Regional Topics Panel

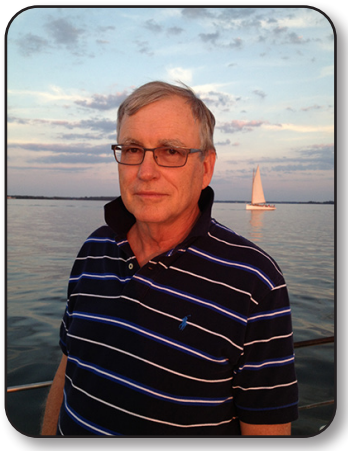
Panel Moderator

José A. Rivera, University of New Mexico

José A. Rivera is a Professor of Planning at the School of Architecture and Planning and a Research Scholar at the Center for Regional Studies at the University of New Mexico. His teaching fields include rural community development, public policy analysis, and water resources management. His research interests include water management institutions, comparative irrigation governance systems, social and political organization of irrigation, and mutual aid organizations in traditional cultures. José's past and current fieldwork on these topics includes the southern provinces of Spain, the coastal valleys of Peru, Baja California Sur in Mexico, Ilocos Norte in the Philippines, and the American Southwest. In 1991 he co-authored a book titled Rural Environmental Planning for Sustainable Communities, followed by a book titled Acequia Culture: Water, Land, and Community in the Southwest (1998). José has also served as an expert witness in a number of water rights transfer applications in the State of New Mexico, qualified to present testimony in the areas of economic development, public administration, and acequia culture.

Mountain Hydrology in a Changing Climate

John L. Wilson, New Mexico Tech



John L. Wilson is Professor Emeritus of Hydrology and Research Professor of Hydrology, in the Department of Earth and Environmental Science at the New Mexico Institute of Mining and Technology in Socorro, New Mexico. He has a BS from Georgia Institute of Technology, and MS, CE and PhD degrees from the Massachusetts Institute of Technology. He is a current or former member of many professional society, university and government science advisory panels and committees, including the National Science Foundation's (NSF) Advisory Committees for Geoscience, and for Environmental Research and Education, the National Research Council's Committee on Hydrologic Science, and the American Geophysical Union's (AGU) Committee on Fellows and the AGU Council and Board of Directors. He is former Chair of the Board of Directors of the Consortium of Universities for the Advancement of Hydrologic Science, Inc. (CUAHSI), and is Past-President of AGU's 6,000 member Hydrology Section. Wilson is a Fellow of AGU and of the Geological Society of America (GSA), and a former Darcy Lecturer for the National Ground Water Association. He holds the O.E. Meinzer Award from GSA and the Hydrologic Science Award from AGU, awards given once a year for distinguished research in the fields of hydrogeology and hydrology, respectively. In his own work, which is related mostly to groundwater hydrology, Wilson's research focuses on contaminant source identification, karst hydrology, stream-aquifer interaction, including the hyporheic zone, and mountainous-watershed hydrology. This last topic has taken him into related fields stretching from geostatistical precipitation estimation, through land-surface energy balance modeling, to remote sensing.

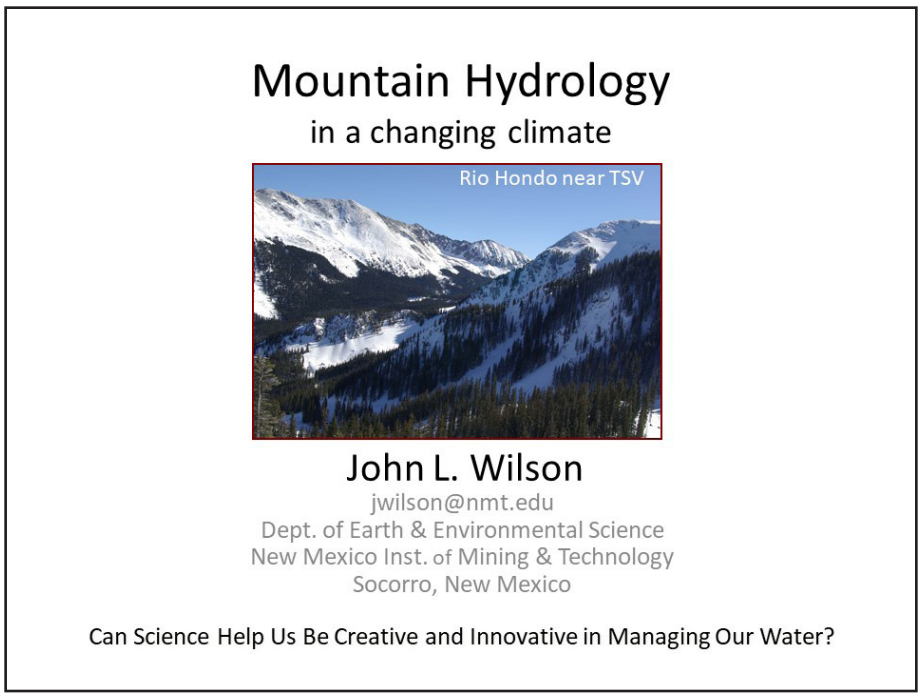


Figure 1. Introduction.

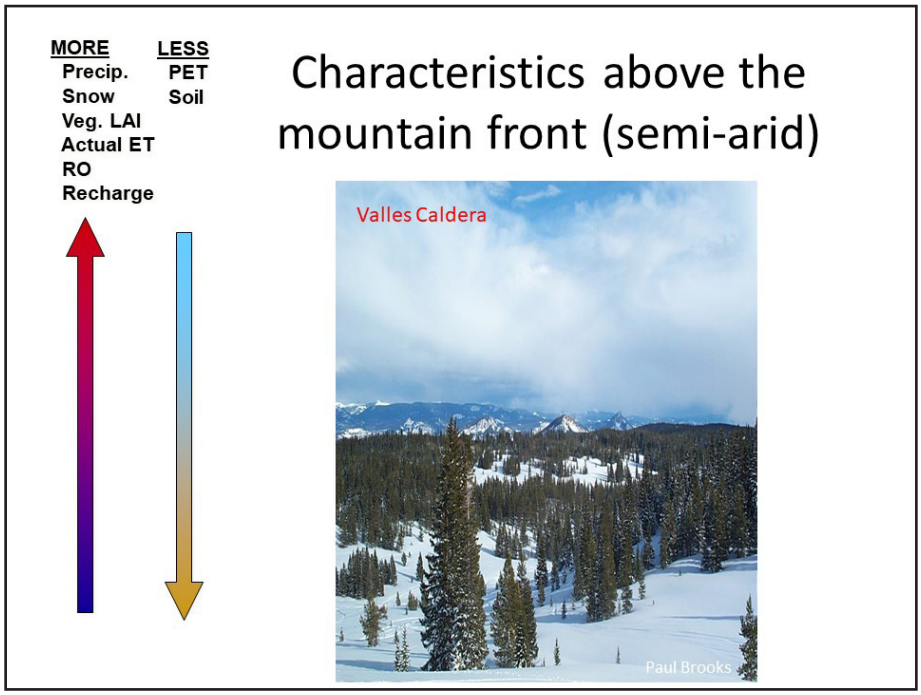


Figure 2. Characteristics above the semi-arid mountain front.

