

## Climate and Tourism on the Colorado Plateau: A Workshop Summary

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*This article is a summary of a workshop on Climate and Tourism co-hosted by WWA, Center for Sustainable Tourism in Leeds School of Business at the University of Colorado, and the National Atmospheric Research Center (NCAR) on January 23-24, 2007 in Boulder, Colorado.*

In the Colorado Plateau (Arizona, Colorado, New Mexico, and Utah), skiing, rafting, fishing, biking, and other outdoor activities bring a large portion of each state's annual revenue. Because climate conditions play a primary role in industry success and long-term viability, these industries are especially vulnerable to climate variability and change. The Climate and Tourism Workshop examined how climate influences daily operations, seasonal revenue, and long-term business sustainability on the Colorado Plateau. Thirty participants ranging from Arizona Golf Association, Vail Resorts, Colorado River Water Conservation District, State Parks, and others gathered at this two-day workshop conducted in a participant-driven, open discussion format. Workshop goals included: communicating climate information to tourism industry professionals, identifying impacts of climate variability and change on tourism operations, exploring potential adaptation and mitigation strategies to increase industry viability, and pinpointing the role of the scientific community in helping industry professionals better manage the effects of climate on business. The latter three topics are summarized in this article.

### Impacts of Climate Variability and Change on the Tourism Economy

Roger Pulwarty of NOAA emphasized that the "goal of this workshop is to distinguish how seasonal climate variability as well as long-term changes in climate impact Colorado Plateau-based tourism." Climate experts began the workshop by presenting climate trends on the Colorado Plateau: observations show a 2°C increase in temperatures, a decline in snowpack, earlier timing of spring snowmelt, and a decrease in late season streamflow volumes.

Participants then discussed how climate variability affects tourism businesses, local economies, and tourist travel behavior. Participants agreed that unfavorable climate conditions such as below average snowpack and streamflows or above average rainfall, affect seasonal revenue and compel businesses to shorten the traditional profit-making season. For example, prolonged periods of rainfall negatively influences tourist willingness to go whitewater rafting, camping, or golfing. And historically, below average snowpack and streamflows lowers revenue generated by snow and water based recreation industries in comparison to wet years. So, considering the impact that seasonal climate vari-



**Figure 14a.** Vail Mountain, Gore Range, Colorado. Warmer temperatures tied to climate change decreases snowpack, affecting seasonal revenue for ski resorts in the West.

ability already has on tourism, a continued decrease in snowpack and streamflow volumes attributed to global warming threatens the long-term livelihood of the tourist industry. Tourism brings a large portion of the annual revenue to towns like Moab, Utah, Taos, New Mexico, Sedona, Arizona, and Telluride, Colorado, who all struggle to maintain stable business activity throughout the year. Author and journalist Allen Best suggested that if tourist visitations decline due to unfavorable climate conditions, these tourist-based communities could increasingly rely on other areas of economic growth, such as natural resource extraction, to offset economic losses. Finally, participants observed that negative public perceptions of climate conditions in destination locations are just as important as the actual conditions themselves. For instance, in the drought year of 2002, the declaration by then Governor Owens that the "entire state is in flames," led to immediate visitor cancellations in many tourism sectors across Colorado—even areas miles away from wildfires, according to Mike Hayes from the National Drought Mitigation Center (NDMC).

### Adaptation & Mitigation Strategies

Discussions identified six industry and community-wide adaptive management and mitigation strategies that could offset current and potential effects of increased climate variability





**Figure 14b.** Whitewater rafting on the Arkansas River in Colorado. With water availability already a concern on the Colorado River, increased climate variability and change might decrease the water available for recreation.

and change. 1) Participants support the creation of an improved early warning drought system, which would give businesses additional time to adjust operations and plan for pending climate conditions. 2) Operational adaptations can offset below-average snowpack or streamflow condition by continuing to expand snowmaking operations at ski resorts and using smaller, lighter boats for whitewater rafting. 3) Industry flexibility and diversity in local economies help businesses adapt to climate variability by offering “off-season” alternative activities such as climbing, jeep tours, or road biking that take advantage of warm and dry conditions. 4) Industries can decrease their contribution to global warming by using “green” innovations, including wind power, energy efficient fuel sources, or water-efficient technologies. 5) Stronger partnerships between researchers, businesses, and local government are important to identify information gaps, and potential research collaborations. 6) Working in close collaboration with the media and developing effective marketing campaigns is important in communicating accurate climate conditions to the general public.

### The Role of the Scientific Community

Workshop participants also identified opportunities for scientific and business collaborations. First, better characterization of certainties and uncertainties in climate variability and change projections would be useful to the tourism industry for long-term planning purposes. Ed Gowan, president of the Arizona Golf Association, recommended using probability confidence intervals for regional temperature and precipitation projections. For example, instead of a projection of 2-5° C increase in temperature over fifty years, a better hypothetical framing would be, “2° C increase is 60-80% likely, a 3° C increase is 40-60% likely, etc.”

Second, participants agreed that development of tourism-climate indices and corresponding threshold values could be poten-

tially useful in pinpointing at-risk industry practices. A Tourism Climatic Index (TCI) (Mieczkowski, 1985), is a quantitative evaluation of climate for the purpose of general tourism activity (e.g., shopping, sightseeing) based on the notion of ‘human comfort.’ Calculation of TCI involves combinations of monthly averages of climate variables, including daily temperature, relative humidity, precipitation, sunshine, and wind. The “climate suitability” for the location of a particular tourism activity is then rated on a scale from ‘ideal’ to ‘impossible.’

Finally, snowpack conditions, streamflows, and precipitation and temperature forecasts are used in every-day operations, but this information is currently scattered among multiple sources and it is difficult to assimilate or interpret in its current format. Therefore, participants would like access to a clearinghouse of current climate information catered towards tourism industry operations because better communication and characterization of climate information would greatly assist industry professionals in every-day operations and long-term planning purposes.

Participants wrapped up the two-day interchange by agreeing that the partnerships formed at the workshop are important in ensuring tourism industry adaptability on the Colorado Plateau. For more information about the workshop, including workshop presentations and related academic literature, visit the WWA “Climate and Tourism Workshop” webpage (see On the Web box).

### Update: U.S. Senate Hearing on Climate and Tourism

Recently, the United States Senate Committee on Environment and Public Works hosted a hearing on, “The Issue of the Potential Impacts of Global Warming on Recreation and the Recreation Industry” on May 24, 2007, led by Senator Barbara Boxer (D-CA). In a statement by Senator Boxer, she recognized that, “global warming can have a profound and negative impact on our outdoor recreation opportunities and businesses.” For more information on this hearing, see On the Web box.

### Sources

Mieczkowski, Z. (1985). “The Tourism Climatic Index: A Method of Evaluating World Climates for Tourism.” *Canadian Geographer*, 29 (3): 220-233.

### On the Web

- WWA “Climate and Tourism Workshop” webpage, available at <http://wwa.colorado.edu/outreach/climatetourworkshop.html>.
- U.S. Senate Committee on Environment and Public Works, available at <http://epw.senate.gov/public/index.cfm?FuseAction=Home.Home>.

