

Nature-based tourism, resource dependence, and resilience of Arctic communities: Framing complex issues in a changing environment

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Highlights for Twitter:	Arctic communities may be becoming increasingly dependent on nature-based tourism., Is tourism dependence making Arctic communities more vulnerable to boom-bust cycles?, We suggest a framework that enables examination of potential nature-based tourism dependence in Arctic communities.
Abstract:	Current research on tourism in the Arctic has focused largely on the extent, location and type of tourism activities that occur in the region. Recently, challenges have been identified that the tourism industry is likely to face in the wake of global changes, including climate change. Related research, conducted within and outside of the Arctic, suggests that rural communities can become economically dependent on natural resource extraction (e.g., oil, gas, timber harvesting, and mining of minerals) and non-extractive resources (e.g., nature-based recreation and tourism), limiting diversification and potentially threatening resilience of rural communities. In the western USA, communities have become dependent on both extractive and non-extractive natural resource activities including nature-based tourism, however it is less clear whether a similar situation is occurring in Arctic communities. In this paper, we propose a framework and indicators to analyze the potential dependence of Arctic communities on nature-based tourism and the resilience of Arctic communities to potential boom-bust cycles of nature-based tourism. To do so, we examine the current state-of-knowledge about tourism and nature-based tourism in the Arctic through the lens of boom-bust dynamics and Social-Ecological Systems (SES).

Manuscript JOST-4586 Response to Reviewer Comments

Reviewer(s)' Comments to Author: Referee 1	Author Response
<p>Perhaps, the authors could examine how tourism may make these communities more vulnerable instead of resilient?</p>	<p><i>Depending upon how tourism functions within a community, it has the capacity to either make communities more vulnerable (if substituted as a "staple" and implemented without local community control) or more resilient. We have tried to address this idea throughout the paper, however we feel that an extensive treatment of resilience vs. vulnerability is beyond the scope of this paper, particularly given the word limit for the journal. The indicators we present are intended to measure the degree to which tourism may be contributing to the relative resilience or vulnerability (if the two are viewed as opposite ends of a spectrum). This has been clarified within the text where practical.</i></p>
<p>The author(s) address the importance of gateway communities. However, there is some research illustrating that the designation of gateway communities for certain Arctic communities, may be somewhat limited. Addressing this, would bolster the analysis.</p> <ul style="list-style-type: none"> • Lemelin, R.H., & Dawson, J. (2014). Great expectations: examining the designation effect of marine protected areas in coastal Arctic and Sub-Arctic communities in Canada. <i>The Canadian Geographer/Le Géographe Canadien</i>, 58 (2), 217–232. • Bennett, N., Lemelin, R.H., Koster, R. & Budke, I. (2012). A Capitals Framework for Appraising and Building Capacity for Tourism Development in Aboriginal Protected Area Gateway Communities. <i>Tourism Management</i>, 33(4), 752-766. • Lemelin, R.H., Johnston, M., Stewart, E.S., & Bennett, N. (2013). "Gateway Communities or Port of Call? Examining the Relation between National Parks and Communities Located in the Canadian Arctic." In Lemelin, R.H., Maher, P., & Liggett, D. (Eds.). <i>From talk to action: How tourism is changing the Polar Regions.</i> (pp. 61-77). Centre for Northern Studies, Lakehead University: Thunder Bay, Ontario. 	<p><i>Thank you for this suggestion. These sources have been incorporated and discussed where appropriate within the manuscript, with the exception of Lemelin, Johnston, Stewart, & Bennett (2013) which appeared in a conference proceedings publication and which we were unable to procure.</i></p>
<p>There has been quite some research on tourism and resilience, this discussion needs to be better</p>	<p><i>This body of work has been referenced in the section on 'Tourism dependence and community resilience'.</i></p>

