Alaska Climate Teleconferences
Hosted by the Alaska Center for Climate Assessment and Policy

CLIMATE CHANGE AND TOURISM IN ALASKA
John Walsh, University of Alaska
Tuesday, February 10, 2009; 10:00-11:00AM (ADT)

SUMMARY
Written by Brook Gamble

We had over 40 participants, including representatives from the Aircraft Pilots Association, Alaska Conservation Solutions, Alaska Pacific River Forecasting Center, Alaska Railroad, Alaska Travel Industry Association, Arctic Region Super Computing Center, Fairbanks Convention and Visitors Bureau, Fairbanks Channel 13 News, Alaska Department of Transportation, Coastal Engineering, East Carolina University, Fairbanks Convention and Visitors Bureau, Fairbanks Northstar Borough Assembly, Bridgewater Hotel, NANA Regional Corporation Inc., National Park Service, National Weather Service, Natural Habitat Adventures, Fairbanks Daily News Miner, NOAA Coastal Services Center, NOAA National Climactic Data Center, NOAA's National Weather Service, Princess Cruises, Alaska Department of Fish and Game.

PRESENTATION AND PODCAST
The teleconference presentation is available as a .pdf file on the ACCAP Climate Teleconference Website under “Archive of Past Conferences”:
http://www.uaf.edu/accap/teleconference.htm

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Supported by ACCAP and NOAA data from the National Climate Data Center

There are at least two ways in which climate affects tourism demand:

1) Climate on landscapes and ecosystems: if climate change causes landscapes to change in a way that affects demand. For example, if wildlife migrates or if glaciers disappear, demand for tourism will change.

2) Seasonal cycles of weather (what this research/talk focuses on): the weather that tourists experience at a certain site.

The caveat: tourism is clearly affected by other factors that can potentially swamp weather: cost of fuel, state of the economy, etc.

Climate is usually presented in term of averages for a certain time period (week, month year etc) and this information may obscure the weather that really matters to tourists. When tourists leave a destination, they remember what the weather was when they came, not what the long-term averages were. The goal in this project is to develop a tourism climate index that captures weather information that is specific to tourist activities at a particular location. It will determine suitability of a particular activity at the specified time of day and time of year.

Variables reported by weather stations around the state and world provide the data for the study and include: temperature, humidity, wind, visibility, and significant "present weather" like snow, rain, blowing dust etc. There are over 100 possibilities for the "present weather" however most pertain to precipitation. "Perceived temperature" is a variable in the index. In the summer it combines humidity and temperature measurements to attempt to accurately predict what tourists are experiencing. In the winter the wind chill factor and temperature are combined to create the variable of perceived temperature.

The index is constructed for each hour of the day for each day of the year over a long period of time for each location specified. The quantity in the index is a combination of the weather variables defined above (each their own sub-index) and is called the Climate Index for Tourists (CIT). The CIT is the quantity that is examined to look at variations in weather over time in different locations. For each sub-index examined, three possible outcomes are defined and given a numerical ranking depending on whether that variable is suitable for a particular activity: ideal=2, marginal=1, unsuitable=0. So, for example if all four of the sub-indices of perceived temperature, wind, visibility and present weather conditions are ideal for a given activity, or '2's, then the overall CIT is also a 2. If all conditions are not suitable for a given activity, or are '0's, then the CIT is also a 0, meaning the activity is unsuitable for a tourist. The CIT is based on the sub-indexes and is calculated for every hour of every day.

Threshold settings for determining the suitability of weather for a given activity the sub-categories are set in the index, but are flexible. For example, a person using the index can decide that the threshold for ideal conditions for sightseeing is between 40 and 85 degrees Fahrenheit, marginal conditions are between 20 and 40 or 85 and 95 degrees Fahrenheit, and unsuitable conditions are less than 20 and greater than 95 degrees Fahrenheit. The thresholds for wind, visibility, and present weather are similarly adjusted by the user for a given activity. The user can also specify the range in the time of day that the activity will likely occur. The thresholds for an activity like sightseeing in the summer will be very different

from an activity such as skiing in the winter. The primary limitation on creating an index is that it requires reliable historic (several decades) and current weather data for the specified location.

The prototype examples given are from King Salmon, Alaska and Anchorage, Alaska. King Salmon was included because of its proximity to Katmai National Park and Preserve. Anchorage is a popular destination for skiers in the winter. For comparison, two sites in Florida were chosen: Orlando and the Everglades. Changes over time are quite different for the two regions.

Visitation at two national parks were compared: Denali and the Everglades. The tourism climate index captures the seasonal cycle of park visitation trends very well in a graph of the two overlaid on each other. As you might expect, peak visitation at parks coincides with suitable weather conditions.

