

The degree of heating and resulting climate impact depends largely on what we do now. It matters that we reduce our carbon footprint, use fewer fossil fuels and fertilizers, and learn how to change, manage and mitigate.

Landmark initiatives have already begun in California. The state made history with passage of the Global Warming Solutions Act of 2006 (AB32), promising to reduce global warming pollution to 1990 levels by 2020. In partnership with the state, UC scientists have been leaders in climate-change research for a decade. UC Agriculture and Natural Resources (ANR) scientists are advancing our knowledge of global warming impacts on food production and natural resources. For example:

1. Increased carbon storage, by as much as 4,000 to 4,500 pounds per acre over standard farming practices.

2. Reduced soil erosion and improved water infiltration, as well as forest conservation.

3. Improved drought tolerance in plants, potentially helping farmers around the world to maintain crop productivity.

California's \$37 billion agricultural industry will be severely affected by the coming changes. Recent and predicted increases in temperature will have major impacts on where plants can be grown. Changing temperatures will also likely shift the range of native plants, and even cause some to disappear altogether (see page 57).

In this special issue of *California Agriculture*, UC scientists advance our understanding of how climate change will affect California (see page 59). New research reported suggests a mechanism to explain why initial increases in crop production are followed by declines. This research has important implications for hunger and nutrition worldwide.



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Wild fires have become more frequent and widespread in California in

Recent years, and the state's forests are becoming increasingly dry and vulnerable to fire. The state's forests are becoming increasingly dry and vulnerable to fire. The state's forests are becoming increasingly dry and vulnerable to fire.

kinds of invasive pests and diseases are increasing because of rising temperatures overall, and because pests consume more of the plant due to higher carbon and lower nitrogen content. In addition, the lack of winter chill periods will allow pests to breed throughout the year.

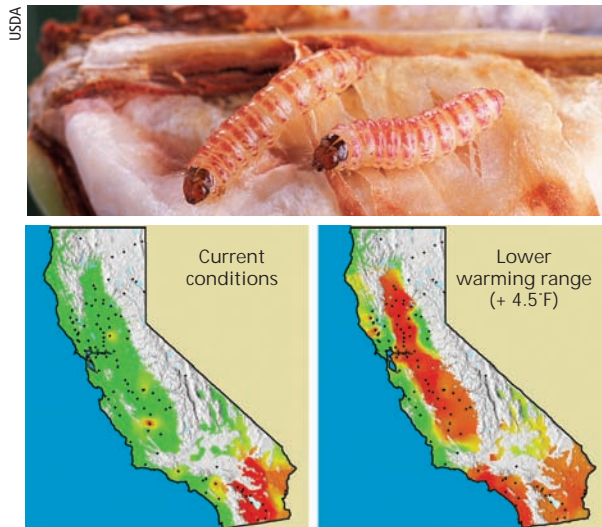
Scientists also describe mitigation options to reduce agriculture's impact on the climate system. For instance, California dairies, the valued producers of 21% of the nation's milk, can help decrease greenhouse-gas emissions and reduce their contributions to global warming (see page 79). UC investigations have shown that management practices can have a significant impact on greenhouse-gas emissions. UC researchers are studying incentives for farmers to incorporate them into their everyday practices (see page 91). In a review of carbon trading, scientists discuss evolving markets as tools to reduce greenhouse-gas emissions (see page 96).

Climate change will challenge California's natural ecosystems. For example, no Joshua trees will be able to grow in Joshua Tree National Monument in the Mojave Desert. The monument is currently dominated by oaks and madrone. These changes also will affect wildlife populations that depend on these ecosystems.

Such profound challenges require not only research — to develop new pest and disease strategies, new cropping systems and better understanding of the changes in timing of seasonal events — but also education and public outreach. We must foster greater science literacy, enabling people to make informed choices, develop new options and take action at all levels. UC, and other organizations, are working to develop a research track or set of actions will be enough to curb the ongoing and complex changes to our climate system. Solutions will require partnerships and will involve tradeoffs — ecological, economic and social.

ANR, with its network of campus-based scientists, Cooperative Extension (CE) specialists and county-based CE advisors, is uniquely situated to identify, examine and deliver research-based information to growers. ANR has 18 Extension Centers located throughout California's various crop production and climatic zones, from the high desert on California's northern border to the highly productive Imperial Valley desert on our Mexican border. These centers retain decades of records on climate, water, crop productivity and biodiversity, among other long-term data sets. All are now invaluable sources of information to project the local effects of changing climate, and to experimentally test new crop options, plant and animal production methods, ways to conserve biodiversity, and options to remain sustainable and viable in a global economy.

