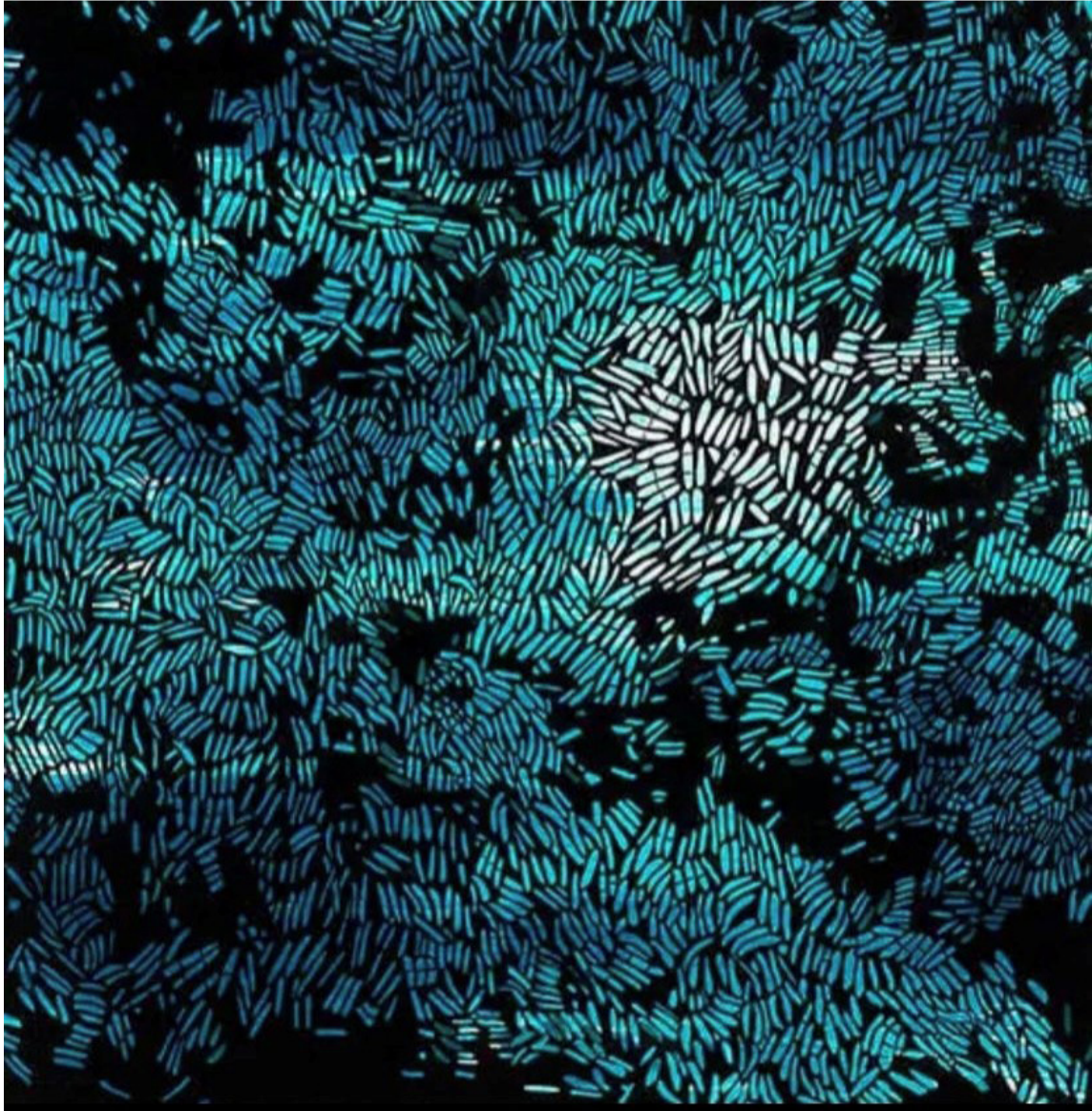


The National Academies Press Fall and Winter 2023

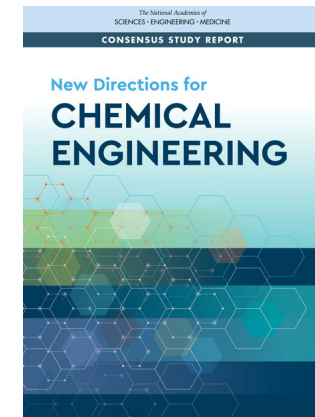
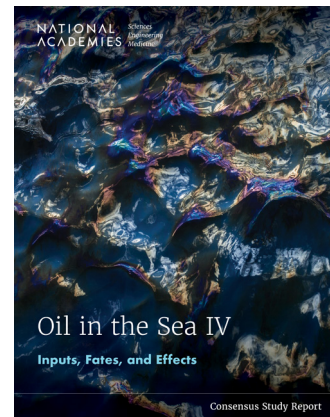
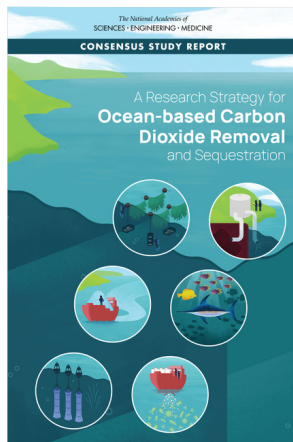


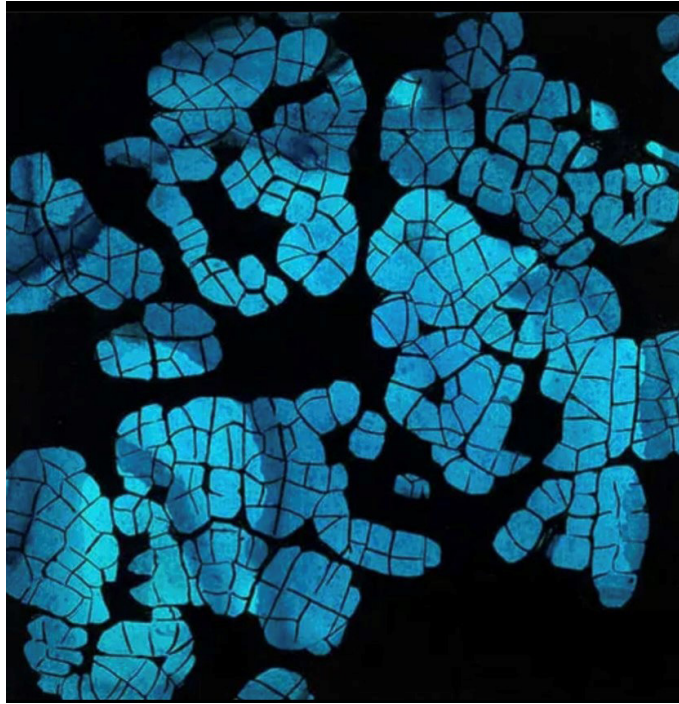
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Outstanding Academic Titles 2023

Chosen by the American Library Association

(to be announced December 2023)





New Titles for Fall and Winter



January 2024

8.25 x 10, 200 pages

Paperback: 978-0-309-69821-4

\$30.00

Ebook Available: \$22.99

Rise and Thrive with Science

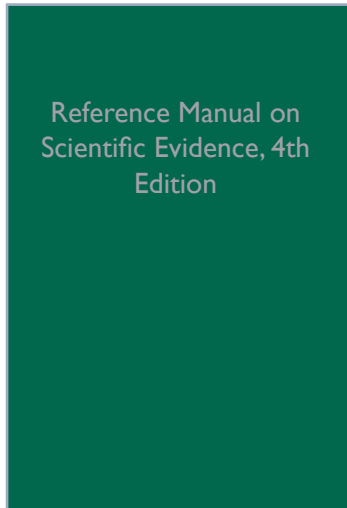
Empowering Approaches to Teaching PK-5 Science and Engineering

Research shows that children learn science and engineering subjects best by engaging from an early age in the kinds of practices used by real scientists and engineers. By “doing” science and engineering, children not only develop and refine their understanding of the core ideas and crosscutting concepts of these disciplines, but can also be empowered to use their growing understanding to make sense of questions and problems relevant to them. This approach can make learning more meaningful, equitable, and lasting.

Using cases and shorter examples, *Rise and Thrive with Science* shows what high-quality teaching and learning in science and engineering can look like for preschool and elementary school children. Through analyses of these examples and summaries of research findings, this guide points out the key elements of a coherent, research-grounded approach to teaching and learning in science and engineering. This guide also discusses the kinds of support that educators need to implement effective and equitable instruction for all children. This book will provide inspiration for practitioners at the preschool and elementary levels to try new strategies for science and engineering education, whatever their level of experience.

