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Agricultural Outlook Forum  
U.S. Department of Agriculture

Presented: February 23-24, 2012

Educating to Build a Better Future:  
Impact of Climate Change  
On Agriculture

Barbara Allen-Diaz

translating research

# Transformational Education

All 50 states  
District of Columbia  
U.S. territories

## Local Access

part of Land-grant University System

civic engagement

TRUSTED RESOURCE

Rural

URBAN

national network

FOOD SAFETY

water conservation

# COOPERATIVE EXTENSION

ONLINE

train the trainer

seminars

Leadership Development

agriculture

ranching

ENVIRONMENT

FORESTRY

ask-an-expert

ENERGY

HEALTHY PEOPLE

HORTICULTURE

learning tools

farming

nutrition

Disaster preparedness

4-H youth development

Small Business

webinars

FAMILY WELL-BEING

community economic vitality

# **Educating to Build a Better Future**

## *Impact of Climate Change on Agriculture*

**Barbara Allen-Diaz**  
**Vice President**

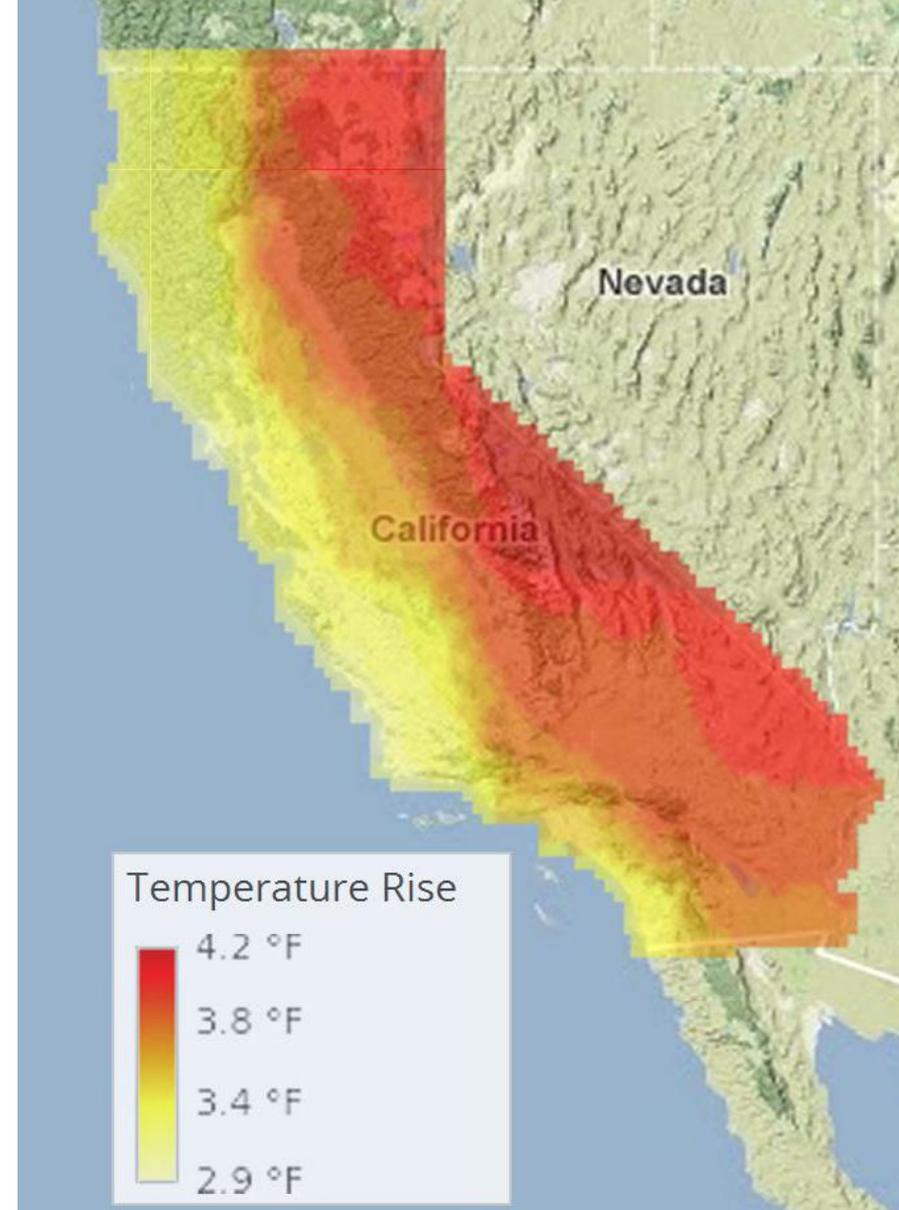
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EXTENSION**

