DEVELOPING A RESILIENCE FRAMEWORK TO ASSESS TOURISMS’ RESPONSE TO CLIMATIC EVENTS

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Stress and Disturbances
What is resilience

“... measure of the persistence of systems and of their ability to absorb change and disturbance and still maintain the same relationships between populations or state variables” (Holling, 1973: 14)

The essence of resilience thinking is that it explicitly seeks to address change rather than avoid it.
Further definitions

- Related concepts: ecological resilience, social resilience, adaptive capacity, vulnerability.
- Different views – but Klein et al. (2003) propose that ‘adaptive capacity’ is the collective ability to manage resilience.
State space

Three dimensional stability landscape with two basins of attraction showing (Walker et al., 2004).
Panarchy

Because of cross-scale interactions, the resilience of a system at a particular focal scale will depend on the influences from states and dynamics at scales above and below.
A tourist destination

Example of a socio-ecological system
Case study Queenstown-Wanaka (NZ)
Methodology

1. Understand the context:
- subsystems and their functional units
- relationships within subsystems

2. Identify relevant climate/weather disturbances and interactions with subsystems

3. Development of proxies for measuring or assessing L, R, P for each functional unit

For this present paper: 34 interviews with business operators
Tourism activity sub-systems

• Snow based (ski field, helisking)
• River based (fishing, rafting, jet boating)
• Lake based (fishing, kayaking, scenic boat trips)
• Air based (scenic flights, sky diving, air show)
• Land based (events, guided walks, horse riding, wine trails, 4WD)
• Other (bungee, gondola, luge)
• Transport (airport, shuttle services, scenic tours, local bus)
• Indoor attractions (entertainment, museum)
• Accommodation (backpacker hostel, hotel, camping ground, luxury lodge)
### Climaltic factors

<table>
<thead>
<tr>
<th>Sub-system</th>
<th>Adverse</th>
<th>Favourable</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Snow</strong></td>
<td>Lack of snow and precipitation, wind, rain; heavy snow increases avalanche risk; warm temperatures</td>
<td>Heavy snow early in the season, regular snow, cold temperatures</td>
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<tr>
<td><strong>River</strong></td>
<td>Heavy rain and flooding; frost and ice on river; extremely low river levels</td>
<td>Normal rainfall patterns leading to normal river flows</td>
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<tr>
<td><strong>Lake</strong></td>
<td>Wind and high waves; debris on the lake after flooding</td>
<td>Road closures elsewhere and tourists redirected onto lake activities</td>
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<tr>
<td><strong>Air</strong></td>
<td>Wind, rain and poor visibility</td>
<td>Settled weather periods</td>
</tr>
<tr>
<td><strong>Land</strong></td>
<td>Heavy rain and flooding; heavy snow (avalanches); wind</td>
<td>Wind, if other activities have to be cancelled and tourists are diverted</td>
</tr>
<tr>
<td><strong>Indoor</strong></td>
<td>Wind can lead to power cuts; ice on carparks; heavy rain increases maintenance costs (e.g. leaks)</td>
<td>Rain and wind that lead to cancellation of other activities</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>Wind leads to closure of gondola; frost makes luge and bungee hazardous; poor visibility</td>
<td></td>
</tr>
<tr>
<td><strong>Transport</strong></td>
<td>Frost and ice; heavy snow</td>
<td>Heavy snow for those providers that have 4WD vehicles</td>
</tr>
<tr>
<td><strong>Accom.</strong></td>
<td>Rain for campgrounds</td>
<td>Rain, frost for non-camping accommodation</td>
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<tr>
<td>Activity</td>
<td>Sub-system</td>
<td>Thresholds</td>
</tr>
<tr>
<td>-------------------</td>
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<td>-----------------------------------------------------------------------------</td>
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<tr>
<td>Heli skiing</td>
<td>Snow based</td>
<td>If marginal snow conditions more often than the current 1 in 4 years</td>
</tr>
<tr>
<td>Ski field</td>
<td>Snow based</td>
<td>30 km wind shuts down T-bar, less wind shuts down chair lift; gusty winds have lower threshold</td>
</tr>
<tr>
<td>Scenic flights</td>
<td>Air based</td>
<td>Flights need 100% visibility as they are ‘scenic’ flights</td>
</tr>
<tr>
<td>Airshow</td>
<td>Air based</td>
<td>15-18 knots limit for WW1 planes, 32 knots other types; Low cloud or fog</td>
</tr>
<tr>
<td>Skydive</td>
<td>Air based</td>
<td>CAA rules for daylight hours; Solid cloud base above 15,000 ft; Wind &lt;21 km/hr on ground wind</td>
</tr>
<tr>
<td>Fishing</td>
<td>River based</td>
<td>20 mm rain in &lt; 2 hours</td>
</tr>
<tr>
<td>Jet boat I</td>
<td>River based</td>
<td>River flow: 9.5-1250 m³</td>
</tr>
<tr>
<td>Jet boat II</td>
<td>River based</td>
<td>Maybe cancel at 80 m³; Ice in river</td>
</tr>
<tr>
<td>Rafting</td>
<td>River</td>
<td>Optimum river flow 10-70 m³ &gt;400 m³ stops operation</td>
</tr>
<tr>
<td>Gondola</td>
<td>Other</td>
<td>Gondola &lt; approx 75 km/hr wind speed, otherwise</td>
</tr>
</tbody>
</table>
Proxies for Latitude

- **PRODUCT**: Diversity of tourist activities that allows operation across many weather conditions.
- **CUSTOMER BASE**: Diversity of markets and segments.
- **STAFFING**: Degree of operational flexibility, and retention of experienced staff.
- **SEASONALITY**: Extent of operating window (ideally all year round).
- **ACCESS**: Dependence of activities in sub-system on a particular location or resource (e.g. cultural ties to one specific river).
- **NETWORKS**: Connectedness of activity sub-system, within and across other sub-systems to allow diversification in the face of adverse conditions.
- **COMPETITION**: Degree to which profitability and flexibility are compromised by competition.
Proxies for Resistance

- **WEATHER SENSITIVITY**: Degree to which activities in the sub-system are limited by adverse climatic conditions.
- **COPING RANGE**: Level of critical threshold above which operation is not possible.
- **RESPONSE OPTIONS**: Range of response options to disturbance/stress in the sub-system (i.e. feedbacks).
Proxies for Precariousness

- **FREQUENCY**: Extent to which operations in activity sub-system are disrupted under current climate conditions.
- **CLIMATE CHANGE**: Extent to which climate change will exacerbate climatic impacts.
Challenges

- Fully operationalise framework
- Development of quantifiable indicators and integration of qualitative information (e.g. power relationships)
- Diversity within sub-systems (weighting of keystone activities?)
- Scale (e.g. how to “add up sub-systems” to destination?)
- Other, complex destination issues (e.g. flow of information)
- Multiple stress factors, etc. etc.
Outlook

• Importance of the concept of Resilience
• Researching destinations as socio-ecological systems represents a holistic approach
• Further extension: Panarchy in tourism systems