Few science teaching resources are available for educators of children in preschool through grade. Yet practitioners at these levels have an immediate need for examples of classroom practice, professional development, and other supports to help them implement high-quality strategies for teaching and learning in science and engineering. Although there are thousands of instructional activities and lessons online that purport to be aligned with particular sets of standards, teachers may wonder how effective these activities are and how well they fit together to meet the needs of their students. *Rise and Thrive with Science* will be an essential guide for teachers as they organize instruction to enable young children to carry out their own science investigations and engineering design projects, determine the kinds of instruction that lead to meaningful learning, and try to engage every one of their students.

Nancy Kober with contributions from Heidi Carlone, Betsy Davis, Ximena Dominguez, Eve Manz, and Carla Zembal-Saul | Amy Stephens and Heidi Schweingruber, Editors | National Academies of Sciences, Engineering, and Medicine



February 2024
6 x 9, 2,000 pages
2- Volume Paperback
978-0-309-70123-5
\$125.00
Ebook Available: \$99.99

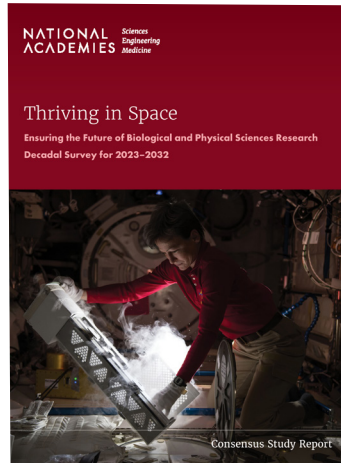
Reference Manual on Scientific Evidence, 4th Edition

Reference Manual on Scientific Evidence is a primary reference source for federal judges on questions of science in litigation. This resource assists judges in managing cases involving complex scientific and technical evidence by describing the basic tenets of key scientific fields from which legal evidence is typically derived and by providing examples of cases in which that evidence has been used. It offers judges advice on how to manage expert testimony, discusses emerging problems with expert testimony, and provides information on the methodology of areas of science that often present difficult issues when introduced in the form of expert testimony.

First published in 1994 by the Federal Judicial Center, *Reference Manual on Scientific Evidence* has been relied upon in the legal and academic communities and is often cited by various courts and others. Judges faced with disputes over the admissibility of scientific and technical evidence refer to the manual to help them better understand and evaluate the relevance, reliability and usefulness of the evidence being proffered. The manual is not intended to tell judges what is good science and what is not. Instead, it serves to help judges identify issues on which experts are likely to differ and to guide the inquiry of the court in seeking an informed resolution of the conflict.

The 4th edition updates the topics covered in the 2011 3rd Edition with the latest science and expands to discuss many new topics, identifying issues that will be useful to judges and others in the legal profession. This valuable reference examines pivotal issues in the areas of science most often subject to dispute, discussing assessment of a case's needs and evaluating experts and data. *Reference Manual on Scientific Evidence* will support judges and other legal professions to ensure that science presented in the courtroom can be understood in the lens of the scientific method and reasoning.

National Academies of Sciences, Engineering, and Medicine



March 2024

8.5 x 11, 354 pages

Paperback: 978-0-309-69498-8

\$60.00

Ebook Available: \$44.99

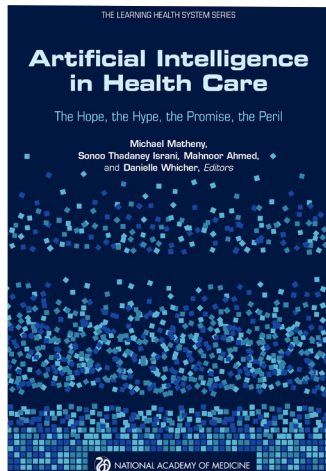
Thriving in Space - Ensuring the Future of Biological and Physical Sciences Research: A Decadal Survey 2023-2032

Not since the Apollo era have U.S. capabilities and ambitions for space exploration grown in intensity or breadth of interest as is seen in the present. There are more astronauts conducting more experiments in space now than ever before. There are commercial trips to space that expand participation in science and spawn increased desires for personal space travel. There are industrial processes being developed for space. And NASA is headed back to the Moon with the Artemis program, and then on to Mars. All this exists because the U.S. has invested in the science and technology to further develop space-based research and applications. Research in the biological and physical sciences has been critical to those advances being humanly possible and safer than ever before.