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60	<p>developed and properly integrated into the discussion.</p> <p>Page 2 of 4 Last-chance tourism should be defined.</p> <p>In the discussion on global climate change problem (first paragraph) the work by Dawson, J., Stewart, E. J., Lemelin, R. H., & Scott, D. (2010) The carbon cost of polar bear viewing tourism in Churchill, Canada, <i>Journal of Sustainable Tourism</i>, 18(3), 319-336 should be cited.</p> <p>Churchill, Canada and the community formerly known as Barrow, Alaska are frequently cited throughout the manuscript, both locations, should be described. These descriptions would help with the subsequent analysis.</p> <p>Reviewer(s)' Comments to Author: Referee 2</p> <p>Thank you for the opportunity to review your submission. I thoroughly enjoyed reading it - as both a comprehensive state of affairs, and as a hand rail towards future work. I have no substantial edits to suggest. Best of luck making some of your posited framework indicators into a research reality.</p> <p>There are a few grammar and stylistic issues, which will likely be caught in copy edit (ref a vs. b; some missing commas; missing year in a few citations, etc.).</p> <p>As you've mentioned the issue of collecting tourist numbers (data inconsistency, etc.) I would suggest one additional reference to look at:</p> <p>Maher, P.T. (2017). <i>Tourism Futures in the Arctic</i>. In K. Latola & H. Savela (Eds.). <i>The Interconnected Arctic</i>. (pp. 213-220). Amsterdam: Springer.</p>	<p><i>Complete. The term has been defined on page 2 where it first appears.</i></p> <p><i>Complete.</i></p> <p><i>Additional descriptions of both locations have been added (within the confines of the remaining word limit) to provide more background to aid in interpretation of the analysis provided in the manuscript.</i></p> <p>Author Response</p> <p><i>Thank you so much for your support of our work! We also look forward to making our framework indicators into a research reality!</i></p> <p><i>A thorough proofreading has been completed by native English speakers and these issues have been corrected where found.</i></p> <p><i>This reference has been incorporated to the indicators section of the manuscript.</i></p>
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Nature-based tourism, resource dependence, and resilience of Arctic communities:

Framing complex issues in a changing environment

Abstract

Current research on tourism in the Arctic has focused largely on the extent, location and type of tourism activities that occur in the region. Recently, challenges have been identified that the tourism industry is likely to face in the wake of global changes, including climate change.

Related research, conducted within and outside of the Arctic, suggests that rural communities can become economically dependent on natural resource extraction (e.g., oil, gas, timber harvesting, and mining of minerals) and non-extractive resources (e.g., nature-based recreation and tourism), limiting diversification and potentially threatening resilience of rural communities.

In the western USA, communities have become dependent on both extractive and non-extractive natural resource activities including nature-based tourism, however it is less clear whether a similar situation is occurring in Arctic communities. In this paper, we propose a framework and indicators to analyze the potential dependence of Arctic communities on nature-based tourism and the resilience of Arctic communities to potential boom-bust cycles of nature-based tourism. To do so, we examine the current state-of-knowledge about tourism and nature-based tourism in the Arctic through the lens of boom-bust dynamics and Social-Ecological Systems (SES).

Key words: Arctic tourism; nature-based tourism; resilience; SES; resource dependence; protected areas

Word count: 9,949

Introduction

Tourism has been widely recognized as a potential agent of economic, social and ecological change worldwide. In particular, nature-based tourism, where some aspect of nature itself is the tourist attraction (Cheer & Lew, 2018b; Balmford et al., 2015), has the potential to provide many economic benefits to remote communities. But it brings many challenges, including concerns about ecological impacts to sensitive ecosystems. Arctic tourism (nature-based or otherwise) occurs in high-latitude areas where visitors are willing to travel large distances to see extreme environments and landscapes, exotic wildlife, and to experience indigenous communities and culture. More recently, “last chance tourism”, where tourists flock to sites where landscapes, seascapes or the species that inhabit these places are at risk of disappearance due to global forces like climate change, has become a phenomenon that attracts visitors to the Arctic. (Groulx et al. 2016; Lemelin et al., 2010). Paradoxically, the carbon emissions from travel and waste created by arctic tourism also contribute to the global climate change problem (Dawson, Stewart, Lemelin, & Scott, 2010). Further, the paradox results in communities investing in and potentially becoming dependent on tourism, even though (and also often because) the source of attraction is fleeting.

Arctic tourism is also increasingly seen as an avenue for development in many small, often remote communities that have few other economic opportunities. Although the social and economic make-up of Arctic communities can vary substantially depending on their location, many have typically relied on the surrounding environment for hunting and gathering, local and regional governments, and extractive industries associated with the resource base (e.g. gold and mineral prospecting/mining, petroleum-based industries and commercial fishing/whaling, etc.)