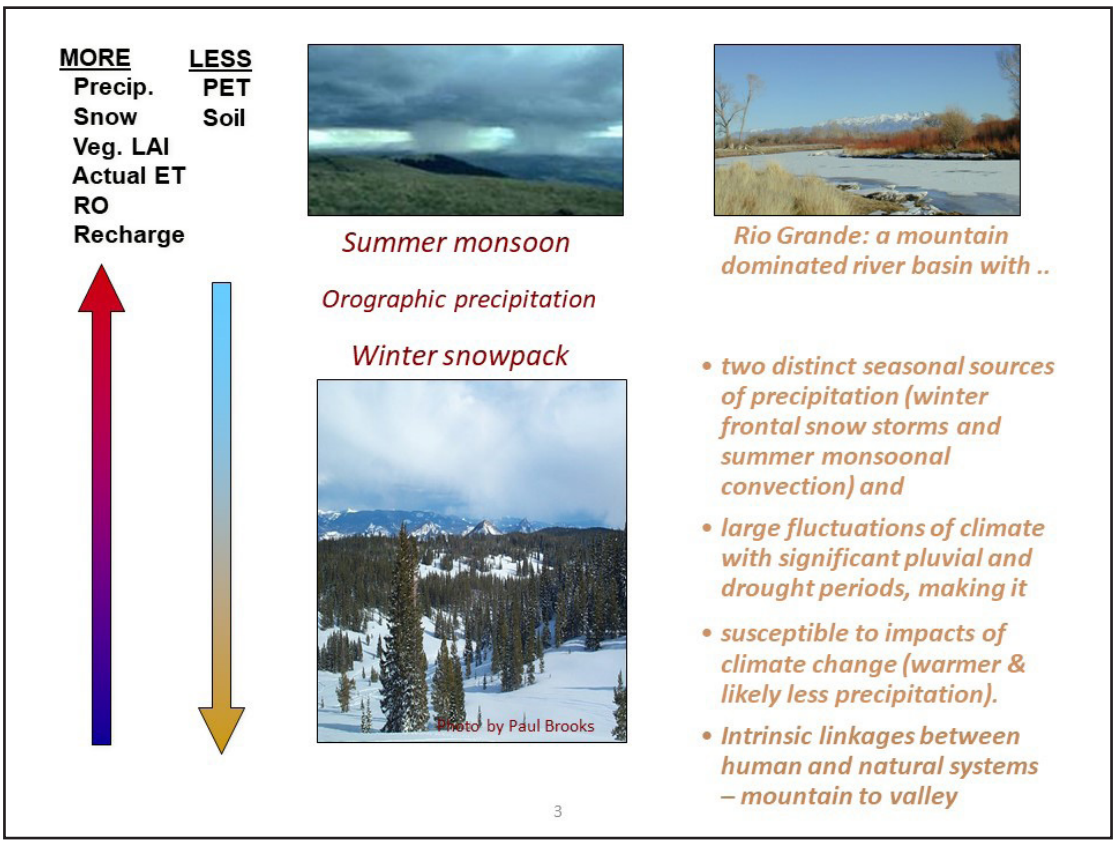


Figure 3. Orographic precipitation.

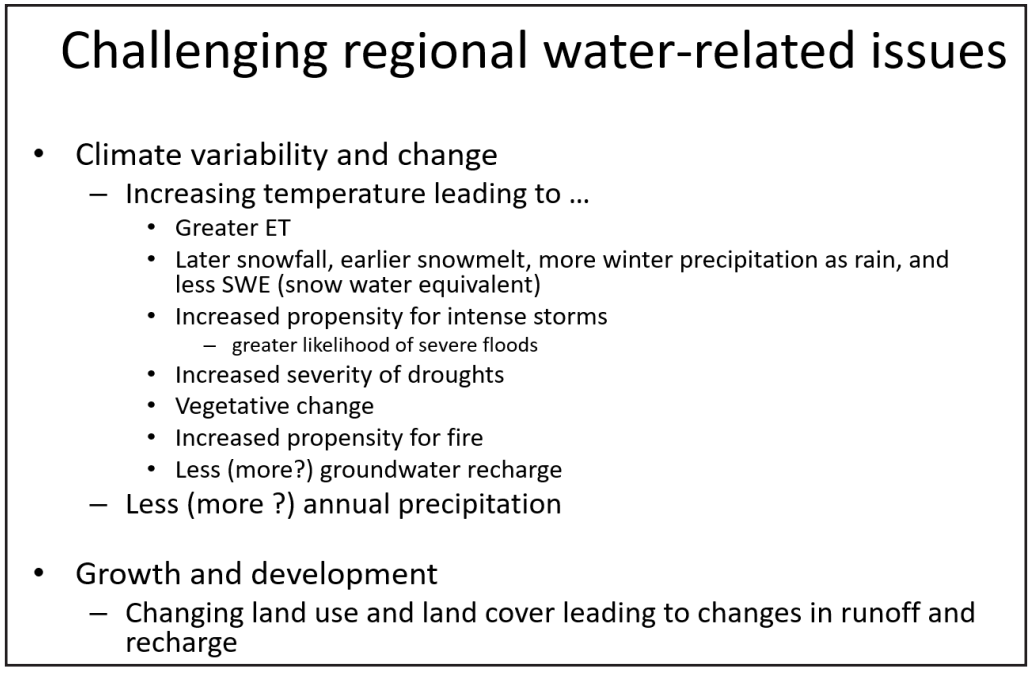


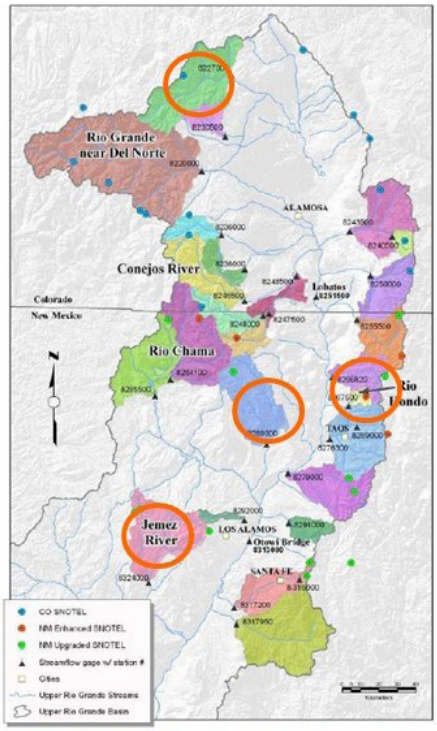
Figure 4. Challenging regional water-related issues.

Rio Grande Mountain Watershed Field Sites

- Rio Hondo near Taos
- El Rito, a Rio Chama tributary
- Valles Caldera National Preserve and the Jemez River Basin
  - Also site of an NSF CZO
- Saguache Creek in Colorado

Each a ~1,000 km^2 intensively studied watershed

Rio Hondo and El Rito have downstream acequia systems



Map of Rio Grande in northern NM and southern Colorado

Figure 5. Rio Grande mountain watershed field sites.

