

North Bay Climate Adaptation: crafting a framework for collaboration

Lisa Micheli, PhD
Pepperwood Foundation

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Laguna Science Symposium Challenge:

What are the climate change risks to our region's watershed resources?

How can we work together to increase the resilience of North Bay ecosystems to climate change?



Observations

The fate of water resources, agriculture and ecosystems in a Mediterranean climate are inextricably linked.

The best scale for climate analysis does not necessarily match the best scale for adaptation implementation.

This challenge demands an unprecedented level of regional collaboration.

Sonoma County is again poised for a critical leadership role by modeling local government capacity to meet the challenge.



MEDITERRANEAN ECOSYSTEMS

Cover only 2.2 percent of Earth's land surface, yet account for 20 percent of all known plant species. Only tropical rainforests have a greater density of plant species.



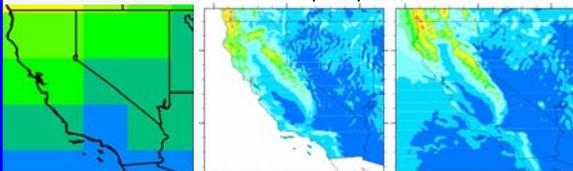
Shaw et al 2009

The Nature Conservancy considers these water-limited ecosystems to be at greater risk from climate change than rainforests.

Climate Scenario Downscaling:

can be cost-effectively achieved at macro-regional scale of "Southwest"

Annual mean precipitation



Global climate model ~300 km

"Observations" 4 km

Downscaled global climate model (9 km)

Duffy 2009



State of CA Response:

2009 CALIFORNIA CLIMATE ADAPTATION STRATEGY DISCUSSION DRAFT

A Report to the Governor of the State of California in Response to Executive Order S-13-2008



Public Review Draft



Comprehensive and interdisciplinary in scope.

Aims only to provide planning guidelines for local governments—not on the ground solutions.

Recommendations for implementation will be at coarse scale and will ignore resources important to us.

Can help to facilitate data sharing and a network of stakeholders.

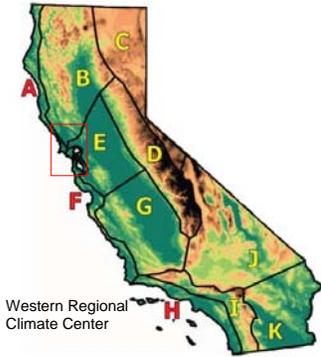
Bay Area Regional Context

The Bay Area is comprised of 4 out of 11 California climate regions

North Bay a potential climate "refuge" due to microclimate diversity and extent of intact habitat

Coastal influence: fog/marine layer greatest uncertainty for climate model predictions

Climatic/hydrology monitoring key to provide "reality check" on model projections!



Nine Bay Area Counties: BAOSC Coarse Filter Analysis - Landscape Units

- 29 Landscape Units, 4 Urban Areas
- Capture diversity and biogeography of vegetation across study area
- Compromise between high resolution cover classification and even coverage across Bay Area
- Provide a means to break down recommendations into geographically coherent units.

The Bay Area as a whole needs to coordinate to leverage resources from Feds and State



Spotted Owl, *Strix occidentalis*

Emerging habitat models will identify opportunities to preserve Bay Area biodiversity.

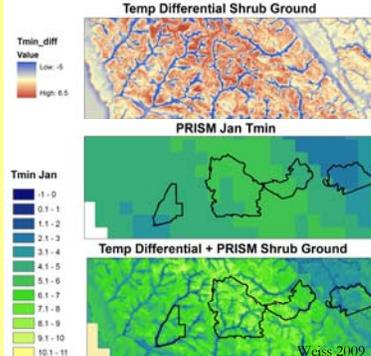
Cal Academy CBDR scale: 11km pixels
USGS next iteration: scale <1km

A SONOMA COUNTY PROTECTED AREAS NETWORK?