HEALTHY FOOD SYSTEMS • HEALTHY ENVIRONMENTS • HEALTHY COMMUNITIES • HEALTHY CALIFORNIANS

# Impact of Climate Change on Agriculture

- Global climate change
- Agriculture and climate change
- Examples of Cooperative Extension's impact



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# Who is involved?

- Governments
- Non-profits
- Universities
- Corporations



**INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE**  
 sustainable solutions for ending hunger and poverty  
 Supported by the CGIAR



**COP17/CMP7**  
**UNITED NATIONS**  
 CLIMATE CHANGE CONFERENCE 2011  
 DURBAN, SOUTH AFRICA

**IPCC**  
 INTERGOVERNMENTAL  
 PANEL ON  
 CLIMATE CHANGE



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**COOPERATIVE  
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Chemistry

Biology

Animal Science

GLOBAL

Physics

REGIONAL

Climate Science

Community Development

Plant Science

Modeling

Mathematics

LOCAL

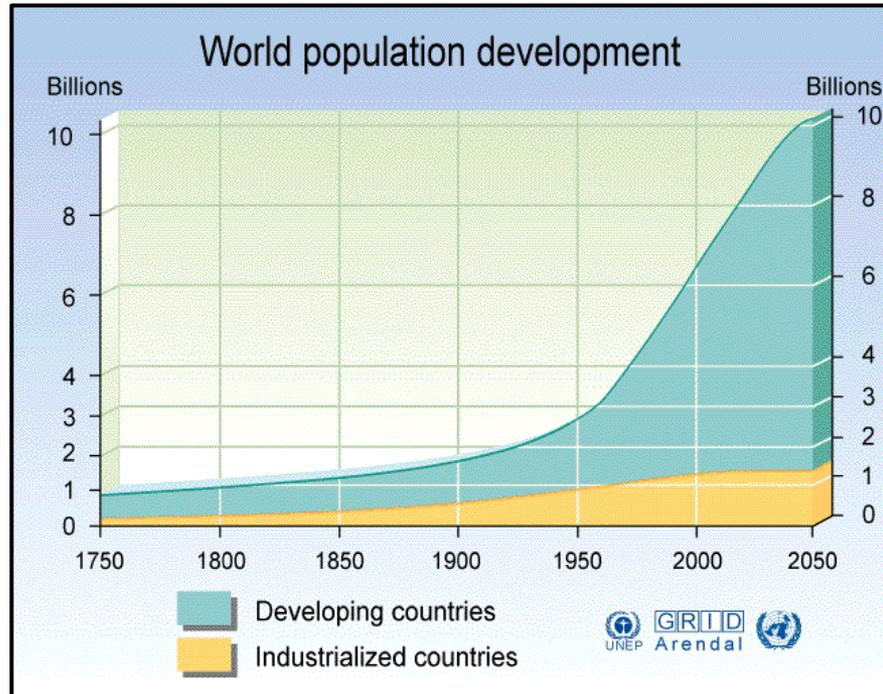
Social Science

Human Health Sciences

# Primary Drivers in Climate Change

- increased CO<sub>2</sub>
- increased temperature
- increase in extreme events
- altered seasonality of precipitation (more/less winter or summer)
- increased fire frequency and severity
- melting of mountain glaciers/ice caps

# The Global Picture



By 2060:

- Population growth will increase by 50%.
- Global food demands are expected to double.

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# Global Challenges

- Provide safe and abundant food and fiber
- Address poverty and malnutrition
- Ensure energy access and security
- Adapt to climate change and other environmental challenges
- Ensure growth and jobs

# Local Challenge

- Sustainable Agriculture in three dimensions
  - Ecological
  - Economic
  - Social and Political

# Sustainability

## Sound Ecology

Water & air quality protected  
Viable wetlands & habitat  
Healthy biodiversity

## Viable Economy

Investment \$\$ available  
Positive affect on local economy  
Adequate infrastructure

## Natural Resources

- ◆ Soils ◆ Climate ◆ Minerals
- ◆ Topography ◆ Precipitation
- ◆ Flora & Fauna
- ◆ Etc.