For the U.S. to continue to lead among the pioneering nations that embrace space exploration for both national security and global sustainability interests, it is necessary to resolve several scientific challenges that leverage or require the space environment in the coming decade. For the U.S. to thrive in that international competition and to benefit the majority of citizens who will not themselves travel to space, it is imperative to foster a biological and physical science research and technology community that includes scholars, practitioners, explorers, and enthusiasts.

This decadal survey on biological and physical sciences research in space will review the state of knowledge in the current and emerging areas of space-related biological and physical sciences research and generate recommendations for a comprehensive vision and strategy for a decade of transformative science at the frontiers of biological and physical sciences research in space. *Thriving in Space* will help NASA define and align research to uniquely advance scientific knowledge, meet human and robotic exploration mission needs, and provide terrestrial benefits.

Committee on Biological and Physical Sciences Research in Space 2023-2032 | National Academies of Sciences, Engineering, and Medicine



August 2023

6 x 9, 306 pages

Paperback: 978-0-309-70513-4

\$42.00

Ebook Available: \$28.99

Artificial Intelligence in Health Care The Hope, the Hype, the Promise, the Peril

The emergence of artificial intelligence (AI) in health care offers unprecedented opportunities to improve patient and clinical team outcomes, reduce costs, and impact population health. While there have been a number of promising examples of AI applications in health care, it is imperative to proceed with caution or risk the potential of user disillusionment, another AI winter, or further exacerbation of existing health- and technology-driven disparities.

Artificial Intelligence in Health Care synthesizes current knowledge to offer a reference document for relevant health care stakeholders. It outlines the current and near-term AI solutions; highlights the challenges, limitations, and best practices for AI development, adoption, and maintenance; offers an overview of the legal and regulatory landscape for AI tools designed for health care application; prioritizes the need for equity, inclusion, and a human rights lens for this work; and outlines key considerations for moving forward.

National Academy of Medicine | The Learning Health System Series | Michael Matheny, Sonoo Thadaney Israni, Mahnoor Ahmed, and Danielle Whicher, Editors

Foundational Research
Gaps and Future
Directions for Digital
Twins

March 2024

6 x 9, 200 pages

Paperback: 978-0-309-70042-9

\$40.00

Ebook Available: \$34.99

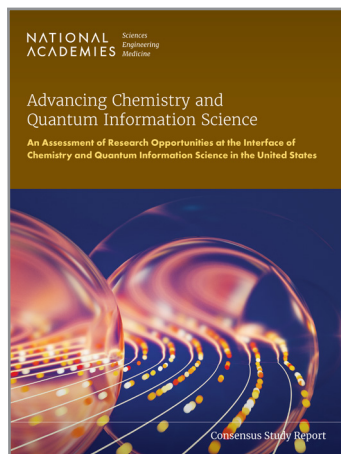
Foundational Research Gaps and Future Directions for Digital Twins

The digital twin is an emerging technology that builds on the convergence of computer science, mathematics, engineering, and the life sciences. A digital twin is a virtual representation of an object or system that spans its lifecycle, is updated from real-time data, and uses simulation, machine learning and reasoning to help decision making. Once informed with such data, the virtual model can be used to run simulations, study performance issues, and generate possible improvements, which can then be applied back to the original physical object. By enabling predictive insights and effective optimizations, monitoring performance to detect anomalies and exceptional conditions, and simulating dynamic system behavior, digital twins have the capacity to revolutionize scientific research, enhance operational efficiency, optimize production strategies, and unlock new avenues for scientific and industrial growth and innovation.

Because of their potential to transform scientific and industrial practices, digital twins have captured the attention and imagination of professionals across various disciplines and sectors. Digital twins have the potential to lead to safer, more efficient products and services, support improved health and well-being across our communities, and advance our understanding of the world around us in support of sustainable decision-making. Realizing these benefits requires a sustained and holistic commitment to an integrated research agenda that addresses foundational digital twin challenges across mathematics, statistics, and computing.

Foundational Research Gaps and Future Directions for Digital Twins explores needs and opportunities to advance the mathematical, statistical, and computational foundations of digital twins in applications across science, medicine, engineering, and society. This book also considers ways to bridge the gaps that currently hinder the effective implementation of digital twins in scientific research and industrial processes. *Foundational Research Gaps and Future Directions for Digital Twins* provides practical recommendations to bring the value promise of digital twins to fruition, both today and in the future.

