

Iowa Climate Statement 2018: Designing Buildings and Communities for Iowa's Future Climate

Climate change is already here, and it is affecting people, plants, animals, and large sectors of our economy. U.S. climate scientists project that by mid-century heat wave temperatures in Iowa will increase by 7 °F for the average year and by 13 °F once per decade compared to late 20th century heat waves. The strongest rainfall events of the year (annual maximum daily widespread precipitation) covering areas as large as a third of Iowa are projected to double in intensity (daily total rainfall) by mid-century, with most of this change coming before 2025. We must start now to *adapt* our built environment, including buildings and flood mitigation systems, to this changing climate.

Buildings in Iowa must withstand a hotter, more humid climate, with more frequent and extreme storms and dry spells. Strategies for home and business owners for designing, building, retrofitting, and re-envisioning our communities in the face of a changing climate are now necessary and available.

Buildings obviously protect occupants from rain, yet with increasing precipitation, more than just a sturdy roof is required. Water may also enter a building from the foundation or walls. In particular, heavier rain events and higher water tables affect foundations, and standards going forward must reflect that. Building enclosures can be designed to withstand heavier driving rain by integrating rain screens, larger gutters and downspouts, and steeper roof slopes. Green roofs (roofs fully or partially covered with vegetation) could provide greater runoff retention and insulation.

Climate-aware businesses are adapting their buildings through available tools and services such as the B-READY resilience index. The United States Green Building Council recently issued a report recommending adaptation strategies for buildings based on climate regions. Strategies include greater insulation of buildings and more controlled ventilation. In Iowa, well-placed, better sized, dynamically shaded windows in buildings oriented south maximize solar gain in winter and minimize it in summer when the sun is more directly overhead. Dark surfaces can become 40 °F hotter than white surfaces or reflective, cool roofs. The temperature difference between outside and inside determines cooling loads, and cool roof systems will reduce energy costs significantly.

Effective strategies to reduce air conditioning (AC) loads include planting shade trees and weatherizing buildings now to control enhanced energy costs under the effects of climate change. The largest portion of AC load for buildings in the Midwest is attributed to humidity, as it takes far more energy to condense moisture from the air than to simply cool it.

Iowa communities would benefit from adopting localized plans that invest in smart runoff management to reduce the effects of flooding by infiltrating the rain where it falls and slowing the runoff from infrastructure. Green infrastructure (bioswales, rain gardens, urban forestry and permeable pavements) can also have a positive impact on flood reduction.

Ultimately, reducing carbon emissions remains the best long-term strategy to mitigate additional climate change damage, but adaptation now is necessary in today's changed climate. Changing our built environment to be more sustainable and resilient can help reduce future climate change while protecting us from the changes that have already occurred.

Signed by -

Ulrike Passe
Associate Professor of Architecture
Director, Center for Building Energy
Research
Iowa State University

David Courard-Hauri
Professor of Environmental Science
and Sustainability
Drake University

Jerald Schnoor
Co-Director
Center for Global and Regional
Environmental Research
University of Iowa

David Osterberg
Professor Emeritus
College of Public Health
University of Iowa

Gene Takle,
Emeritus Professor of Agronomy
Iowa State University

Peter S. Thorne
Professor and Head
Occupational & Environmental Health,
Director, Environmental Health Sciences
Research Center, College of Public Health,
University of Iowa

Iowa Climate Statement 2018: Designing Buildings and Communities for Iowa's Future Climate

Matt Abbott
Biology Professor
Des Moines Area Community College

Mahdi Al-Kaisi
Professor
Soil Management and Environment
Iowa State University

Lee-Ann H. Allen
Professor
Inflammation Program
Department of Internal Medicine and
Department of Microbiology and
Immunology
University of Iowa

Jonathan Andelson
Professor of Anthropology
Department of Anthropology
Director, Center for Prairie Studies
Grinnell College

Craig A. Anderson
Distinguished Professor
Department of Psychology
Iowa State University