Questions:

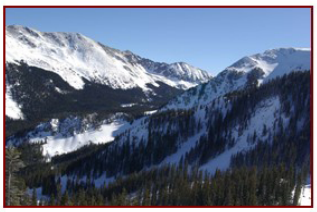
- How are the deeper mechanisms of recharge within the mountain block connected, if at all, to the shallower ground and surface water hydrology of the downstream acequia irrigation valley?
- How will these processes be affected by future land use/cover or climate changes?
- How are these mountain processes coupled to downstream water uses, e.g., acequias

Example Location:

- Rio Hondo near Taos, NM

Observation and modeling

- Water chemistry and isotopes (precipitation, snow, wells, springs, streams), precipitation, stream flow
- Modeling of land surface processes and 3D modeling of groundwater flow and age



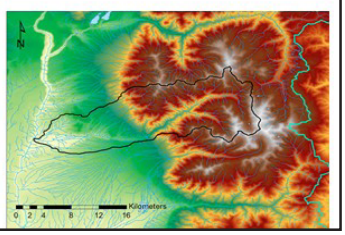


Figure 6. Mechanisms of recharge images.

Figure 7. Future land or climate change images.

Figure 8. Mountain processes to downstream water-use images.

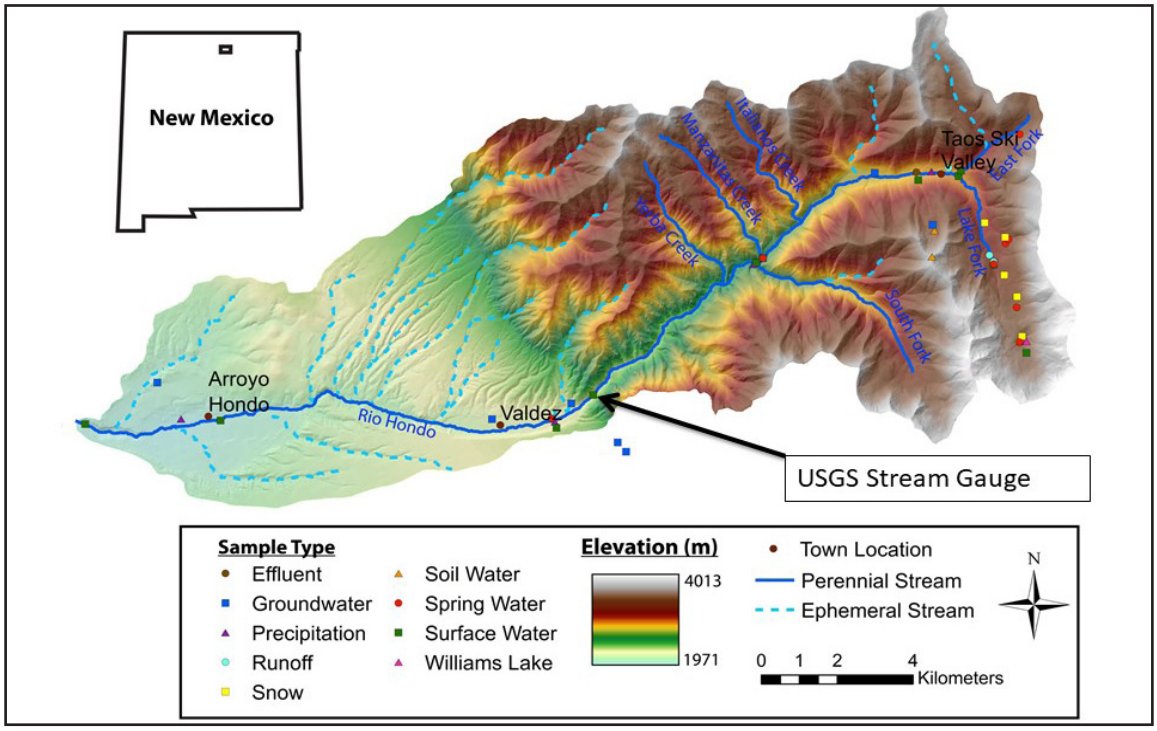


Figure 9. New Mexico USGS Stream Gauge Map.

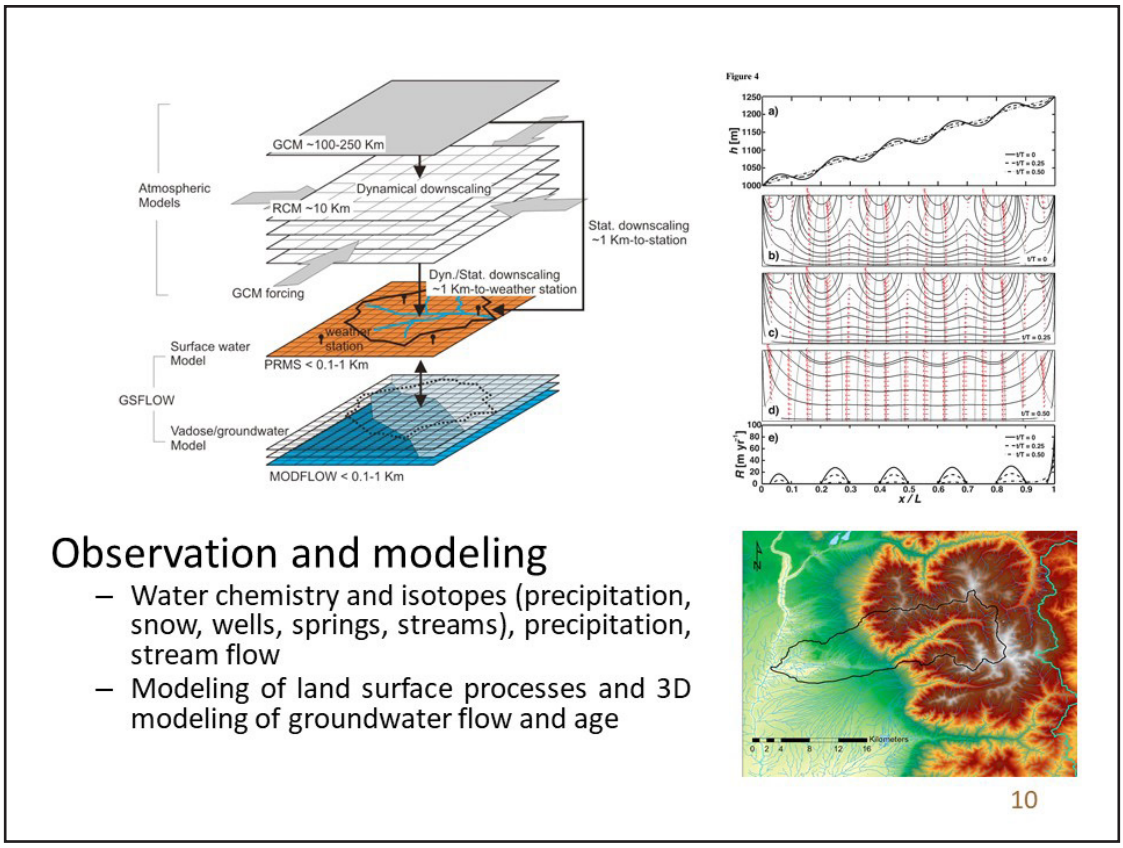


Figure 10. Observation and modeling.