Committee on Foundational Research Gaps and Future Directions for Digital Twins | National Academy of Engineering | National Academies of Sciences, Engineering, and Medicine



January 2024

8.5 x 11, 240 pages

Paperback: 978-0-309-69809-2

\$26.00

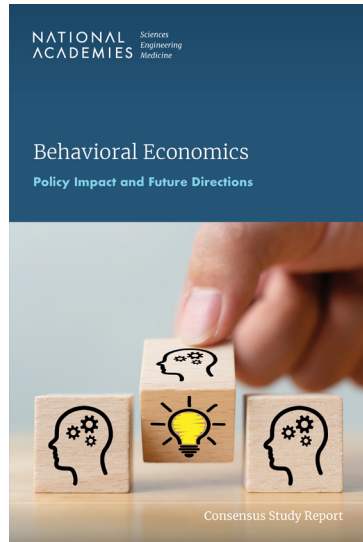
Ebook Available: \$20.99

Advancing Chemistry and Quantum Information Science An Assessment of Research Opportunities at the Interface of Chemistry and Quantum Information Science in the United States

The field of quantum information science (QIS) has witnessed a dramatic rise in scientific research activities in the 21st century as excitement has grown about its potential to revolutionize communications and computing, strengthen encryption, and enhance quantum sensing, among other applications. While, historically, QIS research has been dominated by the field of physics and computer engineering, this book explores how chemistry - in particular the use of molecular qubits - could advance QIS. In turn, researchers are also examining how QIS could be used to solve problems in chemistry, for example, to facilitate new drug and material designs, health and environmental monitoring tools, and more sustainable energy production.

Recognizing that QIS could be a disruptive technology with the potential to create groundbreaking products and new industries, *Advancing Chemistry and Quantum Information Science* calls for U.S. leadership to build a robust enterprise to facilitate and support research at the intersection of chemistry and QIS. This book identifies three key research areas: design and synthesis of molecular qubit systems, measurement and control of molecular quantum systems, and experimental and computational approaches for scaling qubit design and function. *Advancing Chemistry and Quantum Information Science* makes recommendations to support multidisciplinary and collaborative research in QIS, the development of new instrumentation, and facilities, centralized and open-access databases, and efforts to create a more diverse and inclusive chemical workforce.

Committee on Identifying Opportunities at the Interface of Chemistry and Quantum Information Science |
National Academies of Sciences, Engineering, and Medicine



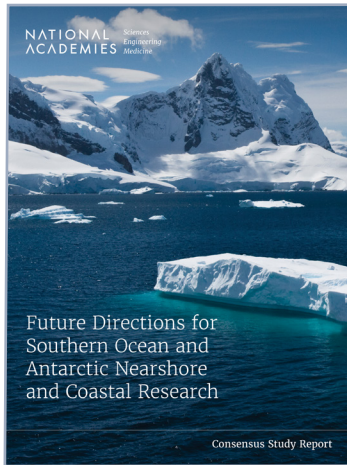
July 2023
6 x 9, 258 pages
Paperback: 978-0-309-69983-9
\$25.00
Ebook Available: \$19.99

Behavioral Economics Policy Impact and Future Directions

Behavioral economics - a field based in collaborations among economists and psychologists - focuses on integrating a nuanced understanding of behavior into models of decision-making. Since the mid-20th century, this growing field has produced research in numerous domains and has influenced policymaking, research, and marketing. However, little has been done to assess these contributions and review evidence of their use in the policy arena.

Behavioral Economics: Policy Impact and Future Directions examines the evidence for behavioral economics and its application in six public policy domains: health, retirement benefits, climate change, social safety net benefits, climate change, education, and criminal justice. This book finds that the principles of behavioral economics are indispensable for the design of policy and recommends integrating behavioral specialists into policy development within government units. In addition, *Behavioral Economics* calls for strengthening research methodology and identifies research priorities for building on the accomplishments of the field to date.