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3 (Burns, 2018; Kaján, 2014a). Increasingly, global economic and social trends have enabled more
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5 people to travel to the Arctic. Climatic factors, such as breaking up of sea ice have facilitated
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7 access to many remote arctic communities, such as Utqiagvik, Alaska, (formerly Barrow), an
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9 historically native Iñupiat community situated on the coastal tundra where subsistence activities
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11 including hunting, fishing, and whaling have been integral to local way of life (Hillmer-Pegram,
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13 2016). As communities become easier to access, they are experiencing an influx in nature and
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15 culture-based tourism activity (Hillmer-Pegram, 2016; Kaján, 2014a). Further, nature
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17 conservation efforts (e.g. the development of parks and protected areas) in rural or remote areas
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19 such as the Arctic regions, are increasingly expected to contribute to the economies of these
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21 areas by generating revenue from nature-based tourism and related activities and expenditures
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23 (Pashkevich, Stjernström, & Lundmark, 2016).
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32 While integrating tourism (including nature-based tourism) as part of a diversified economy can
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34 provide communities with an often much-needed source of revenue, over dependency on tourism
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36 may adversely affect communities if the economy is solely centered on tourism, as economic
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38 dependence on tourism can result in reduced resilience and increased vulnerability of a
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40 community. Moreover, there are some Arctic communities where nature-based tourism has
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42 experienced rapid growth (“boomed”) and resulted in significant challenges of managing the
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44 natural resource base on which tourism depends. For example, the community of Churchill,
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46 Manitoba (Canada), for decades known as ‘the polar bear capital of the world’, relies heavily on
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48 income generated from polar bear viewing (Lemelin, 2008), and residents of the Nunavut
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50 Territory in Canada rely on polar bear populations for subsistence as well as income from sport
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52 hunting operations (Dowsley, 2010). The community of Churchill in particular has a long history
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3 (as well as established infrastructure) of nature-based tourism, first becoming popular as a
4 destination for birding and viewing beluga whale captures as early as the 1960s (Lemelin, 2008).
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6 Kaktovik, a community along the Arctic coast in Alaska, has also seen an influx of polar bears
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8 due to declining sea ice and a subsequent increase in tourism (Department of Planning &
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10 Community Services, 2015; Wolfe, 2013). Originally a coal mining community, Longyearbyen
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12 at Svalbard, Norway, is also known for its polar bear viewing opportunities, but has more diverse
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14 tourism opportunities than Churchill. Svalbard has been a destination for tourists since the late
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16 19th century, but the number of overnight stays have tripled in the last 20 years reflecting strong
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18 bonds between the tourism industry, research, and governing institutions (Viken, 2010). Svalbard
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20 also draws tourists from cruise ships who view historical and cultural remains from the whaling
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22 and mining industries as well as trekkers seeking solitude in the Norwegian wilderness (Aars et
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24 al., 2005; Guðmundsdóttir & Sæþórsdóttir, 2009; Hagen et al., 2010; Lemelin & Dyck, 2008). In
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26 these communities as well as others that host polar bear tourism, increased incidents of human-
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28 polar bear interactions as well as disruption of coastal denning habitat pose threats to polar bear
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30 populations (Lemelin & Dyck, 2008).
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41 Nature-based tourism is the main economic driver in several small Scandinavian Arctic
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43 communities. In Finnish Lapland, including the communities of Saariselkä and Kilpisjärvi, rapid
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45 development of tourism has resulted in tensions with Sami reindeer herders and with residents
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47 concerned about the sustainable use of nature, including the impact of motorized recreation on
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49 traditional activities such as skiing (Kaján, 2014b). In Norway's Lofoten region, spectacular
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51 natural scenery including dramatic fjords combined with mild summer temperatures draw
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53 thousands of tourists each year. This area has also recently become the backdrop for several
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3 Hollywood films, and is heavily promoted as a travel destination, resulting in a surge of tourism
4 that has become unmanageable for local infrastructure (Henley, 2016; Kristoffersen & Midtgard,
5 2016). In Alaska between 2010 and 2014 most of the annually generated \$54.3 million dollars
6 from tourism occur below the Arctic Circle (Loeffler & Colt, 2015), however both Utqiagvik and
7 Kaktovic on the North Slope are exceptions. In these communities, residents struggle with how
8 to expand tourism in a sustainable and culturally appropriate manner (Wolfe, 2013; Wanasuk &
9 Thornton, 2015; Hillmer-Pegram 2016).
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23 In some cases, a booming tourism industry could result in conflict and adverse long-term impacts
24 in Arctic communities. Increased tourism could have ripple effects by changing infrastructure,
25 technology, communication, and community demographics as well as altering the nature of
26 social interactions, cultural identity, and community cohesion in Arctic communities
27 (Amundsen, 2012; Puhakka, Sarkki, Cottrell, & Siikamäki, 2009). Arctic tourism is subject to
28 change in response to global markets (as traveling to the Arctic is costly), or changes in natural
29 conditions that alter the quality of the tourist/recreation experience (Kaján, 2014a). If the
30 resource attracting tourism (e.g., polar bears or glaciers) is subject to degradation or
31 displacement as the result of climate change, sole dependence on nature-based tourism may
32 result in an economic “bust” similar to communities dependent on extraction of a single natural
33 resource (Krannich & Petrzela, 2003). As such, this may contribute to decreased resiliency, or
34 increased vulnerability of these communities.
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3 In this paper we examine the potential for economic dependence and subsequent resilience or
4 vulnerability of Arctic communities that host nature-based tourism. First, we review the tourism
5 literature to examine the phenomenon of Arctic tourism, specifically nature-based tourism, upon
6 which some Arctic communities now depend, in part or in full, as an economic driver. Next, we
7 discuss the concept of “tourism dependence” and examine the implications of tourism
8 dependence in Arctic communities. Finally, we propose a conceptual and analytical framework
9 of potential measurable indicators for the future analysis of dependence of Arctic communities
10 on natural resources as the basis for nature-based tourism. In the discussion of our analytical
11 framework, we identify important data needs (key indicators) for analyzing and comparing the
12 relative dependence of Arctic communities on nature-based tourism, discuss availability of
13 data/operationalization of measuring proposed indicators, and suggest potential methods of data
14 collection to facilitate development of indicators and a consistent baseline of data on tourism
15 dependence that can be used comparatively between communities.
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Tourism in the Arctic region