Regional plans can provide critical recommendations for individual Counties to be resolved at finer planning scales (e.g. parcels)

Field data can help translate scenarios to an ecologically meaningful scale:

Climate = Topoclimate + Mesoclimate



8-10°C inversion measured with Thermochrons

Extrapolate across the landscape using topography

Lay underneath PRISM

"Reality" at scale of population processes (10-30 m)

Evaluate variability within park parcel, any polygon, at scale at which populations are working (10-30m)

Take Home Message -Local resiliency is quite high once spatial variability factored

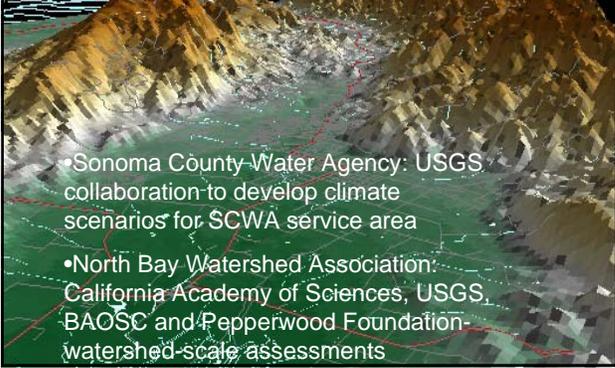
The Watershed Approach is critical to Climate Adaptation



A tool for holistic water and biodiversity resource planning

- Interdisciplinary and incorporates historical perspectives and future scenarios
- Identifies spatial linkages
- Facilitates collective community analysis and action via Watershed Plans

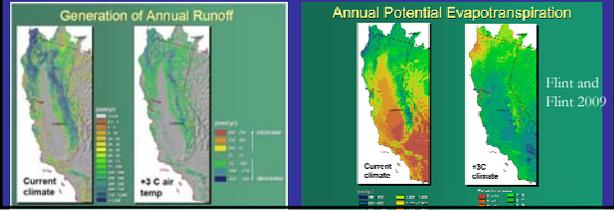
North Bay Watershed Scale Pilot Studies



- Sonoma County Water Agency: USGS collaboration to develop climate scenarios for SCWA service area
- North Bay Watershed Association: California Academy of Sciences, USGS, BAOSC and Pepperwood Foundation watershed-scale assessments

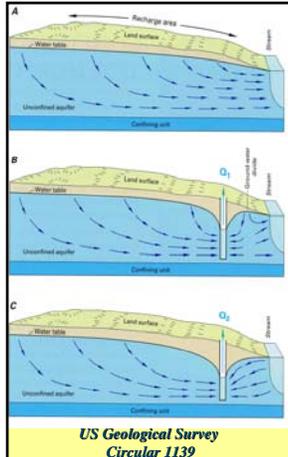
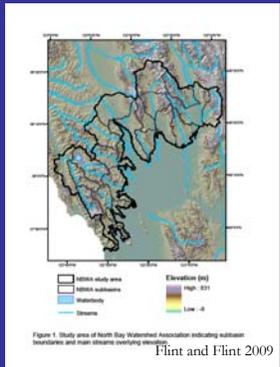
SCWA's Influence of Climate Change on the Hydrology of the Russian R. Basin

- develop downscaled future climate scenarios necessary for hydrologic modeling of the Russian River Water System
- develop and calibrate a regional-scale hydrologic model to provide daily inputs for future climate for the SCWA water management models
- prepare future climate inputs for ground-water models in Sonoma County, Santa Rosa Plain, and Healdsburg.



NBWA's Adapting to Climate Change: "State of the Science" for North Bay Watersheds

- Watershed summaries of hydrologic impacts
- Overlay climate effects with BAOSC landscape units and ecological resources of concern
- Evaluate implications for a range of watershed project types



Related Work: Sonoma County Groundwater Planning

- People and ecosystems need a sustainable water supply
- Surface Water + groundwater = one resource
- Join the voluntary water-table monitoring program!



Making the Global Local



Climate adaptation requires both "downscaling" scientific model projections and "zooming out" conservation plans to a regional scale. Implementation is always local.

An ad-hoc regional coalition of scientists and resource managers is coalescing to form a North Bay Climate Adaptation Response Team...as a first step we helped to put on this conference!



SOLUTIONS are in the hands of local citizens and governments

Given risks to water resources and biodiversity, continued efforts to *mitigate* (reduce) greenhouse gases are worth it!

Addressing risks requires a North Bay regional approach to analysis requiring collaboration across disciplines and scales.

Counties and Cities need to develop and implement adaptive measures: a point of coordination for key SoCo players: SCWA, SCAPOSD, PRMD, SCDTPW, cities, NGOs, and ??? to define an adaptation strategy?

We must monitor real-time climate change to effectively refine adaptation responses over time!



Thank you!
lmicheli@pepperwoodpreserve.org