Committee on Future Directions for Applying Behavioral Economics to Policy | Robert Moffitt, Alison Bутtenheim, and Alexandra Beatty, Editors | National Academies of Sciences, Engineering, and Medicine



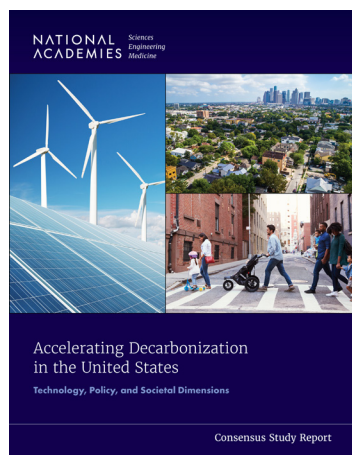
February 2024
8.5 x 11, 240 pages
Paperback: 978-0-309-70682-7
\$45.00
Ebook Available: \$34.99

Future Directions for Southern Ocean and Antarctic Nearshore and Coastal Research

The Southern Ocean and the coast of Antarctica are some of the harshest and most remote places on Earth, distant from all major population centers and yet a region of global importance. Although diverse and complex, the Southern Ocean and nearshore Antarctic ecosystems and environments are fragile, and currently facing increasing stresses from human-induced factors, especially climate change. Ocean temperatures are rising, sea ice extent is changing, ice shelves are retreating, and the underlying structure and food webs of ecosystems are evolving. Many of these processes have important feedbacks that can in turn affect global processes. A robust understanding of the past and present physical, chemical, biological, and geological processes that occur in nearshore Antarctica and the Southern Ocean is essential for predicting how the evolving local environment might impact the globe.

Future Directions for Southern Ocean and Antarctic Nearshore and Coastal Research identifies three science priorities in Southern Ocean and Antarctic nearshore and coastal research: the impact of Antarctica and Southern Ocean on global sea level; the interaction of Antarctica and the Southern Ocean with ocean circulation and global climate; and the structure and function of the Southern Ocean and nearshore Antarctic ecosystem and its relationship with ongoing environmental change. This book determines the needed observations and actions to advance these science priorities and notes any gaps between the science drivers and the portfolio of capabilities.

Committee on Future Directions for Southern Ocean and Antarctic Nearshore and Coastal Research |
National Academies of Sciences, Engineering, and Medicine



March 2024
 8.5 x 11, 600 pages
 Paperback: 978-0-309-68284-8
 \$95.00
 Ebook Available: \$80.99

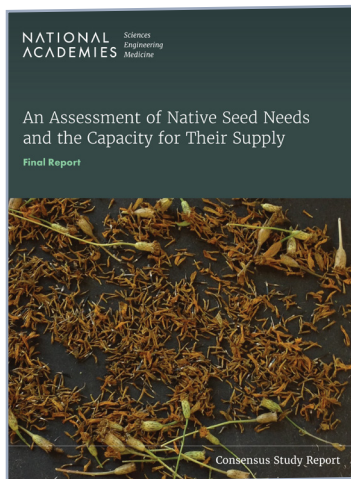
Accelerating Decarbonization in the United States Technology, Policy, and Societal Dimensions

The United States has set an interim emissions target of 50-52 percent below 2005 levels by 2030 toward a net-zero goal. Modeling analyses suggest that the federal policies could provide 70-80 percent of the emissions reductions toward the 2030 target. The U.S. is attempting the first fair, equitable, and just technological transition in its history. If successful, the transition will affect almost every part of the U.S. economy and leave the country with an affordable and accessible energy system that produces zero net GHG emissions, and also affords important co-benefits, such as reduced emissions of ambient air pollutants that cause illness and death; revitalized energy, building, and industrial sectors; increased resilience to environmental and social stressors; produce net increases in employment; and result in fair, equitable, and just treatment of both displaced fossil workers and low-income and historically marginalized populations.

Through an assessment of current federal, state, and local climate and energy policies, *Accelerating Decarbonization in the United States: Technology, Policy, and Societal Dimensions* identifies gaps and barriers to implementation that would prevent the nation from attaining its climate, economic, and societal goals. It follows on the 2021 study *Accelerating Decarbonization of the U.S. Energy System*, which laid out federal actions needed during the 2020s to put the nation on a fair and equitable path to decarbonization by mid-century.

Accelerating Decarbonization in the United States focuses on five major objectives of decarbonization policy – GHG emission reductions, equity and fairness, health, employment, and public engagement – that cut across eight different sectors: electricity, buildings, land use, transportation, industry, finance, fossil fuels, and nonfederal actors. This book offers long-term, whole-of-society recommendations to implement, adapt, and expand on existing local, state, and federal climate and energy policies to achieve energy services that are clean, affordable, and equitable, reduced impacts from climate change, better health and employment opportunities, cleaner air. The recommendations of *Accelerating Decarbonization in the United States* will provide advice on filling policy gaps, overcoming implementation barriers, and establishing adaptive management strategies so that the United States can realize its net-zero emissions goal and all Americans can benefit from an equitable energy system.