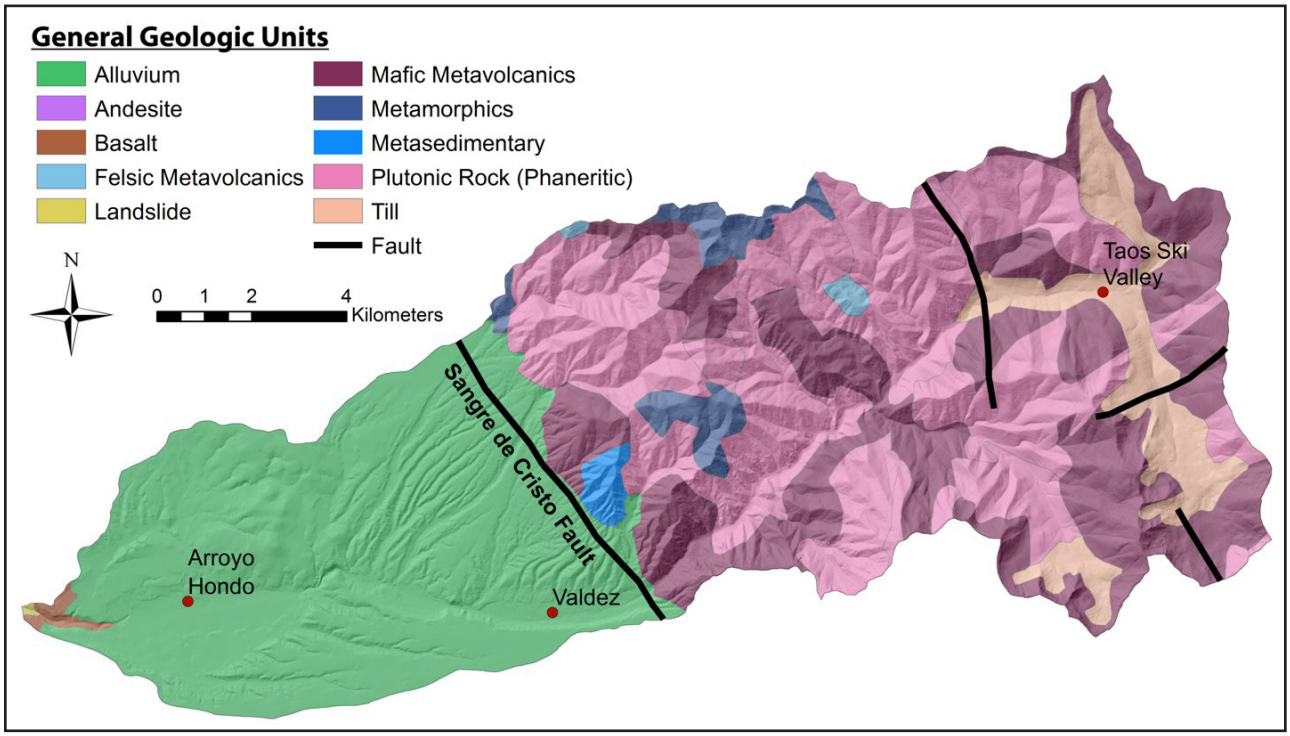


Figure 11. Sangre de Cristo Fault Map.

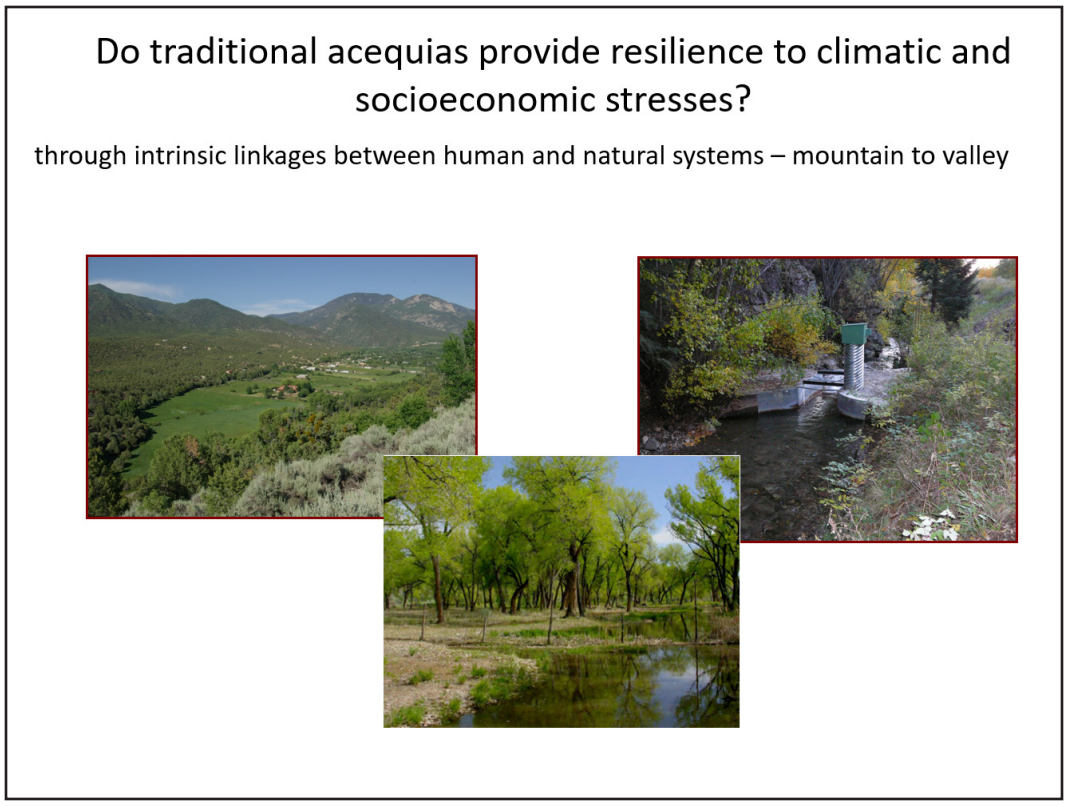


Figure 12. Acequias possibly provide resilience to climatic and socioeconomic stresses.