## Feasible Implementation

Public supports proposal  
Adequate resources available  
Laws & regulations work or can be changed

## Landowner Objectives

Land use patterns and values  
Landowner contributions  
What is their vision?

## Social Equity

All segments of society share wealth  
Public has opportunity for input  
Rewards fairly distributed

# Sustainability

- Agriculture must think globally
  - Consider growing food demand
  - Consider issues related to climate change
  - Recognize the need for a variety of food production systems
- Revisit our models and organizations to assure they are properly aligned with emerging priorities

# Agriculture and Climate Change

- Extremely vulnerable
- Increasing temperatures reduce yields, increase weeds and pests
- PPT: increase the likelihood of short-run crop failures and long-run production declines
- threatening global food security

# Agriculture and Environment

- invasive species
- increased nitrogen (region specific, surface and groundwater issues)
- fragmentation of ecosystems
- water



# Cooperative Extension's role

- Apply discovery generated by local research to improve the lives of the population.
- *Translational research*
- Four examples
  - National and local

# Translational Research

- Process of applying discoveries generated through research
- Research aimed at enhancing best management practices in the community
- Principles of partnerships, sharing of data, cooperation, informing others

# Four Examples of CE efforts

1. Cal-adapt.com
2. eXtension.org
3. Lake Tahoe
4. Yolo County, CA

# cal-adapt

EXPLORING CALIFORNIA'S  
CLIMATE CHANGE RESEARCH

The screenshot displays the main navigation area of the cal-adapt website. It features six primary menu items arranged in a 2x3 grid:

- View Local Profiles**: QUICKLY EXPLORE CLIMATE PROJECTIONS FOR YOUR LOCAL AREA. Includes a line graph showing temperature trends from 1950 to 2100, with a y-axis ranging from 62 F to 74 F.
- Explore Climate Tools**: INTERACTIVE MAPS & CHARTS. Includes icons for sun, snowflake, water drop, and waves.
- About Cal-Adapt**: Includes a 'NEW' badge for 'EXTREME HEAT TOOL' and a 'FAQS' link with a question mark icon.
- Access Data**: ACCESS THE RAW DATA USED IN CAL-ADAPT. Includes a download icon and text: 'Select and download data in a variety of tabular and GIS formats'.
- Resources**: INFORMATION, ARTICLES & LINKS. Includes an icon of books and text: 'Find out more about how climate change in California is relevant to your community'.
- Community**: PARTICIPATE IN COMMUNITY BASED TOOLS AND ACTIVITIES. Includes an icon of three people and text: 'Find out how you can share your thoughts and findings, communicate with experts, and help to collect new data'. It also shows social media sharing options: 'Tweet 0' and 'Like 376'.

Site developed by:  
Geospatial Innovation Facility



Cal-Adapt is a product of the Public  
Interest Energy Research (PIER) program

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State of California, Edmund G. Brown Jr., Governor

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## Resources

INFORMATION, ARTICLES & LINKS



Find out more about how climate change in California is relevant to your community

## Cal-Adapt Resources

Cal-Adapt provides a view of how climate change might affect California. Here you can work with visualization tools, access data, browse journal articles, and participate in community sharing to contribute your own knowledge.

### CALIFORNIA CLIMATE STORIES

Rising Temperatures in Agriculture



### ANNOUNCEMENTS

#### Welcome to Cal-Adapt!

2011 June 06

After months of development, this web resource is now open to public use. Within this site you will find a variety of tools and resources that enable you to visualize climate change data throughout California.

[more »](#)

### UNDERSTANDING CLIMATE CHANGE

- What is climate change?
- What causes climate change?
- The Golden State at Risk
- What are the different emission scenarios?
- What are the different global climate models?
- What is California doing about climate change?

### ABOUT CAL-ADAPT

Cal-Adapt is an online resource designed to provide a view of how climate change might affect California at the local level. Here you can work with visualization tools, access data, and participate in community sharing to contribute your own knowledge.