Marc P. Armstrong
Professor and Collegiate Fellow
Geographical and Sustainability Sciences
University of Iowa

Mark Aronson
Department of Biology
Scott Community College

Rajeev Arora
Professor
Horticulture
Iowa State University

Benjamin S. Avner
Fellow Physician
Roy J. and Lucille A. Carver College of
Medicine
University of Iowa

Vladimir P. Badovinac
Associate Professor
Departments of Pathology and
Microbiology & Immunology
Carver College of Medicine
University of Iowa

Mark Baechtel
Lecturer and Director of Forensic
Activities, Editor, Rootstalk: A Prairie
Journal of Culture, Science and the Arts
Grinnell College

Richard G. Baker
Professor Emeritus
Department of Earth and Environmental
Sciences
University of Iowa

Jennifer Barr
Scientific Editor and Writing Consultant
College of Medicine
University of Iowa

Paul E. Bartelt
Professor and Chair
Department of Biology
Waldorf University

Philip W. Becraft
Professor and Associate Chair
Genetics, Development & Cell Biology
Department
Iowa State University

Russ Benedict
Professor of Biology
Department of Biology
Director of Prairies for Agriculture Project
Central College

David Bennett
Professor and Chair
Department of Geographical and
Sustainability Sciences
The University of Iowa

Peter Berendzen
Associate Professor
Department of Biology
University of Northern Iowa

Bryson Bergerud
Biology and Microbiology Instructor
Science Department
Iowa Central Community College

E. Arthur Bettis III
Professor Emeritus
Department of Earth and
Environmental Sciences
University of Iowa

Ryan Bezy
Associate Professor of Biology
Dept. of Natural & Applied Sciences
Mount Mercy University

Diane Birt
Distinguished Professor
Food Science and Human Nutrition
College of Agricultural and Life Sciences
and College of Human Sciences
Iowa State University

Gail A. Bishop
Professor of Microbiology & Internal
Medicine, Holden Chair of Cancer Biology
Director, Center for Immunology &
Immune-Based Diseases, Roy J. and
Lucille A. Carver College of Medicine
University of Iowa

Andrea Bixler
Professor
Department of Biology
Clarke University

Amy Blair
Associate Professor and Chair
Department of Biology
Saint Ambrose University

Robert Blount
Assistant Professor
Department of Internal Medicine,
Division of Pulmonary and Critical Care
Medicine
University of Iowa

Brian Bristow
Biology Professor
Iowa Lakes Community College

E. Dale Broder
Assistant Professor
Biology
Saint Ambrose University

Garry R. Buettner
Professor
Free Radical and Radiation Biology
Department of Radiation Oncology
College of Medicine
University of Iowa

Aaron Bunker
Associate Professor
Biology-Chemistry Department
Morningside College

Beth E. Caissie
Assistant Professor
Department of Geological and
Atmospheric Sciences
Iowa State University

David G. Campbell
Henry R. Luce Professor in Nations & the
Global Environment, Professor of Biology
Department of Biology
Grinnell College

Greg Carmichael
Co-Director
Center for Global and Regional
Environmental Research
University of Iowa

Ryan Carnahan
Associate Professor
Department of Epidemiology
College of Public Health
University of Iowa

Silvia Cianzio
Professor
Department of Agronomy
Iowa State University

Russell Ciochon
Professor
Department of Anthropology
University of Iowa

Iowa Climate Statement 2018: Designing Buildings and Communities for Iowa's Future Climate

