**

MARCH 2022	Seminar, Adapting urban areas to a more extreme climate using blue-green infrastructure
	Colloquium in Climatology, Climate Impact and Remote Sensing, Geographics Institute, University of Bern, Bern, CH
NOVEMBER 2021	Conference, Planning urban drainage systems for climate change
	Fachtagung: Regenwasser und Abwasser im Klimawandel, Zurich, CH
OCTOBER 2021	Conference, Adapting to more extreme precipitation in Switzerland: Where, why, how?
	AQUA 360: Le Congres Suisse Sur L'eau de la SSIGE et du VSA, Bellinzona, CH
AUGUST 2021	Workshop presentation, Who is responsible for urban heat mitigation through green infrastructure?

European Infrastructure and Climate Network Seminar Series, Online (Link to slides)

MARCH 2021 Seminar, Evaluating the performance of vegetated and reflective roofs to cool cities and increase solar panel yield

Environmental & Water Resources Institute, Carnegie Mellon Graduate Student Chapter, Pittsburgh, PA, USA / Online

JULY 2017 Lunch Seminar, Incorporating NA-CORDEX Output into Intensity Duration Frequency Curves

US National Center for Atmospheric Research (NCAR), Boulder, CO, USA

MAY 2017 Session Moderator, Climate: NA-CORDEX, CSSR, Urban heat Islands and LOCA

Infrastructure and Climate Network, Annual Workshop, New Hampshire, USA

## **Public Engagement**

SEPT 2023 (DUBENDORF, CH)

2023 Eawag InfoTag: Wasserforschung für nachhaltige Entwicklung, EMPA Dubendorf Campus *Speaker, "Werkzeuge für klimaresiliente Städte"* 

Spoke to stakeholders in the water sector as part of Eawag's annual outreach to the local community Link to program

MARCH 202I (ZURICH, CH / ONLINE)

# 2020-21 Graduation Ceremony, Environmental Engineering, ETH University Keynote Speaker, "Keep calm: This is only your first step"

Spoke to the 2019 and 2020 graduating classes from ETH Environmental Engineering about my career path, alluding to uncertainties, choices and future steps relevant for young engineers Link to speech

OCT 2015-APR 2016 (CENTRAL VALLEY, PA, USA)

# Scientist in the Classroom Pilot, National Center for Science Education *Scientist in Environmental Engineering*

An initiative to engage high school students in controversial topics like climate change and coal plant air and water pollution

#### Peer-Review

REVIEW FOR JOURNALS Climatic Change; J. Infrastructure Systems; Sustainable and Resilient Infrastructure; Energy Efficiency;

International J. Climatology; Frontiers in Water; Urban Water Journal; Blue-Green Systems; J. Hydrology Environmental Challenges; J. Sustainable Water Inf.; Building and Environment; Water Resources Research

REVIEW FOR CONFERENCES World Environmental and Water Resources Congress

REVIEW FOR PROPOSALS US-Israel Bi-National Agricultural Research and Development Fund

#### **PUBLICATIONS**

### Peer-Reviewed (12, citations: 321, h-index: 9)

- I. Rodriguez, M., Guangtao, Fu., Butler, D., Yuan, Z., and **L. Cook** (2023). Global Resilience Analysis of Combined Sewer Systems Under Continuous Hydrologic Simulation. *J. Environmental Management*. 344, 118607 (11 pp.) doi:10.1016/j.jenvman.2023.118607
- 2. Tan, T., Kong, F., Yin, H., Cook, L., Middel, A., and S. Yang (2023) Carbon dioxide reduction from green roofs: A comprehensive review of processes, factors, and quantitative methods. *Renewable and Sustainable Energy Reviews* 182. doi.10.1016/j.rser.2023.113412
- 3. Probst, N., Bach, P.M., **Cook, L.**, Maurer, M., and J. P. Leitao (2022) Blue Green Systems for urban heat mitigation: mechanisms, effectiveness and research directions. *Blue-Green Systems* 4 (2): 348–376. doi.10.2166/bgs.2022.028
- 4. Cavadini, G.B. and **L. Cook** (2021) Green and cool roof choices integrated into rooftop solar energy modelling. *Applied Energy* 296. doi.10.1016/j.apenergy.2021.117082
- 5. Cook, L. and T. Larsen (2020) Towards a performance-based approach for multifunctional green roofs: An interdisciplinary review. *Building and Environment* 107489. doi.10.1016/j.buildenv.2020.107489
- 6. Cook, L., McGinnis, S., and C. Samaras (2020) The Effect of Modelling Choices on Updating Intensity Duration Frequency Curves and Stormwater Infrastructure Designs for Climate Change. *Climatic Change* doi.10.1007/s10584-019-02649-6
- 7. Cook, L., Samaras, C., and J.M. VanBriesen (2019) Using Rainfall Measures to Evaluate Hydrologic Performance of Green Infrastructure Systems under Climate Change. Sustainable and Resilient Infrastructure doi.10.1080/23789689.2019.1681819
- 8. Cook, L., Samaras, C., and J.M. VanBriesen (2018) A Mathematical Model to Plan for Long-Term Effects of Water Conservation Choices on Dry Weather Wastewater Flows and Concentrations. *J. Environmental Management*. 206C, 684 697. doi.10.1016/j.jenvman.2017.10.013