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40 Definitions of what constitutes the Arctic region vary. For the purposes of this paper, following
41 de la Barre et al. (2016), we use the geographic definition of the Arctic including Alaska,
42 northern Canada, Greenland, the Faroe Islands, Iceland, northern Fennoscandia, and northern
43 Russia (de la Barre et al, 2016). This region contains a landmass of over 14 million km² across
44 eight countries of which over 2.5 million km² are under some form of legal protection for natural
45 values (Pagnan, 2002). These protected areas embody many of the values that impel tourists to
46 visit the region. The Arctic region houses a range of cultures, including many indigenous
47 communities, and is socio-economically heterogeneous from region to region (de la Barre et al.,
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3 2016). Tourism in the Arctic includes urban tourism, travel between different regions, and
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5 nature-based tourism. Arctic tourism is characterized by typically difficult to access locations set
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7 within fragile environments (de la Barre et al., 2016) and is highly seasonal in nature, which
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9 provides some challenges for tourism planning and development. (de la Barre et al., 2016; Yu,
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11 Schwartz, & Walsh, 2009).
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18 The recent growth in tourism to Arctic regions (Balmford et al. 2009; Newsome et al. 2013) is
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20 partly a function of overall increases in global tourism, and globalizing economies (Müller,
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22 Lundmark, & Lemelin, 2013, Maher et al., 2014). Nature-based tourism has become
23
24 increasingly popular as an alternative development pathway for rural and remote communities
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26 worldwide, which are facing demographic and economic changes (Amundsen 2012; Burns,
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28 2018; Hall and Saarinen 2010). In the Arctic, general tourism and nature-based tourism have
29
30 been closely linked for many decades (i.e., Fredman and Tyrväinen 2010; Hall & Boyd, 2005),
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32 as the draw of the unique and pristine scenery, and symbolic qualities of the natural attractions
33
34 often go hand-in-hand with activities such as hiking, camping, and wildlife viewing. Global
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36 changes including changes in climate are influencing tourism in Arctic regions (Müller et al.,
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38 2013). However, the rise in tourism in Arctic regions can also be attributed to global climate
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40 change itself, as threats to Arctic ecosystems are recognized (e.g., melting glaciers, loss of
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42 species habitat) by tourists who are driven to experience polar environments and their associated
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44 megafauna and indigenous cultures before they are gone (Dawson et al., 2010; Lemelin et al.,
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46 2010; Müller et al., 2013). Termed “last-chance” or “doom” tourism, this relatively new trend
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48 has been promoted in tourism marketing, particularly in the Arctic (Lemelin et al., 2010). An
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50 example of last chance tourism is the influx of tourists interested in viewing polar bears in their
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3 natural habitat before it disappears, such as in Churchill, Manitoba; Kaktovik, Alaska; and
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5 Svalbard, Norway. A warming Arctic climate threatens polar bear populations as sea ice duration
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7 and extent decreases, reducing the amount of time they are able to spend on sea-ice feeding on
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9 seals (Derocher, Lunn, & Stirling, 2004; Lemelin et al., 2010). Diminishing sea ice also increases
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11 the time polar bears spend on shore, increasing the likelihood of encountering tourists and local
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13 residents, leading to increased bear mortality (Clark, Van Beest, & Brook, 2012; Rode et al.,
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15 2015; Wilder et al., 2017). While there is evidence that tourism activities negatively impact polar
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17 bear populations, research also exists that suggests these same activities are relatively benign
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19 (Atwood et al., 2016; Dyck & Baydack, 2004).
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28 **Tourism dependence and community resilience**