Committee on Accelerating Decarbonization in the United States: Technology, Policy, and Societal Dimensions
 National Academies of Sciences, Engineering and Medicine



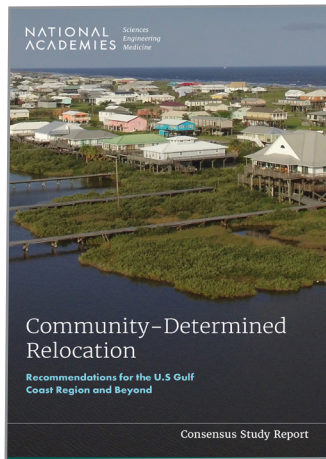
August 2023
8.5 x 11, 240 pages
Paperback: 978-0-309-69025-6
\$40.00
Ebook Available: \$29.99

An Assessment of Native Seed Needs and the Capacity for Their Supply: Final Report

Extreme weather and wildfires, intensified by climate change, are damaging the native plant communities of landscapes across the United States. Native plant communities are foundational to thriving ecosystems, delivering goods and services that regulate the environment and support life, provide food and shelter for a wide range of native animals, and embody a wealth of genetic information with many beneficial applications. Restoring impaired ecosystems requires a supply of diverse native plant seeds that are well suited to the climates, soils, and other living species of the system.

This study examines the needs for native plant restoration and other activities, provides recommendations for improving the reliability, predictability, and performance of the native seed supply, and presents an ambitious agenda for action. An Assessment of Native Seed Needs and the Capacity for Their Supply considers the various challenges facing our natural landscapes and calls for a coordinated public-private effort to scale-up and secure a cost-effective national native seed supply.

Committee on an Assessment of Native Seed Needs and Capacities | National Academies of Sciences, Engineering, and Medicine



February 2024
6 x 9, 250 pages
Paperback: 978-0-309-70872-2
\$40.00
Ebook Available: \$29.99

Community-Determined Relocation Recommendations for the U.S Gulf Coast Region and Beyond

Millions of people in the United States and millions more across the globe are at risk of displacement from the effects of climate change. In the U.S. Gulf Coast region, flooding due to sea level rise and storm surge, subsidence, and land loss are increasing the potential for displacement of individuals, towns, and entire cities, including indigenous communities. These effects compound other climate-related hazards, including damage to vital infrastructure (e.g., water, sewage, electricity, health care facilities, and roads); the release of pollutants due to storm damage; and heat exposure.

Disaster displacement is not a new phenomenon, but equitably addressing it poses a multitude of challenges for residents and community stakeholders across sectors and jurisdictions. Displacement can change all aspects of daily living, such as housing, community and cultural ties, employment, access to health care, availability of safe drinking water and other services, food sufficiency, and household wealth. In a region with a high potential for annual disasters, like the Gulf Coast, displacement, or the threat of it, often affects people who have survived the stress and accrued trauma of one or more disasters. Measures can be taken to support people who must move out of harm's way, yet very few communities are preparing for, or managing the risk of displacement.

Community Driven Relocation explores the issue of managed retreat in the Gulf Coast. This book reviews the history of the region, including ingrained inequities, examines the science that characterizes the region's future and helps to explain its ongoing disaster record, and considers the overall impact of chronic stressors on community wellbeing. This study offers new guidance, improving our understanding of the intersectionality of community wellbeing, planning processes, government policy, and implementation funding.

Committee on Managed Retreat in the U.S. Gulf Coast Region | National Academies of Sciences, Engineering, and Medicine