- 9. Cook, L., Anderson, C.J., and C. Samaras (2017) A Framework for Incorporating Downscaled Climate Output into Existing Engineering Methods: Application to Precipitation Frequency Curves. *J. Infrastructure Systems.* 23 (4). doi.10.1061/(ASCE) IS.1943-555X.0000382
- Fischbach, J.R., Siler-Evans, K., Wilson, M., Tierney, D., Cook, L., and L. May (2017) Resilient Stormwater Management in Allegheny County and the Pittsburgh Metropolitan Region: A Pilot Study. Santa Monica, Calif.: RAND Corporation, RR-1673-MCF, 2017
- II. Marchetti, P.A., Gupta, V., Grossmann, I.E., Cook, L., Valton, P.M., Singh, T., Li, T., and J. Andre (2014) Simultaneous Production and Distribution of Industrial Gas Supply-chains. *Journal Computers & Chemical Engineering*. 69, 39-58. doi.10.1016/j.compchemeng.2014.06.010
- 12. Cook, L. and R. McCuen (2013). The Hydrologic Response of Solar Farms. *Journal Hydrologic Engineering*. 18(5), 536-541. doi.10.1061/(ASCE)HE.1943-5584.0000530

#### Swiss Trade Journals

- 13. Smith, V., **Cook, L.**, and S. Oppliger (2023) Umsetzung blau-grüner Infrastruktur Weltweit. Was kann die Schweiz daraus lernen? *Aqua und Gas* 103(9) 16-24 link: Internal Eawag Repository
- 14. Schnorf, H., Bergamini, A., **Cook, L.**, and M. Moretti (2022) Revitalisierte Bäche leisten einen Beitrag zur städtischen Pflanzenvielfalt. Les ruisseaux revitalisés favorisent la diversité spécifique de la flore urbaine. *Natur und Landschaft. Nature et Paysage* 35-39. link: Internal Eawag Repository

## **Conference Proceedings**

15. Olmstead, S., O'Connor, A., Samaras, C., Cook, L., and B. Martinez-Pastor (2017) A Climate Engineering Assessment for Transportation Assets - Incorporating Probabilistic Analysis into Extreme Weather and Climate Change Design Engineering. Transportation Research Board 2017 Annual Meeting.

#### **Under Review**

- I. Dietzel, A., Moretti, M., and **L. Cook** (Under Review). Disentangling the ecological role of urban Blue-Green Infrastructure using a Bayesian approach. *Ecological Informatics*.
- 2. Maurer, B., Lienert, J., and **L. Cook** (Under Review). Comparing PV-green and PV-cool roofs to diverse rooftop options using decision analysis. *Building and Environment*.
- 3. Battista, G.B., Rodriguez, M. and **L. Cook** (Under Review). The influence of baseline assumptions on the performance of bluegreen infrastructure to reduce combined sewer overflows. *Water Research*.
- 4. **Cook, L.**, Smith, V., Good, K., Wadzuk, B., Moretti, M. and R. Traver (Under Review). The paradox of choice: Can we implement holistic green infrastructure? *Nature Urban Sustainability*.
- 5. Perrelet, K., Moretti, M., Altermatt, F. and **L. Cook** (Under Review). Engineering blue-green infrastructure for and with biodiversity. *Nature Urban Sustainability*.
- 6. Hongqing, L., Kong, F., Yin, H., **Cook, L.**, Huang, J., Lensky, I.M., and T. Tan (Under Review). Microorganisms play vital roles in the interactions between substrate and plants on extensive green roofs. *Soil Biology and Biochemistry*.

#### In Preparation

7. Cook, L., Ort, C. and T. Larsen (In Prep). Experimental findings of bi-facial solar panels and green roofs? *Building and Environment*.