In a multipartner project, for example, the UC Berkeley Institute of the Environment has launched the Sustainable Neighborhood Project, funded by the Gordon and Betty Moore Foundation, the project is working in China to design, build and monitor a replicable, transit-oriented sustainable neighbor-



USDA

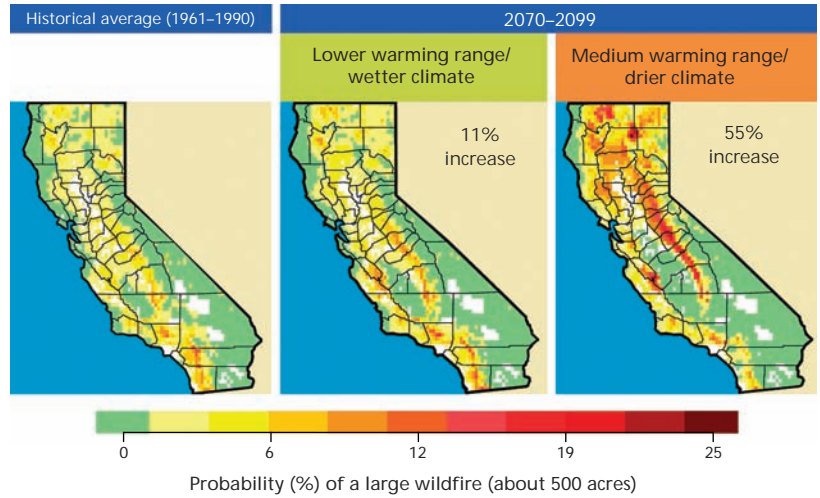
Rising winter temperatures would allow this major cotton pest to expand northward.

hood that generates all of its energy from on-site renewables (such as wind, solar and biomass); processes all of its sewage, food and green wastes; and recycles all its water. If successful, this innovative project will

Closer to home, Sonoma County has joined America's Fund for Integrated Solutions, a national network of local governments, universities and private partners. In partnership with UC, local businesses and others, the county is integrating buildings, and seeking incentives for developing new sources of renewable energy from solar, wind and wave power — all coupled with attention to human needs and behaviors.

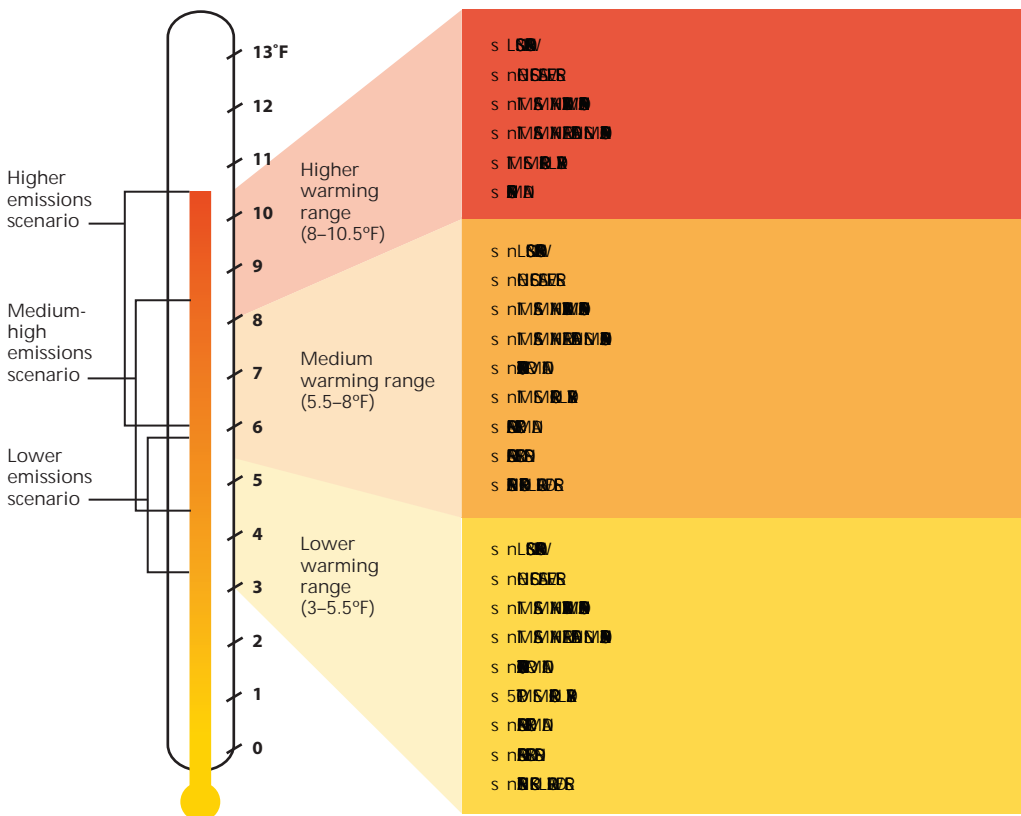
It will take both individual actions, and partnerships at all scales, to change behaviors, industries and the way we think about our place in the world. Perhaps the biggest challenge is making the paradigm shift from a fossil fuel-based economy to one driven by renewable sources of energy.

There is no time like the present for addressing climate change. The critical players are all at the table: politicians, scientists, technologists, city-county and regional planners,



Predicted increase in the frequency of wild res in California. If temperatures rise

ness to make policy and behavior changes to decrease U.S. greenhouse-gas emissions, reduce our dependence on fossil fuels and build green industries with green jobs to depend on it.



* For high ozone locations in Riverside and Visalia

Projected global warming impacts in averages predicted from three global

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