Ronald J. Cisar Assistant Professor Emeritus of Biological Sciences Iowa Western Community College	Robert L. De Haan Professor Biology and Environmental Studies Departments Dordt College	Lonnie Gamble Associate Professor Sustainable Living Department Maharishi University of Management
John D. Colgan Associate Professor Kelting Family Scholar in Rheumatology Department of Internal Medicine University of Iowa	Rhawn F. Denniston William Harmon Norton Professor of Geology Department of Geology Cornell College	Chad V. Gatlin Professor of Biology Indian Hills Community College
Elizabeth Collins Science Instructor Science Department Iowa Central Community College	Martine Dunnwald Assistant Research Professor Anatomy and Cell Biology The University of Iowa	Brian K. Gehlbach Clinical Professor of Medicine Clinical Professor of Neurology Associate Program Director for Fellowship Programs Department of Internal Medicine University of Iowa
John Collins Assistant Professor Sustainable Living Department Maharishi University of Management	Lakshmi Durairaj Associate Professor Division of Pulmonary, Critical Care, and Occupational Medicine, Roy J. and Lucille A. Carver College of Medicine University of Iowa	Eric Giddens Energy Program Manager Center for Energy and Environmental Education University of Northern Iowa
Alejandro P. Comellas Director, ICTS Clinical Research Unit, Associate Professor of Medicine Division of Pulmonary, Critical Care and Occupational Medicine University of Iowa	Julie Ehresmann Associate Professor Science Department Iowa Central Community College	Charles E. Glatz Professor Emeritus Chemical and Biological Engineering Iowa State University
Charles Connerly Professor and Director School of Urban and Regional Planning Founder, Iowa Initiative for Sustainable Communities University of Iowa	Kamyar Enshayan Director Center for Energy & Environmental Education University of Northern Iowa	Bill Gutowski Professor of Meteorology Department of Geological and Atmospheric Sciences Iowa State University
James L. Cornette Emeritus Professor of Mathematics Iowa State University	R. William Field Professor Occupational & Environmental Health, Department of Epidemiology, College of Public Health University of Iowa	Prajwal Gurung Assistant Professor Inflammation Program, Infectious Diseases Department of Internal Medicine University of Iowa
Mary Kathryn Cowles Professor Department of Statistics and Actuarial Science University of Iowa	Brittany Flokstra Instructor Department of Chemistry and Biochemistry University of Northern Iowa	Steven Hall Assistant Professor Department of Ecology, Evolution, and Organismal Biology Iowa State University
Richard Cruse Professor Department of Agronomy Iowa State University	Andrew A. Forbes Associate Professor Department of Biology Director, UI Environmental Sciences Program University of Iowa	Thomas C. Harrington Professor Department of Plant Pathology and Microbiology Iowa State University
Dennis Dahms Professor Quaternary Geochronology & Stratigraphy, Department of Geography University of Northern Iowa	Laurence Fuortes Professor Occupational and Environmental Health, College of Public Health University of Iowa	Emily Heaton Associate Professor Biomass Crop Production Department of Agronomy Iowa State University
Radford Davis Associate Professor of Public Health Dept. Veterinary Microbiology and Preventive Medicine College of Veterinary Medicine Iowa State University	Laurie Furlong Professor Biology Department Northwestern College	Ted Heindel Bergles Professor of Thermal Science Department of Mechanical Engineering Iowa State University
John Dawson Professor Mathematics, Earth and Environmental Sciences Kirkwood Community College		John R. Helms Assistant Professor of Chemistry Biology and Chemistry Department Morningside College

Iowa Climate Statement 2018: Designing Buildings and Communities for Iowa's Future Climate