#### COMMUNICATIONS AT INTERNATIONAL CONFERENCES

- I. Rodriguez, M., Cavadini, G.B.\* and L. Cook (2023). Poster: The effect of model structure and assumptions on combined sewer overflows and green stormwater infrastructure. NováTech 2023, ISARA, Lyon, France, June 6, 2023.
- 2. Cavadini, G.B.\* and **L. Cook** (2023). *Oral: Blue Green Infrastructure in a future climate: is the reduction of combined sewer overflow possible?*. NovaTech 2023, ISARA, Lyon, France, June 5, 2023.
- 3. Cavadini, G.B.\* and **L. Cook** (2023). *Oral: Blue Green Infrastructure in a future climate: can we reduce combined sewer overflows?*. European Geosciences Union 2023, Austria Center, Vienna, Austria, April 26, 2023.
- 4. Cook, L.\*, Good, K., Moretti, M., Kremer, P., Wadzuk, B., Traver, R., and V. Smith (2023). *Poster: Towards the intentional, multifunctional design of green infrastructure*. European Geosciences Union 2023, Austria Center, Vienna, Austria, April 25, 2023.
- 5. Perrelet, K.\*, Moretti, M and L. Cook (2022). Oral: Engineering blue-green systems to improve biodiversity: A perspective and review. World Biodiversity Forum 2022, Davos Congress Center, Davos, CH, June 27, 2022.
- 6. Dietzel, A.\*, Moretti, M and L. Cook (2022). Oral: Quantifying the ecological performance of blue-green infrastructure. World Biodiversity Forum 2022, Davos Congress Center, Davos, CH, June 30, 2022.
- 7. Cavadini, G.B. and **L. Cook\*** (2021). *Oral: Comparing rooftop choices for cooler cities and more electricity.* American Geophysical Union 2021 Fall Meeting, New Orleans, LA, USA, December 14, 2021.
- 8. Cook, L.\* and T. Larsen (2021). Oral: Performance based design of multifunctional green roofs. International Conference on Urban Drainage (ICUD) 2021, Online, October 25, 2021.
- 9. Cavadini, G.B.\* and L. Cook (2021). Oral: Integrating sustainable rooftop choices into solar energy planning to quantify potential increase in photovoltaic yield. CISBAT 2021, Lausanne, CH, September 8, 2021.
- 10. **Cook, L.\*** VanBriesen, J.M., and C. Samaras, C. (2020) *Poster: An Early Warning to Adapt Green Infrastructure.* 9th International Conference on Sewer Processes and Networks (SPN9), Musikkens Hus, Aalborg, DK, August 27, 2019.
- II. Lopez-Cantu, T.\*, Cook, L., and C. Samaras (2019). *Oral: Robust Decision Making for Resilience*. American Geophysical Union 2019 Fall Meeting, Moscone Center, San Francisco, CA, USA, December 13, 2019.
- 12. Cook, L., VanBriesen, J.\*, and C. Samaras (2019) Oral: Using Rainfall Measures to Evaluate Hydrologic Performance of Green Infrastructure Systems under Climate Change. American Geophysical Union 2019 Fall Meeting, Moscone Center, San Francisco, CA, USA, December 13, 2019.
- 13. Cook, L.\*, Larsen, T. (2019). Oral/Poster: Multi-functional Green Roofs. 2019 Eawag Symposium, Forum Chreisbach, Dubendorf, CH, September 12, 2019.
- 14. Cook, L.\*, McGinnis, S., and C. Samaras (2018). Oral: The Effect of Modelling Choices on IDF Curves and Stormwater Infr.. University Council on Water Resources (UCOWR) 2018 Conference, Pittsburgh Marriott City Center, Pittsburgh, PA, USA, June 26, 2018.
- 15. Cook, L.\*, Weinburg, R., Goradia, A., and C. Kolb (2018). Oral: Higher Highs, Lower Lows: Increased Variability within the Ohio River Basin. University Council on Water Resources (UCOWR) 2018 Conference, Pittsburgh Marriott City Center, Pittsburgh, PA, USA, June 26, 2018.
- Cook, L.\*, McGinnis, S., and C. Samaras (2018). Oral: Uncertainty in Adjustment Methods for Climate Updated Intensity-Duration-Frequency Curves. American Geophysical Union 2017 Fall Meeting, Ernest N. Moral Convention Center, New Orleans, LA, USA, Dec 12, 2017.
- 17. Cook, L.\*, Anderson, C.J., Samaras, C. (2017). Oral: A Framework for Climate-Resilient Designs: Translating Extreme Precipitation Data from Climate Change Projections into Engineering Applications. ASCE Congress on Technical Advancement 2017, Duluth Entertainment Convention Center, Duluth, MN, USA, Sep 11, 2017.
- 18. Cook, L.\*, Anderson, C.J., Samaras, C. (2017). Oral: A Framework for Incorporating Downscaled Climate Output into Existing Engineering Methods: Application to Precipitation Frequency Curves. ISIE-ISST, University of Chicago, Chicago, IL, USA, Jun 28, 2017.
- 19. Cook, L.\*, Anderson, C.J., Samaras, C. (2017). Oral: A Framework for Incorporating Downscaled Climate Output into Existing Engineering Methods: Application to Precipitation Frequency Curves. Engineering Sustainability 2017, David L. Lawrence Convention Center, Pittsburgh, PA, USA, Apr 9, 2017.

- 20. Cook, L.\*, Anderson, C.J., Samaras, C. (2016). Oral: Resilient and Reliable Infrastructure in an Uncertain Future Climate: A Framework for Updating Existing Engineering Applications with Climate Model Output. American Geophysical Union 2016 Fall Meeting, Moscone Center, San Fransisco, CA, USA, Dec 13, 2016.
- 21. Cook, L.\*, Anderson, C.J., Samaras, C. (2016). Oral: Translating Extreme Precipitation Data from Climate Change Projections into Resilient Engineering Applications. 4th Annual Decision Making Under Deep Uncertainty (DMDU) Workshop, The World Bank, Washington, D.C., USA, Nov 16, 2016.

\*indicates presenter