Temperature

- Heat waves
- Warmer nights

Salvador Dali, *The Persistence of Memory* (1931)
Sea level rise

- Storms +
- High tide +
- El Nino*
Storms & floods

- More rain during storm events*
Droughts

- More time between rain events*
Freshwater

- Decreased snowpack
- Timing of snowmelt
- Increased evaporation*
Wildfires

- Warmer spring temps
- Drier vegetation
- Santa Ana winds*
Public health

- Extreme heat
- Poor air quality
- Wildfires
- Infectious diseases*

Habitats & wildlife

- Habitat range shifts
- Invasives
- Phenological mismatches
- Pests & pathogens
- Habitat loss
  - Tide pools & estuaries
  - Alpine*
HOW WE’RE ADAPTING...
Climate Understanding & Resilience in the River Valley (CURRV)
Scenario planning

Too hot?
Too cold?
Too wet?
Too dry?
Too hot?
Visualizing the Future
CURRV scenarios defined

• Each scenario is a
  – Possible future state of the world

• Plausible
  – Not forecasts or predictions

• No specific time horizon
Sea level rise & riverine flooding
**Changes to the Physical Environment**

**River-Ocean Connection & Water Residence Time**
The river mouth is usually closed, which traps water in the system for long periods of time. This increases the accumulation of nutrients and contaminants in aquatic habitats.

**Flooding, Inundation, & Sedimentation**
Riverine flooding impacts the Valley as water ponds behind the closed river mouth. There is the potential for restructuring of the Valley as storm waters carve new channels and fill others with sediment.

**Surface Water & Groundwater Salinity**
Increased freshwater influence is experienced during mouth closure, which may recharge groundwater supplies.

**Potential Management Challenges**

**Transportation**
Access in the Valley is frequently impaired by sedimentation, standing water, and flooding. This obstructs roads, bridges, trails, and evacuation routes; and leads to a need for increased flood preparedness, especially among emergency responders.

**Cultural & Historical Resources**
High rates of erosion and re-structuring of channels compromise the integrity of historical, cultural, and spiritual sites.

**Changes to the Natural Environment**

**Habitats associated with saltwater** give way to those associated with freshwater, due to ponding behind the closed mouth. Sediment loading outpaces sea level rise and upland habitats increase.

- **Beaches & Sand Dunes**
- **Open Tidal Channels & Mudflats**
- **Salt Marsh**
- **Salt Flats**
- **Fresh-Brackish Marsh**
- **Wetland-Upland Transition**
- **Riparian**
- **Upland**
Uncertainty

Multiple variables

Science

Dialogue

Experience

Uncertainty

Multiple variables
Regional planning
Transferable
TEACHING THE FACTS...
Key messages

• Earth’s climate is changing

• Human activities are responsible

• Effecting our society and world

• Humans can take action to reduce impact
Communication challenges

- Political controversy
- Future problem
- Slow change
- Fear & feeling powerless
- Science communication
Culture of silence

84% of San Diego County residents believe climate change is happening*

Mieke Van Zundert, A family dinner in Auver sur Oise.
Successful communication

- Common values
- Quality of life
- Local
- Personal experiences & stories
Solutions - individual & civic
Community of practice

NNOCCL National Network for Ocean and Climate Change Interpretation
Exploring Climate Change in the Classroom

One of the most pressing issue facing estuaries today is climate change. Climate extensions have been woven throughout the curriculum to help students understand why and how climate change is impacting estuaries, as well as ways students can help reduce the impacts of climate change. A climate extension is added to one activity from each principle for a total of six climate extensions; see all related activities here.
Be creative!
Bibliography