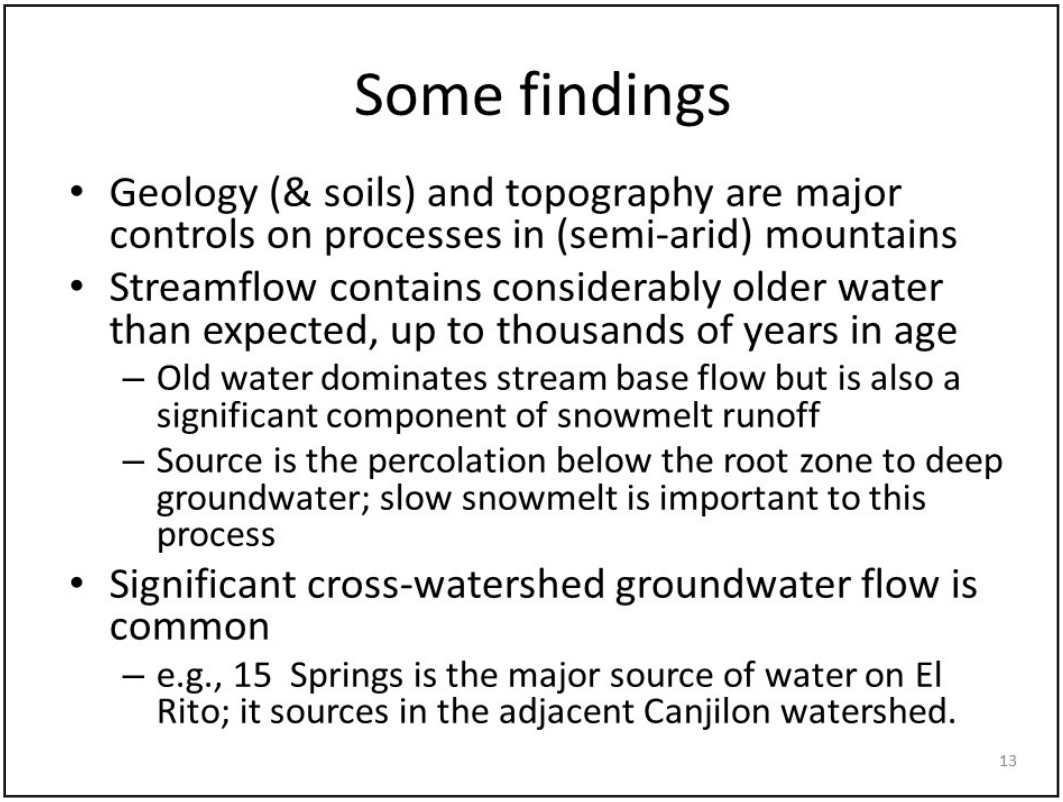


Figure 13. Findings.

NM Land Grants (Mercedes) as the Cradle of Democracy

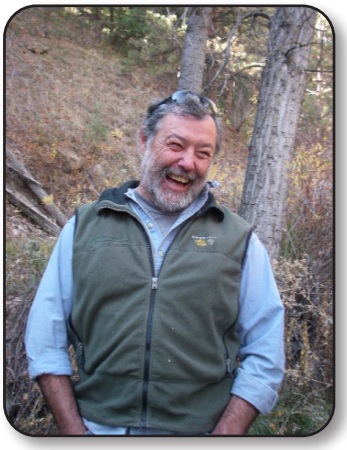
David F. Arguello, Acequia Commissioner
and Land Grant Official

David Fermin Arguello earned a BA in Sociology from UNM, a MSW and PhD from University of Washington. He taught social welfare policy, research, data collection and analysis in Schools of Social Work at the University of Utah, San Jose State University and New Mexico Highlands University. He is now retired and lives in Valdez, NM at his ancestral farm and continues to be active in health, water, and land issues. He belongs to the American Red Cross, National Alliance for Mental Illness, has been on the Commission of two Acequias, is president of the Arroyo Hondo Arriba Land Grant, and vice president of the NM Land Grant Consejo.

Editor's Note: The presenter did not have PowerPoint slides to accompany their remarks, and a transcription of their talk is not available.

Save Our Snow: Climate Change and Ski Areas

Mark Williams, University of Colorado, Boulder



Mark Williams is a Fellow at the Institute of Arctic and Alpine Research and Professor of Geography at the University of Colorado, Boulder. Mark is on the core faculty of Environmental Studies. He is also on the faculty of the Hydrology Program in Geography and his classes can be used to satisfy the Hydrology Certification Program in Geography. His research interest is the hydrology and biogeochemistry of mountain areas, including snow hydrology, glaciology, water quality, surface/groundwater interactions, acid mine drainage, avalanche dynamics, and the water/energy nexus. Mark has current or past research activities in many of the mountain ranges throughout the world, including the Rocky Mountains, Sierra Nevada of California, the Tien Shan and Qilian Shan of China, Andes of South America, European Alps, and the Himalayas. Mark received his PhD in Biological Sciences with an emphasis in ecology from the University of California at Santa Barbara in 1991. He is a Senior Fulbright Scholar, in residence in Ecuador in 1999 and in Nepal in 2013-2014. He was elected a Fellow of the American Geophysical Union in 2012, for "outstanding research that has made fundamental advances in mountain hydrology and biogeochemistry." Mark was the long-time PI of the Niwot Ridge Long Term Ecological Research (LTER) Program, the only alpine LTER program. He is the Co-I on a $7,400,000 grant from USAID to study disappearing Himalayan glaciers and water security for High Asia. He is also a Co-I on a $12,000,000 grant from NSF to study economic and environmental trade-offs from unconventional oil and gas extraction. Before becoming an academic, Mark was the owner and general manager of a backcountry ski lodge and also a certified avalanche instructor. He draws on this varied background to talk to us about climate change and skiing.

Figure 1. Introduction.

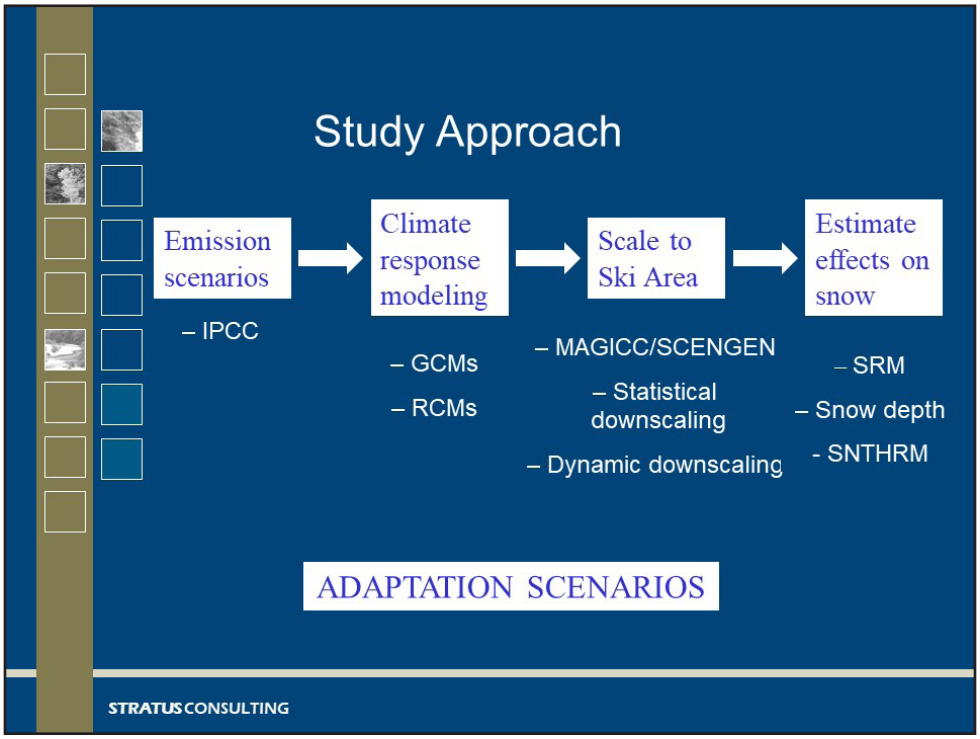


Figure 2. Approach to the snow study.