Steve Hendrix Professor Emeritus Department of Biology University of Iowa	Andrew Kitchen Associate Professor Department of Anthropology University of Iowa	Marc Linderman Associate Professor Department of Geographical and Sustainability Sciences University of Iowa
Brian Hornbuckle Professor Department of Agronomy Iowa State University	Erwin Klaas Professor Emeritus of Animal Ecology Natural Resources Ecology Management Iowa State University	Gabriele Ludewig Professor, Department of Occupational & Environmental Health, DGS, Interdisciplinary Graduate Program in Human Toxicology University of Iowa
Keri C. Hornbuckle Professor, Department of Civil & Environmental Engineering Director, Iowa Superfund Research Program, College of Engineering University of Iowa	Robert R. Klepper Professor of Chemistry Iowa Lakes Community College	Charles F. Lynch Professor Department of Epidemiology College of Public Health University of Iowa
Mohammad Iqbal Professor Department of Earth and Environmental Sciences University of Northern Iowa	Julia Klesney-Tait Associate Professor of Medicine Department of Internal Medicine Carver College of Medicine University of Iowa	J. Elizabeth Maas Assistant Professor Kirkwood Community College
Erin Irish Associate Professor of Biology University of Iowa	Joel N Kline Professor Department of Medicine, Roy J. and Lucille A. Carver College of Medicine, University of Iowa	Mark T. Madsen Professor Emeritus Department of Radiology University of Iowa
Laura L. Jackson Director, Tallgrass Prairie Center Professor of Biology Department of Biology University of Northern Iowa	Owen Kolstad Senior Lecturer Mechanical Engineering Department Iowa State University	Amy Madsen-Smith Biology Department Clinton Community College
Samuel W. James Chair, Sustainable Living Department Maharishi University of Management	Witold Krajewski Director, Iowa Flood Center, Rose & Joseph Summers Chair in Water Resources Engineering University of Iowa	Sunil Malapati Professor of Biochemistry Clarke University
Brandi Janssen Clinical Assistant Professor Director, Iowa's Center for Agricultural Safety and Health College of Public Health University of Iowa	Dennis Lavrov Associate Professor Department of Ecology, Evolution, and Organismal Biology Iowa State University	Ashutosh K. Mangalam Assistant Professor Department of Pathology University of Iowa
Chris Jones Research Engineer IHHR—Hydroscience & Engineering University of Iowa	Hans-Joachim Lehmler Professor Occupational and Environmental Health University of Iowa	Matthew D. Martin Postdoctoral Research Scholar Department of Pathology University of Iowa
Craig Just Associate Professor Department of Civil & Environmental Engineering University of Iowa	Peter Levi Assistant Professor Department of Environmental Science and Sustainability Drake University	Sara E. Mason Associate Professor Department of Chemistry University of Iowa
Meena Khandelwal Associate Professor Departments of Anthropology and GWSS University of Iowa	Louis Licht Adjunct Associate Professor Department of Civil & Environmental Engineering University of Iowa	Dave May Professor Department of Geography University of Northern Iowa
Frederick Kirschenmann Distinguished Fellow Department of Philosophy and Religious Studies Iowa State University	Matt Liebman Professor of Agronomy H.A. Wallace Endowed Chair for Sustainable Agriculture Iowa State University	Paul Mayes Professor of Biology Emeritus Eastern Iowa Community College
		John Mayfield Professor Emeritus Department of Genetics, Development and Cell Biology Iowa State University

Iowa Climate Statement 2018: Designing Buildings and Communities for Iowa's Future Climate

Katherine McCarville
Professor of Geosciences
Delano Professor of Science
Upper Iowa University

Paul B. McCray
Professor and Executive Vice Chair
Department Pediatrics
Pappajohn Biomedical Institute
Carver College of Medicine
University of Iowa

David McCullough
Professor of Biology, Co-coordinator
Environmental Science and Studies
Wartburg College

Julie Meachen
Assistant Professor
Anatomy Department
Des Moines University

Paulina Mena
Associate Professor of Biology
Central College

James Merchant
Professor Emeritus
Occupational and Environmental Health,
College of Public Health
University of Iowa

Laura C. Merrick
Lecturer
Department of Agronomy
Iowa State University

James Michael
Assistant Professor
Department of Mechanical Engineering
Iowa State University

Fernando E. Miguez
Associate Professor
Department of Agronomy
Iowa State University

Kenneth J. Moore
Charles F. Curtiss Distinguished Professor
and Pioneer Hi-Bred Professor
Department of Agronomy
Iowa State University

Marian Muste
Research Engineer and Adjunct Professor
IIHR-Hydroscience & Engineering
University of Iowa

Connie Mutel
Senior Science Writer (retired)
IIHR-Hydroscience & Engineering
University of Iowa