The contributions of different weather elements to overall CIT frequency of ideal sightseeing conditions is examined in a graph that shows the four sub-indexes and how each of their variations affect the shape of the overall CIT that combines them. For example, 20-40% of the days between Julian day 124 and 279 are ideal for sightseeing conditions, due to the contribution of the perceived temperature, visibility, wind and present weather sub-indexes combined to make the CIT. The time of day and the time of year introduce a great proportion of variation that would typically be obscured by a yearly weather summary. The percent of the time attributable to each variable can differ by location. For example, in King Salmon in the winter, temperature can be the limiting factor for suitability, while in Orlando, present weather conditions (usually a form of precipitation) in the summer may be the limiting factor.

Temperatures in Alaska since 1949, by season, show a warming trend in interior and coastal locations for winter, spring and summer, while autumn shows no trend. Climate can affect the seasonal frequency of ideal sightseeing conditions. For example, in King Salmon, when the frequency of ideal conditions in 1956 is compared with 2005, data shows the season starts earlier in 2005. The time difference is as much as a couple of months. These two years were chosen as an example because they were known extremes.

We can use the CIT to quantify the tourism climate season length at the daily resolution. Season is based on the point when the frequency of ideal conditions reaches 40%.Season length in King Salmon has extended, particularly in the last decade. When the number of days in which there are six consecutive hours of ideal conditions in King Salmon is compared to Orlando, the data show that King Salmon’s frequency of ideal days is increasing, while Orlando’s stays steady despite a short trend in increasingly ideal conditions in the 70’s. Statistically, the trends of temperature and CIT by calendar month show that warming in the spring in Alaska has led to a significantly greater frequency of ideal weather conditions for tourists and significantly lower frequencies of unsuitable conditions.

The skiing season in Alaska shows that long seasons have become less frequent. A counter argument to using this data, however, is that skiers may be more concerned with snow conditions that the weather they are skiing thorough. In Orlando, significantly warmer fall temperatures have led to a significantly higher frequency of unsuitable conditions. In summary, ideal tourism weather exhibits different temporal trends: favorable for some locations and activities and not for others- there are winners and losers in climate change projections.

The top four IPCC climate models projections that describe Alaskan climate best between 1980 and 2000 were chosen to analyze future changes in seasonal weather. The daily output was analyzed. Projected changes in thaw dates indicate that earlier breakups will occur across the whole state and thaw dates will increase by 10-15 days by the end of the century. Freeze up is projected to occur later by 10-15 days in Interior Alaska, while changes in freeze up dates closer to the ocean are even larger- up to 50 days in the Chukchi sea. This change is tied to projected sea ice extent.

Future work should include determining optimal thresholds of suitability for different weather events and different activities. Additionally, researchers would like to link the CIT to more direct evidence of tourist participation and satisfaction. Lastly, the sensitivity of the index to climate change is the next step- all of the weather elements need to be factored into future projections.

DISCUSSION

Q: The reason people travel is to see bears, fish, etc. Doesn't whether those animals persist/activities remain an option have a bigger impact on tourists than the weather they experience?
A: Good point- this illustrates the dual link between climate change on ecosystems and tourism. An additional step needs to be taken before we can draw a bottom line on how climate change impacts tourism- it could be great or it could be catastrophic if you aren't catching fish/seeing bears. Hudson Bay polar bear watching may be impacted, for example.

Q: Other variables for tourism are rain/flooding etc, smoke conditions, highs in temps, new insects, insects as vectors for diseases. There are lots of factors that may contribute- please comment.
A: Precipitation, temperature and visibility ARE all factored into this index. Insects are not because this is a weather index.

Q: How might weather in one year affect tourism in the next?
A: This is a key next step and ties into a future work goal of seeing how the CIT ties into tourist participation.

Q: How does this work relate to the entrepreneurial possibilities that climate change may bring to the state? ie: New niches in tourism.

A: This work shows there may be changes in season lengths which will make new windows of time open to existing opportunities or even to new types of activities. Creative responding can come into play.

Participant Comment: how people are outfitted for their activity can make a big difference in a tourist's perception of weather. This should be accounted for when setting thresholds. ie: a whale watcher with raingear and fleece layers will be much warmer than their unprepared, cold counterpart sitting below deck to keep out of the rain.

Q: The work is excellent for a user that wants to use the model in their own area, but HOW does somebody that wants the model run in their specific location with their designated thresholds proceed?
A: Talk to ACCAP or presenter John Walsh to establish a partnership. A source of weather data would first need to be identified.