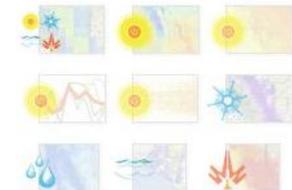
[more »](#)

### FEATURED PUBLICATIONS



2009 California Climate Adaptation Strategy

### CLIMATE TOOLS



## Community

Tools and information to encourage community participation and feedback. Community based features include:

### FEEDBACK

Please let us know your thoughts on the site!

### ASK A CLIMATE EXPERT (COMING SOON)

Cal-Adapt's "Ask an expert" feature will enable users to submit questions and/or vote for previously submitted questions to be answered by a climate expert. Periodically, we will get an expert to provide their answer to the top requested question related to California climate change.

### HISTORIC PHOTO HUNT (COMING SOON)

Cal-Adapt's "Historic Photo Hunt" will give users an opportunity to help scientists monitor changes in the landscape over time.

## Community

PARTICIPATE IN COMMUNITY BASED TOOLS AND ACTIVITIES



Find out how you can share your thoughts and findings, communicate with experts, and help to collect new data



## Example 2



## Climate, Forests and Woodlands Community of Practice

“Objective, research-based and credible information you can use every day to improve your life.”



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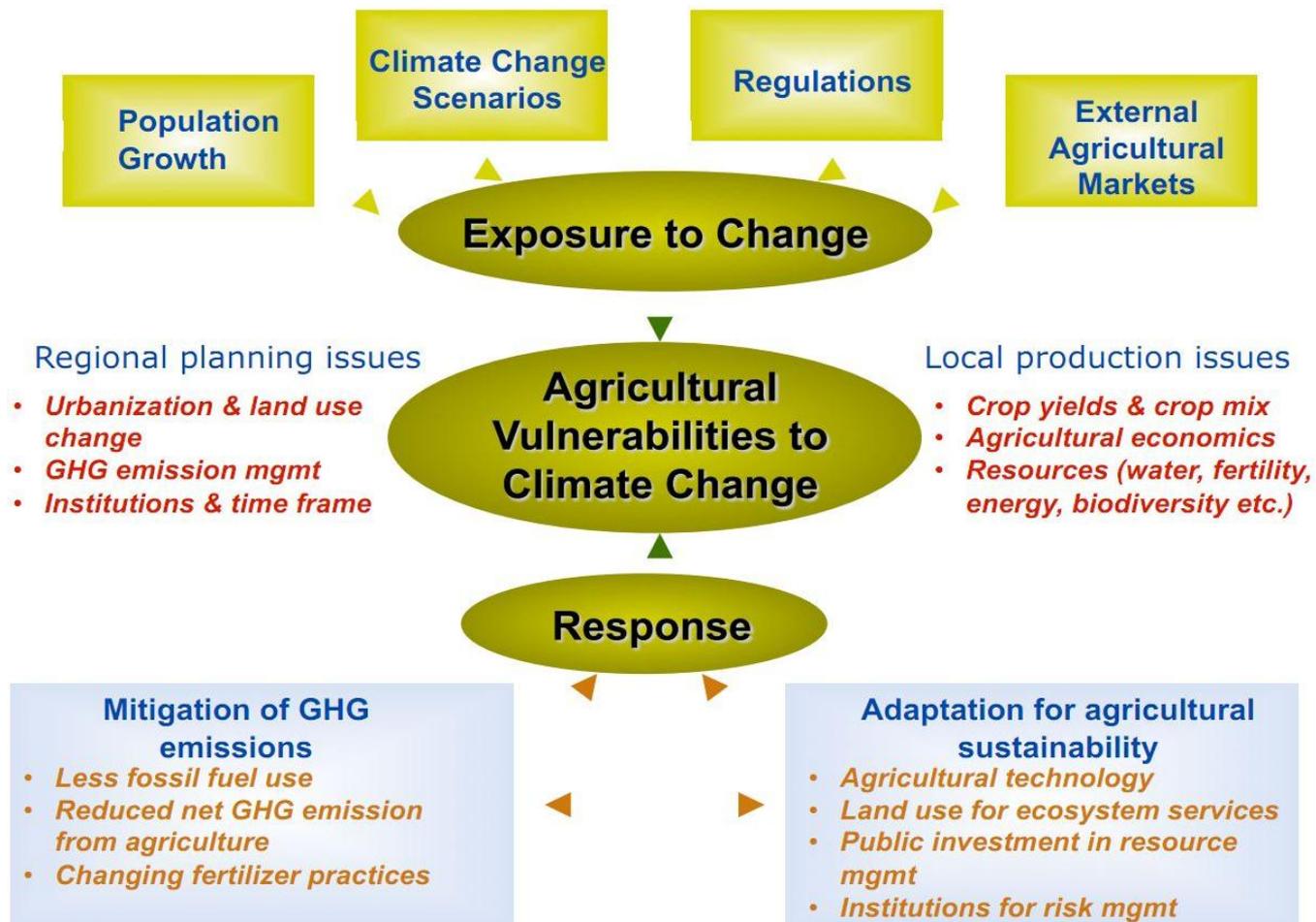
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# Extending current science about climate change to management Agencies in the Lake Tahoe Basin – Susie Kocher – UC Cooperative Extension