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30 The concept of tourism dependence suggests that the economy of communities affected by
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32 nature-based tourism attractions, such as gateway communities to parks and protected areas and
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34 cruise-ship ports, can become overly dependent on income from tourism activities (nature-based
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36 or otherwise) (English, Marcouiller, & Cordell, 2000). The definition of this idea varies within
37
38 the literature, but it is generally characterized by lack of economic diversification within the
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40 community (Krannich et al., 2014; Krannich & Petzelka, 2003; Stedman, 2013), and an
41
42 associated potential decrease in community resilience (i.e., potential increase in vulnerability).
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44 Resilience is defined as an organized network of adaptive capabilities linked to the ability of
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46 people to function and adapt following a disturbance (Norris et al, 2008), including social and
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48 ecological changes. The variability of indicators of resource dependency, which often include
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50 measures of unemployment or income or other measures of community well-being, have
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52 prompted some researchers to caution against overgeneralizations when examining resource
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3 dependency, particularly in the context of rural community development (see Stedman, 2013).
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5 For the purpose this paper, the definition of community resilience is derived from that given by
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7 Bec, McLennan & Moyle (2016) as “the ability of a community to harness its resources in order
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9 to adapt to change” (p. 432).
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16 A now large body of work related to tourism and community resilience began to emerge in the
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18 late 1990s and early 2000s, including early conceptual work by Farrell & Twining-Ward (2004,
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20 2005) and later work by Cochrane (2010) and Strickland-Munro, Allison, & Moore. (2010), that
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22 specifically discussed the impact of protected area tourism on the resilience of communities.
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25 More recently, studies have examined the relationships between tourism, resilience, and
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27 sustainability, and communities’ ability to adapt to environmental changes, particularly climate
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29 change (e.g. Cheer & Lew, 2018a; Hall, Prayag, & Amore, 2018; Lew & Cheer, 2018a; & Lew,
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31 et al., 2016). Authors note the difficulty in understanding and assessing both resilience and
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33 sustainability of communities is due to confusion, particularly to weakly conceptualized
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35 definitions of and lack of differentiation between the two terms, (Lew et al., 2016). Additionally,
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37 the concept of resilience is often applied using ecological resilience theory, which assumes that
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39 systems cycle adaptively through states of collapse and reorganization. This approach has been
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41 highly criticized for its failure to account for *social* causes and implications of these cycles (Hall
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43 et al., 2018). Instead, resilience of communities that are affected by tourism, especially nature-
44
45 based tourism occurring in the Arctic, must be considered as social-ecological systems, as
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47 humans simultaneously derive ecosystem services from the natural environment while also
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49 impacting that natural environment (Hall et al., 2018; Hillmer-Pegram, 2018). Further,
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51 researchers Lew and Cheer (2018b) suggest that there are in essence three tourism systems that
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3 researchers can examine through the lens of resilience: the “attraction system” (i.e. the resource
4 base that drives the tourism), the “economic system”, and the “community system” (Lew &
5 Cheer, 2018b). Here, we consider resilience within the context of a community’s economic
