185 Weather sensitivity of visitation to Protected Natural Areas: Establishing trends and trajectories in a time of changing climate.

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Background

A major determinant of visitor use of outdoor recreation opportunities in PNAs is ambient weather at place – specifically, the four key variables of temperature, humidity, wind speed and solar radiation. Visitors routinely assess ambient weather before undertaking a range of recreational activities in the outdoors, evaluating the key variables – individually and in combination - relative to both personal preferences and the planned actvity at place. Weather at place may vary widely from year to year, masking underlying changes in visitation demand. Furthermore, the influence of ambient weather conditions on visitation varies widely from place to place, such that the same conditions may deter a significant number of visitors to one place, while generating little to no deterence at others - and may even encourage visitation.

Consequently, understanding the influence of weather on visitation is a core consideration for visitor management at the operations level, but increasingly also at the strategic investment level as historic weather patterns are modified by climate change. However, at the place/destination scale of analysis, separating the influence of weather on visitation from other influences, such as visitor preference, is complex; when the scale of analysis expands to the national level, the challenge becomes daunting. Nevertheless, PNA managers need to make informed decisions on long-term investment in visitor services and infrastructure based on underlying demand trends and trajectories, and the extent to which these are influenced by weather is therefore a critical consideration. To address this current uncertainty, the New Zealand Department of Conservation (DOC) has developed a statistical tool to quantify the weather sensitivity of several hundred visitor destinations across its portfolio of PNAs.

Method

Adopting an Artificial Intelligence (AI) approach, an Artificial Neural Network (ANN) was developed to analyse complex weather data from New Zealand's national network of actual and virtual weather stations, and visitation data from DOC's national network of activity (visitor) counters. Compared to conventional statistical models, ANNs are proven to have a more powerful predictive capability. Leveraging these ANN advantages, a weather-sensitivity tool is introduced. This tool is used to:

1. quantify and explain which weather variable(s) amongst a range of confounding variables are most influential on visitation at the destination scale;
2. predict underlying weather-adjusted visitation levels at the destination scale;
3. establish visitation weather-sensitivity at the regional scale.

Based on this analysis, the tool derives a generic weather index for each destination that identifies the individual and combined effect of the four key weather variables. The index is in turn interpreted as a simple weather sensitivity scale to communicate for operational and planning purposes the degree to which visitation levels at destination and regional scales are influenced by weather. This analysis can be further extended to remove the weather signal from visitation levels, allowing the underlying (weather-adjusted) trend in visitation demand to be revealed. Combined with trajectories of changing weather patterns derived from climate models, more robust and resilient investments in PNA visitor services and infrastructure can be made.

References

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