Robert Mutel
Professor of Astronomy
Department of Physics and Astronomy
University of Iowa

Ajay Nair
Associate Professor and Vegetable
Extension Specialist
Department of Horticulture
Iowa State University

William M. Nauseef
Director, Inflammation Program
Department of Medicine, Roy J. and
Lucille A. Carver College of Medicine,
University of Iowa

Ted Neal
Clinical Associate Professor of Science
Education, Department of Teaching and
Learning, College of Education
University of Iowa

Marit Nilsen-Hamilton
Professor, Roy J. Carver Department of
Biochemistry, Biophysics and Molecular
Biology
Iowa State University

Fred Ochs
Professor of Chemistry and Earth Science
Kirkwood Community College

Resmiye Oral
Clinical Professor of Pediatrics
Director, Child Protection Program
University of Iowa Children's Hospital
Roy J. and Lucille A. Carver College of
Medicine
University of Iowa

Patrick T. O'Shaughnessy
Professor
Department of Occupational &
Environmental Health
University of Iowa

Dale W. Olson
Professor Emeritus of Physics
Department of Physics
University of Northern Iowa

James L. Pease
Associate Professor Emeritus
Natural Resource Ecology and
Management
Iowa State University

Reuben J. Peters
Professor
Department of Biochemistry, Biophysics
& Molecular Biology
Iowa State University

Christine Petersen
Associate Professor
Department of Epidemiology
College of Public Health
University of Iowa

Jeffrey T. Ploegstra
Associate Professor of Biology and
Environmental Studies
Dordt College

Liz Queathem
Senior Lecturer in Biology
Department of Biology
Grinnell College

James W. Raich
Professor
Department of Ecology, Evolution and
Organismal Biology
Iowa State University

Mark Rasmussen
Director, Leopold Center for Sustainable
Agriculture
Iowa State University

Ryan Rehmeier
Professor
Department of Biology and
Environmental Science
Simpson College

Michael J. Renner
Professor of Biology and Psychology
Chair, Environmental Science and
Sustainability Department
Drake University

Larry Robertson
Professor
Department of Occupational and
Environmental Health
College of Public Health
University of Iowa

Jennifer G. Robinson
Professor, Departments of Epidemiology
& Medicine, Director, Prevention
Intervention Center
College of Public Health
University of Iowa

Chuck Rodrigues
Chemistry and Biology Instructor
Department of Biological Sciences
Iowa Western Community College

Nilda E. Rodriguez
Associate Professor of Biology
Department of Biology
University of Northern Iowa

Diane Rohlman
Associate Professor
Occupational & Environmental Health
College of Public Health
University of Iowa

Thomas Rosburg
Professor, Department of Biology
Curator of the Drake University
Herbarium
Drake University

Amber D. Ruskell-Lamer
Professor, Biology
Department of Math and Sciences
Southeastern Community College

Iowa Climate Statement 2018: Designing Buildings and Communities for Iowa's Future Climate

Ann E. Russell
Adjunct Associate Professor
Department of Natural Resource Ecology
& Management
Iowa State University

James C. Sacco
Associate Professor
College of Pharmacy and Health Sciences
Drake University

Melanie H. Sadeghpour
Program Chair
Environmental Science
Des Moines Area Community College

Aliasger K. Salem
Professor and Bighley Chair of
Pharmaceutical Sciences,
Head, Division of Pharmaceutics and
Translational Therapeutics
College of Pharmacy
University of Iowa

Paula J. Sanchini
Professor of Biology and
Environmental Science
Coe College

Molly Schiel
Science Instructor
Science Department
Northeast Iowa Community College

Michelle Scherer
Donald E. Bently Professor of Engineering
Associate Director, NSF Sustainable
Water Development Graduate Program
University of Iowa

Lisa Schulte Moore
Professor
Natural Resource Ecology & Management
Associate Director, Bioeconomy Institute
Iowa State University

Timothy M. Sesterhenn
Assistant Professor of Biology
Department of Biology and Chemistry
Morningside College