6 response to potential declines in tourism due to changes in climate, the natural resource base,
7 markets or other geopolitical forces.
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18 Literature also exists that examines the relationship between the tourism industry and
19 dependence in the context of dependency theory (Britton, 1996; Kahn, 1997). The focus of this
20 work lies primarily in understanding how mass tourism in developing countries can result in
21 these areas losing local control and becoming dependent on foreign economies that supply both
22 the infrastructure and tourists for these tourism activities (Wanasuk & Thornton, 2015). When
23 income from mass tourism in these areas does not remain in the host country, tourism activities
24 can result in a structural dependency of host countries on foreign economies (Britton, 1996). This
25 process can also occur at smaller scales within a single country or state, where economic revenue
26 earned from tourism largely leaves the community of origin, resulting in minimal benefit to the
27 community where tourism occurs. Also, decisions made regarding tourism often arise from
28 outside the community. However, tourism is sometimes promoted for diversifying rural
29 economies. Development of smaller scale ecotourism opportunities as well as sustainably-
30 developed indigenous tourism are less likely to result in this type of dependency, as ecotourism
31 operations often involve local participation in and ownership of tourism operations (Kahn, 1997;
32 Wanasuk & Thornton, 2015). In addition, sustainably-developed indigenous tourism results in
33 development of an economy that also supports cultural values (Hillmer-Pegram, 2016).
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3 Rather than focus at the country level scale, we seek to better understand how rural or remote
4 communities in the Arctic can become dependent on income from tourism activities, particularly
5 nature-based tourism activities. In this context, the concept of tourism dependence has evolved
6 from sociological research examining resource dependence of rural communities, primarily as a
7 contributing factor to rural poverty (Freudenburg & Gramling, 1994; Krannich & Luloff, 1991;
8 Nord, 1994; Peluso, Humphrey, & Fortmann, 1994). The specific resource that rural
9 communities become dependent on varies, but is linked to the natural resource base of the
10 surrounding area. Thus, economic dependence can be built on a number of natural resources,
11 including timber, ores, minerals, oil, natural gas—any natural resource that can be used for
12 profit. Freudenburg & Gramling (1994) argue that dependency and resultant poverty in these
13 communities develops because the extracted resources, and their profits, do not fully remain in
14 the communities from which they are extracted. Instead, the resources end up providing greater
15 benefits to areas where the resources are used as inputs for industrial development elsewhere.
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37 In developed countries, “staples theory” has been used to describe resource dependency and
38 resilience to declines in rural areas. Nature-based tourism usually depends on resources in rural
39 and remote areas, and such “peripheral” economies have historically relied upon export of
40 “staples” commodities (derived from the natural resource base, such as fish, timber, oil or
41 minerals, animal products such as wool, or livestock) to distant markets and capital input from
42 outside for resource extraction (Schmallegger & Carson, 2010). When resource export declines
43 another “addictive economy”, namely tourism, is suggested as the salvation to escape “the
44 staples trap” and to develop declining resource-dependent communities (Carson & Carson,
45 2011). But self-reliant sustaining tourism has been difficult to develop in peripheral staples
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3 economies, and communities usually rely on large companies and government for capital input,
4 infrastructure, marketing and regulation of tourism industries. This external reliance limits the
5 ability of communities to link economic development to tourism that is occurring locally, thus
6 perpetuating the trap (Carson & Carson, 2011). As such, some researchers have suggested that
7 rather than tourism functioning as an escape from the staples trap, tourism in rural communities
8 often functions similarly to a traditional staples industry, and therefore, the staples thesis
9 provides a valuable conceptual framework for understanding and promoting sustainable
10 development of tourism in remote or rural areas (Schmallegger & Carson, 2010). Arctic
11 communities often share characteristics of peripheral staples economies. Further, distributional
12 inequalities between Arctic peripheries and more centralized areas within wealthy nations such
13 as Norway, the USA, and Russia may functionally be just as much of a problem as foreign
14 countries extracting resources or developing tourism industries, serving as an intra-national
15 staples trap of sorts.