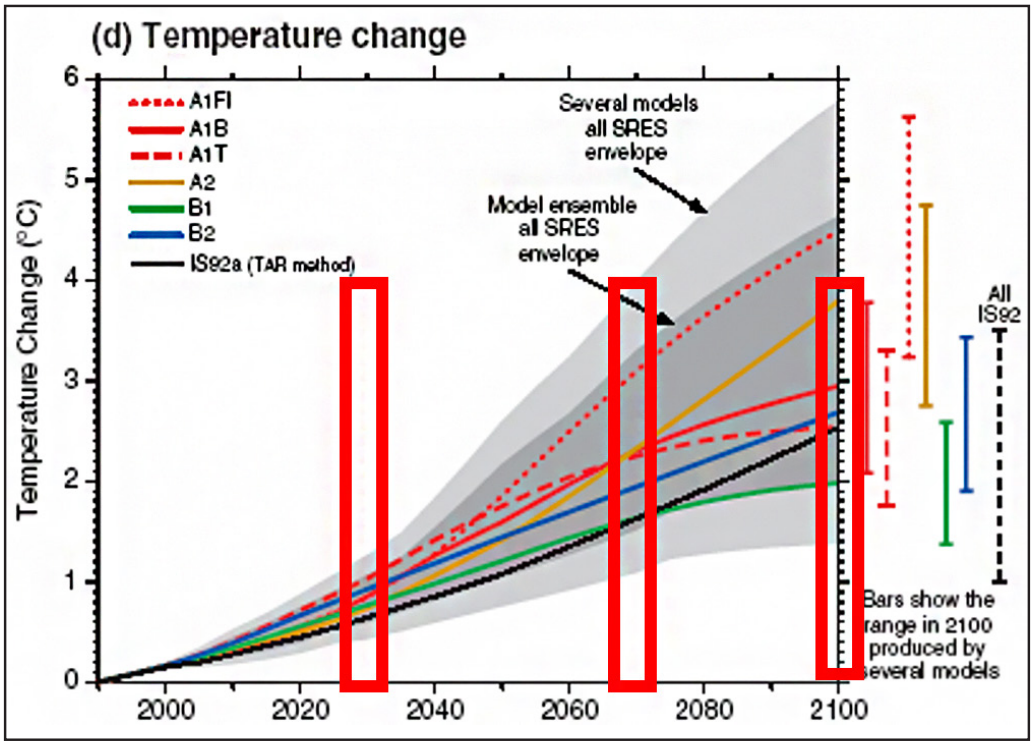


Figure 3. Rising CO_2 will lead to accelerated rise in air temperature.

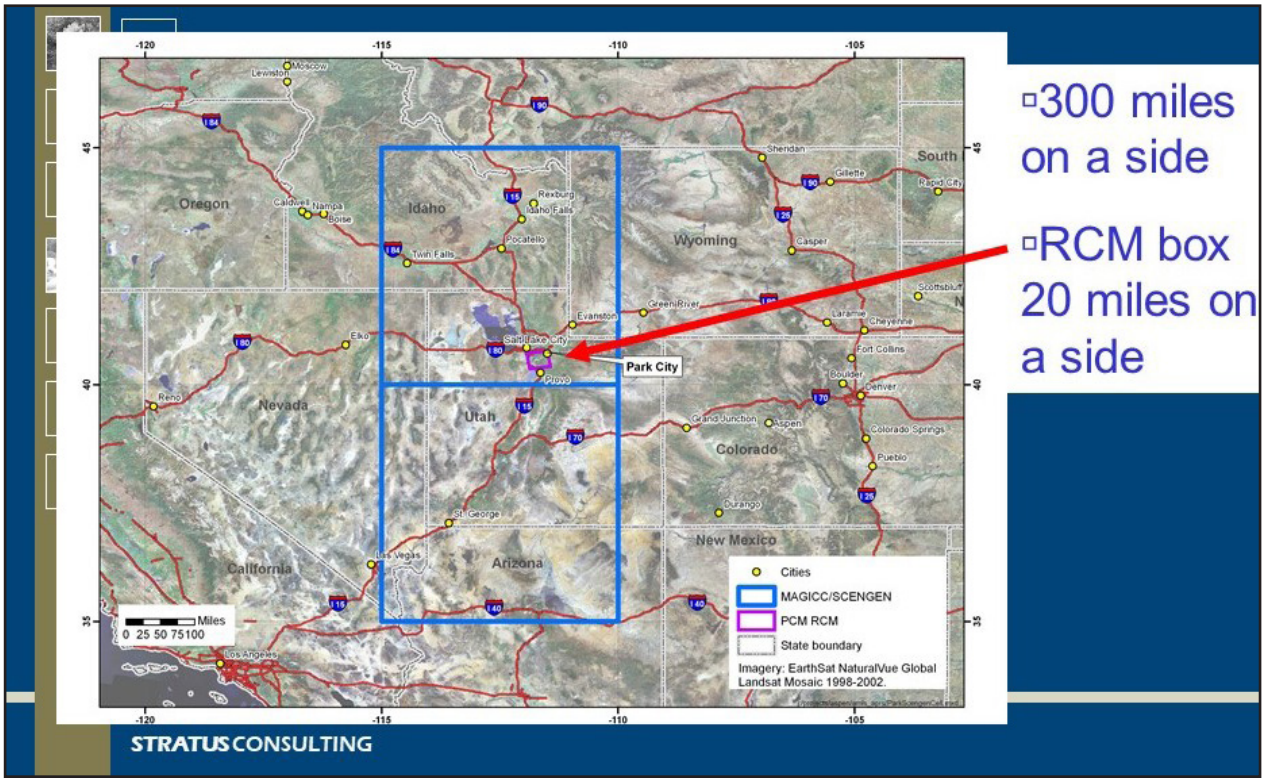


Figure 4. 5x5 grid boxes near Park City.