February 2024

6 x 9, 526 pages

Paperback: 978-0-309-70366-6

\$50.00

Ebook Available: \$40.99

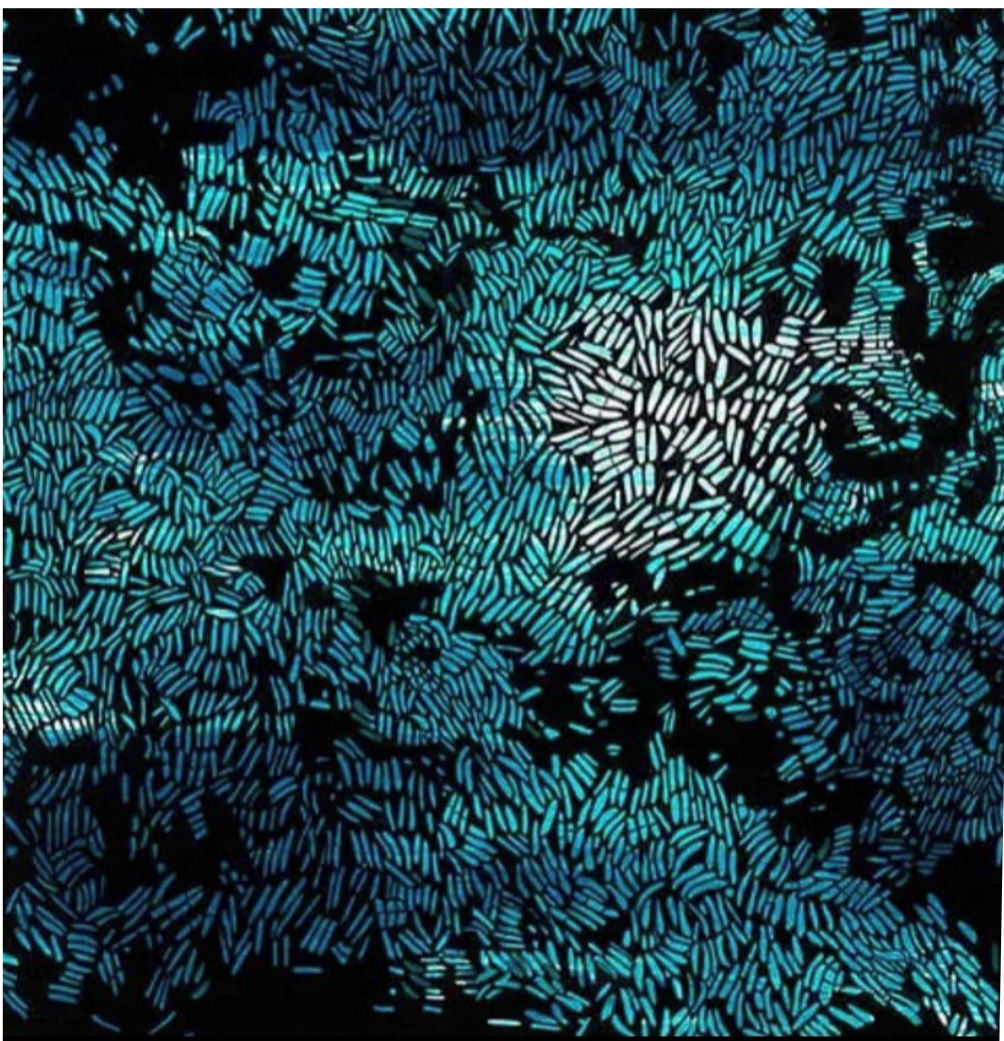
Reducing Intergenerational Poverty

When children live in economically secure, nurturing families, are healthy, receive high-quality education, and are otherwise supported to achieve their potential as adults, society as a whole is better off. Poverty reduces overall economic output and places increased burdens on the educational, criminal justice, and health care systems. Understanding the causes of intergenerational poverty, and implementing programs and policies to reduce it, would yield have a high payoff for children and for the entire nation. This book explores the drivers of long- term intergenerational poverty and identifies policies and programs with the potential to reduce it.

Reducing Intergenerational Poverty is a comprehensive study of intergenerational child poverty in the United States that examines key drivers of long-term poverty, explores the racial and structural factors that help perpetuate intergenerational poverty, and offers evidence-based policies and programs that can create better futures for children from low-income families.

Committee on Policies and Programs to Reduce Intergenerational Poverty | Greg J. Duncan, Jennifer Appleton Gootman, Priyanka Nalamada, Editors | National Academies of Sciences, Engineering, and Medicine

“The costs of persistent intergenerational poverty fall not just on individuals and families with low incomes but on society as a whole. Intergenerational poverty reduces overall economic output and places increased burdens on the educational, criminal justice, and health care systems. Our report sifts through decades of evidence to point to our ‘best bets’ for overcoming these challenges.” - Greg Duncan, distinguished professor in the School of Education at the University of California, Irvine, and chair of the authoring committee



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