36 **Tourism booms and busts**

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38 Rural areas dependent on natural resources experience cycles of rapid growth and instability or
39 decline (boom and bust), due to the limited economic diversity of the areas (Krannich & Luloff,
40 1991). These cycles limit the adaptability of rural communities that become accustomed to
41 periods of prosperity followed by economic decline. Rather than seek opportunities for
42 developing their economies in more viable, sustainable ways, residents become conditioned to do
43 nothing in response to changing conditions, because their past experience suggests that current
44 conditions, whether for better or for worse, lack permanence (Krannich & Luloff, 1991).

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Ultimately, the natural resources available and the characteristics of the community are

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3 intricately interwoven. Degradation of natural resources in these resource-dependent
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5 communities often leads to degradation of the social and economic structure of the community
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7 (Peluso et al, 1994). Further, resource dependence often displays a “nestedness”, whereby
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9 different communities may be dependent on the same resource in different ways and at different
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11 spatial scales (Beckley, 1998). For example, two communities adjacent to a managed forest may
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13 both be dependent on the forest—one for extraction of timber, and the other as a gateway for
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15 recreational access to the forest. Whereas logging activity and infrastructure may provide
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17 economic benefits to the adjacent logging community, recreation activities and associated
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19 support services (restaurants, outfitters, lodging) may more broadly benefit the economy of a
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21 county or entire region from which the recreation area is accessible. The opposite may also
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23 occur, particularly in Alaska, where the state or Native corporations pursue oil and gas
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25 development adjacent to rural communities. This resource extraction benefits the region and state
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27 (Haley & Fisher, 2012), whereas local communities may depend on the land for subsistence and
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29 recreation-related business (e.g. tour guides and outfitters) with a more localized effect. Another
30
31 example of this type of resource dependence nestedness within the Arctic region can be drawn
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33 from the western Hudson Bay polar bear population. This “resource” is the target of polar bear
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35 viewing tourism in Churchill, Manitoba, but also hunted by Inuit peoples in Nunavut.
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46 Related sociological research has examined tourism as a non-extractive use of the natural
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48 resource base that may also result in dependency in rural gateway communities adjacent to parks
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50 and protected areas that serve as tourist attractions. As early as 1980, researchers examined the
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52 growth and decline of the popularity of natural resource-based tourist areas, suggesting that
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54 proper management of an area is necessary to avoid cycles of rapid growth and decline (Butler,
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3 1980). Further research has gone on to quantify levels of tourism dependence of various
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5 communities using ratios of per capita lodging and/or per capita expenditures on eating and
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7 drinking to per capita income (English et al., 2000; Gooch, 1990; Smith & Krannich, 1998). For
8
9 example, case studies of communities in the American west, including the gateway communities
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11 of Jackson, WY and Teton Valley, ID (gateway communities to Grand Teton National Park) and
12
13 Moab, UT (gateway to Arches and Canyonlands National Parks) indicate that resident attitudes
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15 about tourism vary according the intensity (amount or level) of tourism an area experiences in a
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17 given season (Smith & Krannich, 1998). These case studies also describe community
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19 “typologies” related to level of dependence. These typologies, which range from “tourism-
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21 hungry” to “tourism-saturated” suggest a spectrum of dependence, related to both the natural
22
23 resource base and community characteristics. An economy reliant on a recreation and natural-
24
25 resource based tourism industry can result in dependency that makes these so-called tourism-
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27 dependent communities equally vulnerable to cycles of growth and instability as those dependent
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29 on extractive industry (Krannich & Petrzela, 2003).
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39 Further, tourism tends to create service sector employment, with positions that are seasonal and
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41 have lower levels of compensation. However, increases in tourism can result in soaring housing
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43 costs, making it impossible for those employed in the tourism industry to live in the community
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45 where they work (Krannich & Petrzela, 2003). Research also suggests that the impacts of
46
47 protected-area tourism on Arctic and aboriginal gateway communities has been mixed (Bennett,
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49 Lemelin, Koster, & Budke, 2012; Lemelin & Dawson, 2014). While establishment of protected
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51 areas can result in an increase in employment, infrastructure, and environmental protection,
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53 resulting increases in tourism can also lead to degradation of the natural resource base and local
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3 culture (Bennett et al., 2012). In Churchill, Manitoba, for example, in addition to permanent
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5 residents, a transient seasonal workforce (defined as having resided in Churchill for two years or
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7 less) exists to accommodate the tourism demands, and is becoming a larger and larger proportion
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9 of the Churchill population. This workforce has displaced locals and created both actual and
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11 perceived vulnerabilities within the community, particularly concerning risk-taking behaviors
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13 (Schmidt & Clark, 2018).
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20 While the concept of tourism dependence has been applied in Arctic communities in Finnish
21
22 Lapland (Kaján, 2014a), a quantifiable way to measure tourism dependence has yet to be applied
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24 to nature-based tourism broadly in Arctic communities, as availability and scale of data related to
25
26 tourism vary across the Arctic, making quantitative comparisons challenging (Hillmer-Pegram,
27
28 2018). The final sections of this paper examine the role of community control relative to tourism
29
30 dependence, posit tourism-dependent communities as social-ecological systems (SEs), and
31
32 present a framework for measuring and understanding the extent of nature-based tourism
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34 dependency in Arctic communities, whose natural resource base is particularly fragile and
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36 subject to degradation (de la Barre et al., 2016). The ability to determine a community's relative
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38 dependence on nature-based tourism will help determine the extent to which the resilience of a
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40 community may be threatened by, or vulnerable to, dependence on tourism.
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50 **Community control**