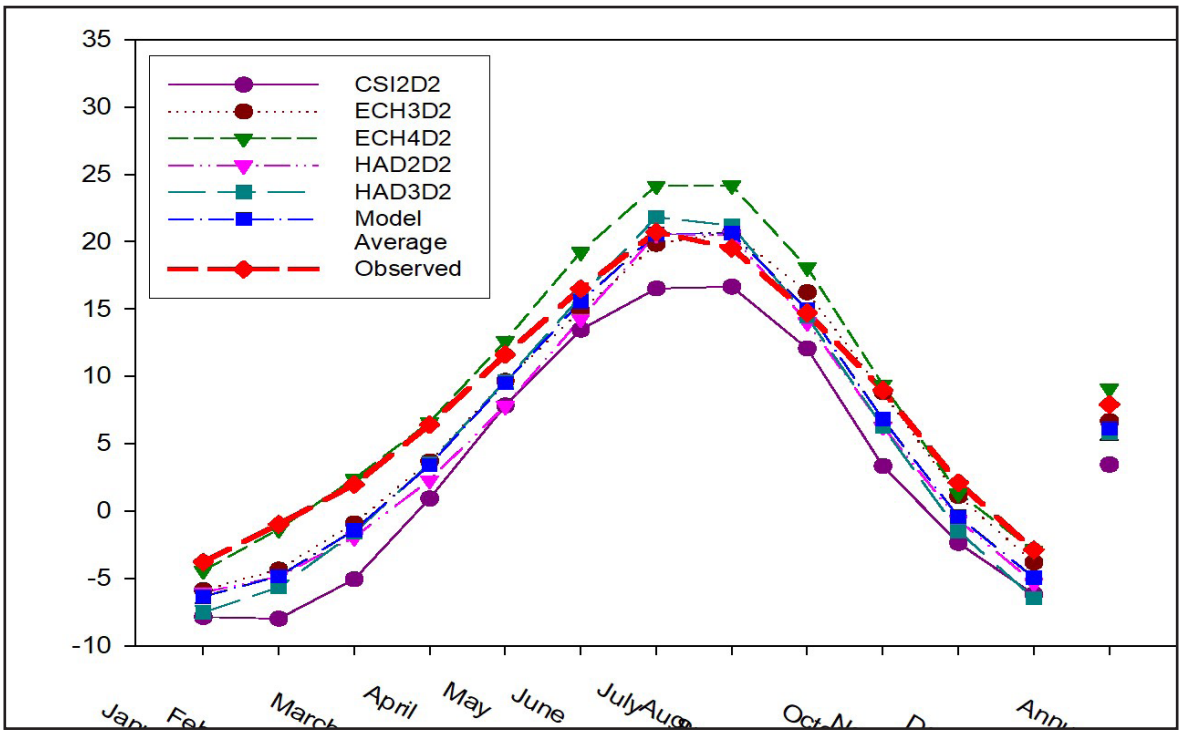


Figure 5. Model vs. observed current (2000) temperatures.

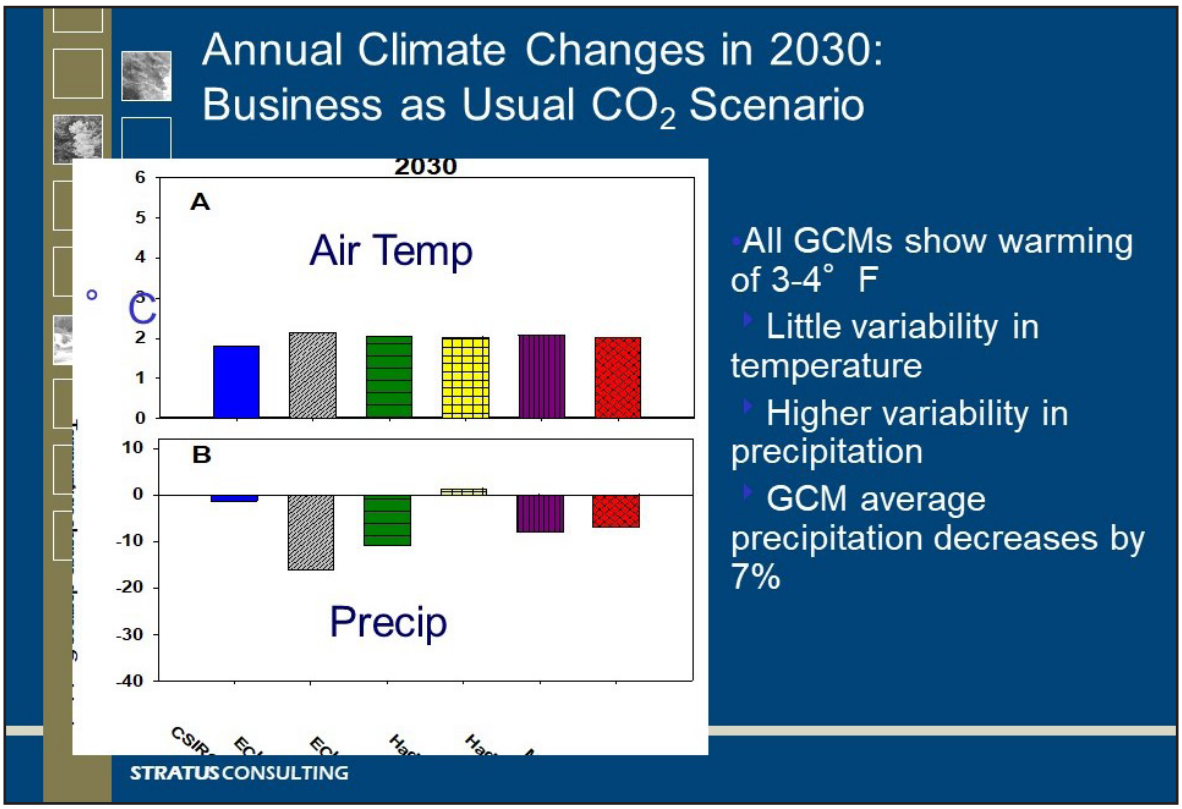


Figure 6. Annual climate changes in 2030 in "business as usual CO_2 scenario."

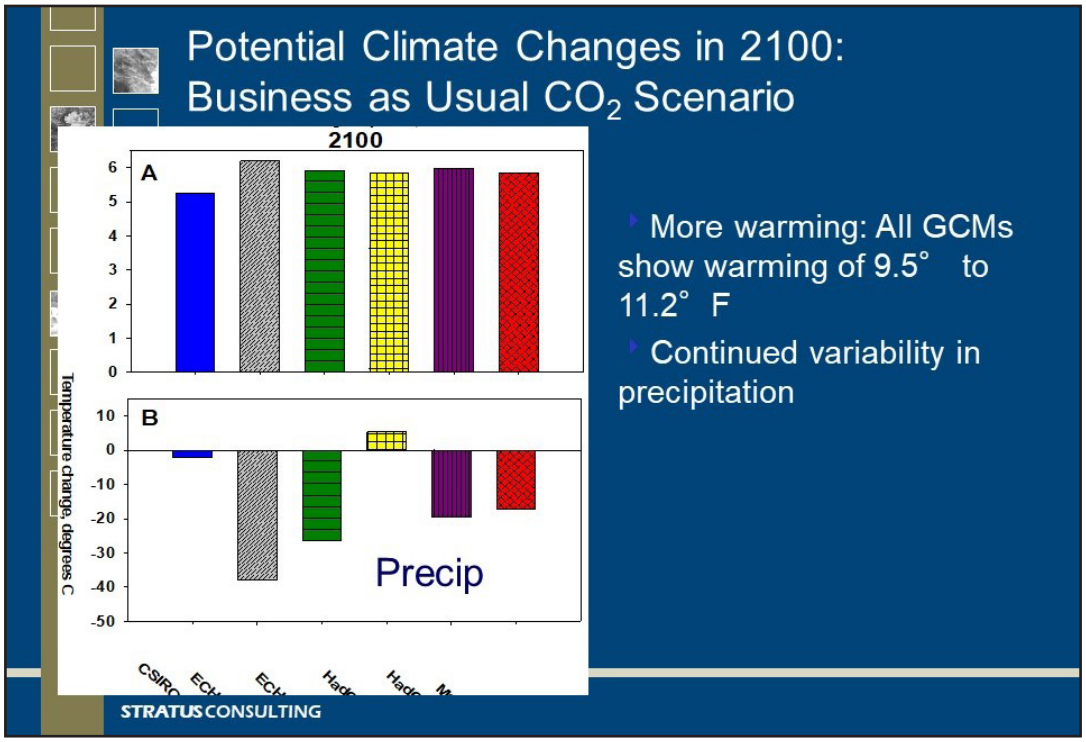


Figure 7. Potential climate changes in 2100.