Paul M. Shand
Professor and Head
Physics Department
University of Northern Iowa

Howard N. Shapiro
Professor Emeritus and Lecturer
Mechanical Engineering
Iowa State University

Anupam Sharma
Associate Professor of Aerospace
Engineering
Iowa State University

Mack Shelley
Professor and Chair
Department of Political Science
Iowa State University

William W. Simpkins
Professor of Hydrogeology
Department of Geological and
Atmospheric Sciences
Iowa State University

Mindy Skarda
Chair and Faculty
Health, Math and Science Department
Southwestern Community College

Nancy Lee Slife
Adjunct Biology Faculty
Math Science Department
Ellsworth Community College

Daryl Smith
Professor Emeritus of Biology
Tallgrass Prairie Center
University of Northern Iowa

Tex A. Sordahl
Professor Emeritus of Biology
Department of Biology
Luther College

Scott Spak
Assistant Professor
School of Urban & Regional Planning
University of Iowa

Muhammad A. Spocter
Associate Professor of Anatomy
Department of Anatomy
Des Moines University

Martin St. Clair
Professor
Department of Chemistry and
Environmental Studies
Coe College

Charles Stanier
Professor of Chemical and Biochemical
Engineering
College of Engineering
University of Iowa

Elizabeth A. Stone
Associate Professor
Department of Chemistry
University of Iowa

Monica R. Storm
Associate Professor
Anatomy & Physiology
Biological & Chemical Sciences
Department
Iowa Western Community College

Jim Stroh
Professor, Biology and Chemistry
Department.
Morningside College

Laura Stunz
Associate Research Scientist
Department of Microbiology
University of Iowa.

Shankar Subramaniam
Professor
Department of Mechanical Engineering
Iowa State University

Robert Summerfelt
Professor Emeritus
Department of Natural Resource Ecology
and Management
Iowa State University

Keith S. Summerville
Deputy Provost
Levitt Distinguished Professor of
Environmental Science
Drake University

David A. Swenson
Associate Scientist
Department of Economics
Iowa State University

Jessica Thistle
Professor of Biology
Des Moines Area Community College

Grant L. Thompson
Assistant Professor
Department of Horticulture
Iowa State University

Alexei V. Tivanski
Associate Professor of Chemistry
Department of Chemistry
University of Iowa

H. S. Udaykumar
Professor
Mechanical and Industrial Engineering
University of Iowa

Richard L. Valentine
Professor
Department of Civil and Environmental
Engineering
University of Iowa

Channon Visscher
Associate Professor of Chemistry
& Planetary Sciences
Dordt College

Kristina Walkup
Professor of Biology
Des Moines Area Community College

Emily O. Walsh
Professor
Geology Department
Cornell College

Michael H. Walter
Associate Professor
Biology
University of Northern Iowa

Iowa Climate Statement 2018: Designing Buildings and Communities for Iowa's Future Climate

Alan D. Wanamaker Jr.
Associate Professor
Department of Geological and
Atmospheric Sciences
Iowa State University

Anna J. Waterman
Associate Professor of Biology
Department of Natural and Applied
Sciences
Mount Mercy University

Larry Weber
Edwin B. Green Chair in Hydraulics
Executive Associate Dean,
College of Engineering
University of Iowa

Paul Weihe
Associate Professor
Biology Department
Central College

Ai Wen
Adjunct Professor
Biology
University of Northern Iowa

Jerrold Weiss
Professor
Departments of Internal Medicine and
Microbiology & Immunology
University of Iowa

Darrell Wiens
Professor of Biology
Department of Biology
University of Northern Iowa

Brian J. Wilsey
Professor
Department of Ecology, Evolution and
Organismal Biology
Iowa State University

Sally L. Wilson
Professor
Biology
Iowa Valley Community College

Lee Wymore
Professor of Biology, Program Director
Department of Science and Math
Indian Hills Community College

Catherine Zeman
Professor
Environmental Health Division
University of Northern Iowa