SOLUTIONS

Climate Choices for a Sustainable Southwest

"Tapping into the Southwest's existing history of adapting to climactic and geographic extremes of the region is key to developing future sustainable solutions."

Above: New solar energy installations are located in the Southwest or are under review in California, Arizona, Nevada, and Colorado.

Right: The Phoenix, Arizona Metro Light Rail is one of the city's sustainability initiatives.

Key Messages

1

There are low-cost, cost-saving, and revenue-generating opportunities for emission reductions in the Southwest, especially in improving energy efficiency and expanding renewable energy production.

2

Past responses to environmental stress and management of natural resources demonstrate the Southwest's capacity for adaptation. These efforts have produced many successes, but also challenges and trade-offs in policy and actions that can increase resilience for some while increasing vulnerability for others.

3

A range of stakeholders are already planning how to prepare for and respond to climate risks in the Southwest, but few have begun implementing adaptation programs, due to financial, institutional, informational, political, and attitudinal barriers.

The eighteenth chapter of the *Assessment of Climate Change in the Southwest United States* describes challenges to implementing mitigation and adaptation plans, given governance issues related to states, municipalities, and regional institutions. The chapter discusses new environmental management initiatives in the region and gives examples of current climate-change mitigation and adaptation initiatives and successes. "Climate Choices for a Sustainable Southwest" analyzes the barriers to implementing solutions, and highlights the practical opportunities afforded through maximizing the co-benefits of mitigation and adaptation, and minimizing costs and environmental and social harms.

A sustainable approach to climate change involves choices that support the long-term maintenance of economic, social, and environmental well-being so that the needs of the present are met without compromising future generations. Achieving a sustainable Southwest requires early warning of climate-change risks and response plans to identify the best pathways that will maximize benefits for the economy, the environment, and society while minimizing costs and environmental risks, especially for the most vulnerable.

For more information about *Assessment of Climate Change in the Southwest United States*, see: www.swcarr.arizona.edu, www.cakex.org, www.islandpress.org/NCAreports.
This fact sheet developed by Institute of the Environment, University of Arizona.

Yuma Desalination Plant. Desalination might become a more viable and socially acceptable option for augmenting water supplies. Courtesy of the US Department of the Interior, Bureau of Reclamation, Yuma Area Office.

Risk Management

Alongside mitigation steps, the Southwest can substantially benefit from the development of adaptation strategies that minimize the impacts of climate changes that cannot be avoided and turn expected climate changes into opportunities. Across local, state, and regional geographic scales, and in the public and private sectors, a number of mechanisms, including early warning systems, emergency planning, irrigation systems, and insurance policies have already been devised in order to respond to climate risks such as drought, heat extremes, floods, wildfires, and cold snaps. As historical weather patterns of extreme events change, the region can prepare by expanding existing risk-management tools and developing new ones.

Mitigation and adaptation activities often have distinct goals, but outcomes from mitigation and adaptation activities may support or undermine each other. For example, an adaptation strategy, such as using air conditioning to relieve the effects of extreme heat, may be pursued, but it increases emissions. Or renewable energy production may be expanded, but some energy production requires more water use, which increases adaptation challenges. It is important to analyze the interaction of mitigation and adaptation in the Southwest in order to maximize potential co-benefits and reduce potential trade-offs.

Reducing Emissions

To mitigate the effects of climate change, the National Research Council recommends reducing greenhouse gas emissions by 50 to 80 percent by 2050 compared to 1990 levels. For the Southwest, which was responsible for 13.4 percent of US total CO_2 emissions in 2009, this challenge is difficult but not impossible. Mitigation options for the region include reducing overall energy consumption and capitalizing on its comparative advantage and opportunities in emission reductions with solar energy, energy-efficiency savings, and low-carbon electric vehicles. The southwestern states already lead the country with installed solar photovoltaics and concentrating solar power generation facilities.

Overcoming Barriers

Barriers to adaptation and mitigation, as categorized by the National Research Council, include inadequate information and experience, inadequate institutional support, lack of resources and technology, and resistance to behavioral changes. Steps to overcome these barriers in the Southwest include building capacity, cooperation and collaboration, market mechanisms, legal reforms, and education. Framing mitigation and adaptation responses in terms of water conservation and energy efficiency may be more effective than making explicit links to climate change for some southwest residents. Rapid and extreme climate change scenarios may prompt the consideration of more extreme adaptation strategies, such as changing water allocation priorities or pursuing large scale climate manipulations (geoengineering).

Examples of synergies and tradeoffs between regionally relevant mitigation and adaptation activities and climate-change impacts

Mitigation *supports* adaptation	Moving from water-cooled concentrating solar power plants in California and Nevada toward dry cooling helps reduce water needs for the energy sector and leaves resources available for other users. Increased urban tree cover increases carbon storage and shading, resulting in lower cooling-energy demand and fewer heat-related health risks.
Mitigation *undermines* adaptation	Carbon capture and storage from coal-burning power plants increases water demand and creates greater competition for regionally scarce water resources. The move to renewable energy can be water intensive: US nuclear power plants may require as much as eight times more freshwater than natural gas plants per unit of electricity generated and 11 percent more than coal plants. Some concentrating solar power plants consume more water per unit of electricity than the average coal plant.
Adaptation *supports* mitigation	Improved forest fuel management (and reduction) decreases the risk of devastating wildfires (and thus large releases of carbon into the atmosphere), and thus maintains watershed health; reduces the risk of landslides, soil erosion, and destruction of infrastructure; and better preserves scarce water resources. Efforts to increase rainwater infiltration on the land to improve water security and reduce the risk of sewer overflows and flooding during extreme rainfall events also reduces the need for energy-intensive sewage treatment and pumping.
Adaptation *undermines* mitigation	Desalinization of seawater to increase local water security during drought years is a highly energy-intensive adaptation option, thus increasing CO_2 emissions (unless the desal plant is solar-powered). Extensive fortification of coastlines against sea-level rise and coastal flooding with seawalls also increases CO_2 emissions from cement.

Information from: Liverman, D., S. C. Moser, P. S. Weiland, L. Dilling, M. T. Boykoff, H. E. Brown, E. S. Gordon, C. Greene, E. Holthaus, D. A. Niemeier, S. Pincetl, W. J. Steenburgh, and V. C. Tidwell. 2013. "Climate Choices for a Sustainable Southwest." In *Assessment of Climate Change in the Southwest United States: A Report Prepared for the National Climate Assessment*, edited by G. Garfin, A. Jardine, R. Merideth, M. Black, and S. LeRoy, 405–435. A report by the Southwest Climate Alliance. Washington, DC: Island Press.