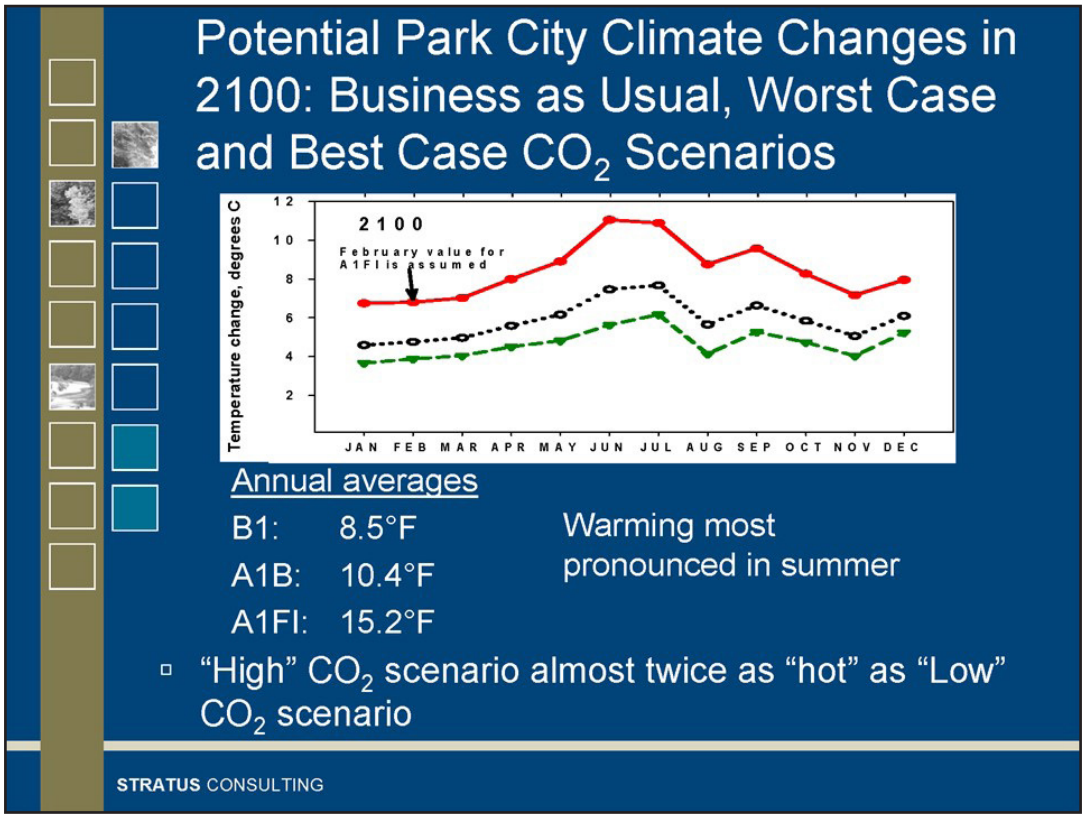


Figure 8. Potential Park City climate changes in 2100: various scenarios.

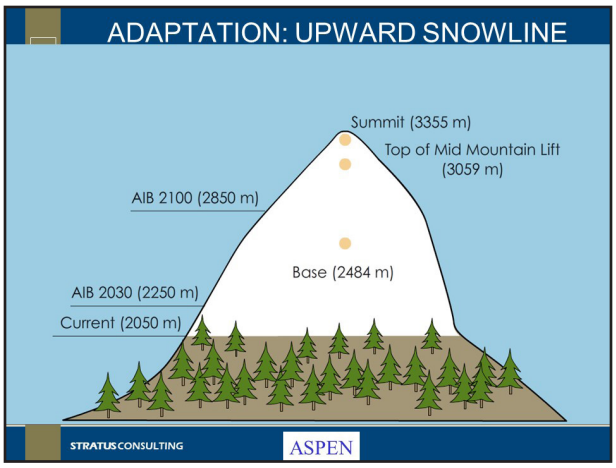


Figure 9. Adapting to the upward changing snowline.

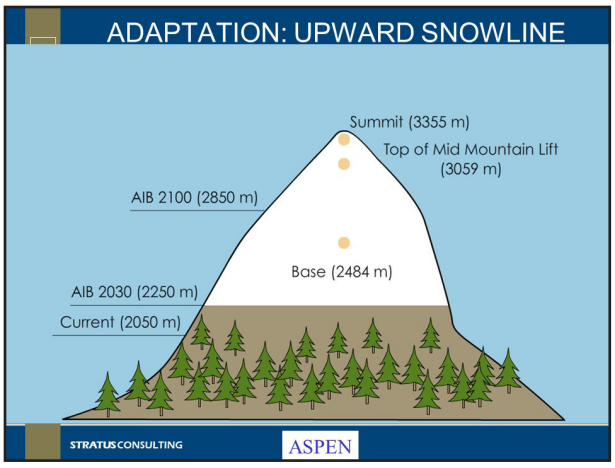


Figure 10. Adapting to the upward changing snowline (cont.).

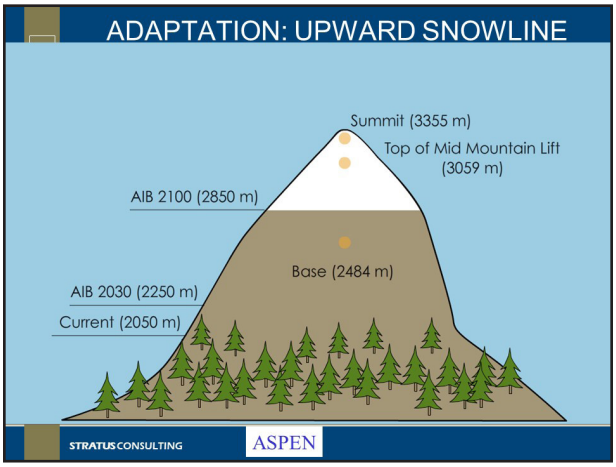


Figure 11. Adapting to the upward changing snowline (cont.).

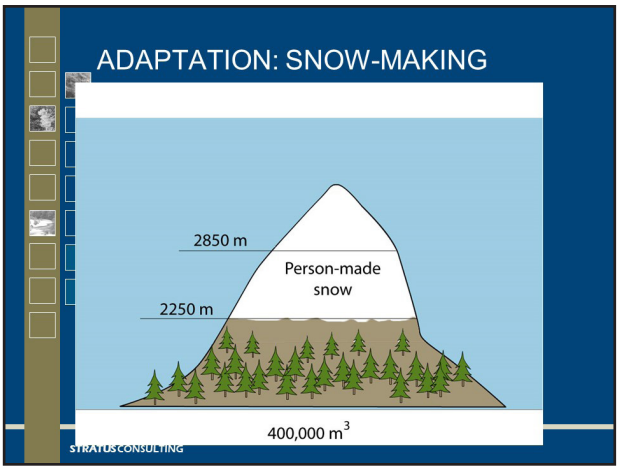


Figure 12. Making snow to compensate for the upward changing snowline.

Figure 13. Businesses adapt to compensate for the upward changing snowline.

Figure 14. How much difference can we make to compensate for the upward changing snowline?

Figure 15. Blog post screenshot.