- About the Tahoe Basin
- What we know about Climate Change
- Developing Partnerships to address Climate Change
- Local Adaptation to Climate Change



## Example 4



Work by Drs. Louise Jackson and Tom Tomich, UCCE and UC Davis

**Local evaluation and options for mitigation and adaptation: Yolo County, CA**

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Typical local CE event – 2/1/12

## **Sharing Strategies and Opportunities for Agriculture in an Era of Climate Change**

Time: 8:30am – 2:00pm Light breakfast and lunch provided. Free Parking.

Where: Buehler Alumni and Visitor Center, UC Davis

**Hear from local farmers and ranchers about innovative strategies for reducing climate impact while increasing economic viability.**

**Learn about the results of a UC Davis collaborative study on agriculture and climate change in Yolo County and give your feedback.**

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# Climate Change Certainties for Agriculture and us all

- Meeting local and global food demand will require diverse production systems
- Diverse production systems will be key to biological adaptation to climate change, new pests and diseases, and crop adaptations
- The challenges for public policy, resource management and science agencies will grow exponentially and intersect as never before
- Innovation will be key to meeting these challenges.

## Summary

# Impact of Climate Change on Agriculture

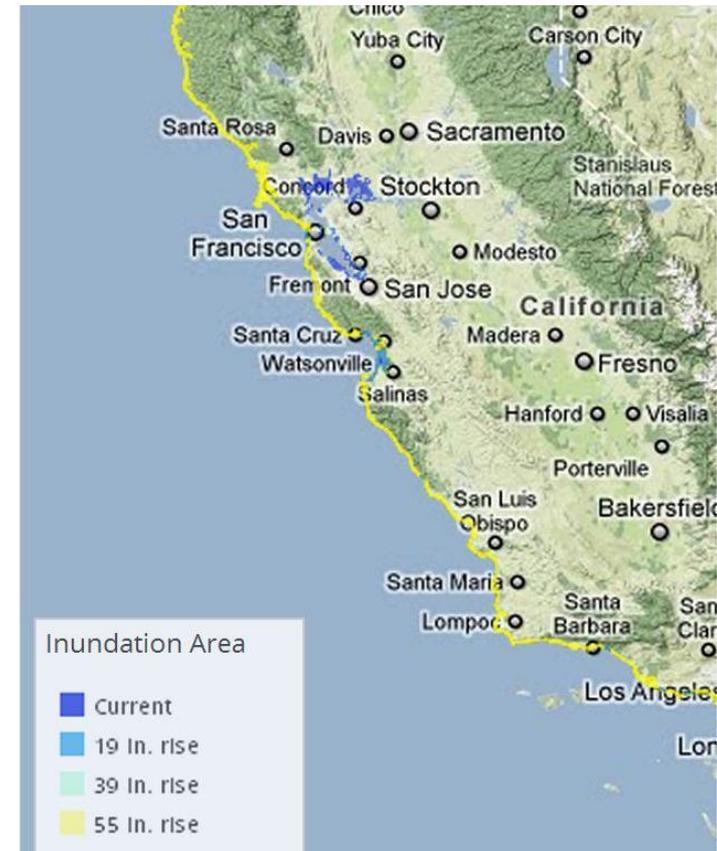
- Global climate change will affect us all
- Agriculture's ability to adapt and be even more productive is critical
- Cooperative Extension is an important part of the solution

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## Sea level rise

Areas vulnerable to a 100-year flood event



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