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52 The reliance of peripheral communities on external governments or large companies for capital
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54 inputs to sustain or develop tourism has been linked to the aforementioned “staples trap” in rural
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3 (and Arctic) communities (Carson & Carson, 2016; Carson & Carson, 2011). Thus, the level of
4 local community control of tourism is an important potential indicator of the relative dependence
5 of a community on nature-based tourism and susceptibility to boom-bust cycles. But what
6 constitutes “community control”? Moreover, in the Arctic, how is a “community” defined?
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8 Carson, Brouder, and de la Barre (2017) argue that a common definition of “community” is often
9
10 elusive and can vary by country and jurisdiction within sparsely-populated areas of the north,
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12 including the Arctic. In addition to permanent residents, these researchers suggest including
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14 “mobile”, seasonal or semi-permanent residents whose association with the community may
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16 fluctuate over time. Historically, these temporary residents are perceived as problematic for
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18 communities, and are associated with conflict and negative impacts on both the permanent
19
20 resident population and the local economy. Further, this transient population tends to be absent
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22 from community statistics (Müller, 2011; Storey, 2010). However, research suggests that these
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24 mobile or temporary residents may aid in stimulating development that could break traditional
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26 cycles of resource path dependence, and thus may have a positive influence on communities
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28 (Carson et al., 2017).
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41 Community control involves collaborative participation of residents, both permanent and
42 temporary, in tourism development through involvement in decision-making processes related to
43 tourism in the community, as well as employment in local business designed to economically
44 benefit the community (as opposed to a large, distant corporation running a tourism related
45 business within a community (Rasoolimanesh & Jaafar, 2016)). In work at World Heritage Sites,
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47 Rasoolimanesh & Jaafar (2016) found that community participation in tourism development
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49 gave residents the opportunity to actively engage in decision-making and activities that allowed
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3 them to establish local control of tourism in their community, rather than be passive subjects to
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5 tourism. Researchers also noted that in these rural areas, the existing political structure often
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7 functioned as a barrier to local residents wishing to be involved in decision-making processes,
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9 and as such economic involvement, through employment in tourism-related work, became the
10
11 preferred means for community participation and engagement in tourism (Rasoolimanesh &
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13 Jaafar, 2016). Further, Carson & Carson (2016), identified lack of local “entrepreneurial
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15 capabilities” including ability/willingness of residents to invest in tourism, as well as a lack of
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17 collaboration within the local tourism industry as factors that may inhibit local community
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19 control of tourism.
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27 While the above research has established the need and benefits of community control over
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29 tourism, as well as identified barriers to community control, several researchers have also
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31 developed indicators for measuring and managing community control of tourism. Indicators have
32
33 a history of use within tourism and leisure studies, particularly within the field of natural
34
35 resource management, as tools to aid in management decisions (Phillips & Budruk, 2011).
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37 Specifically, *community* indicators have been used to measure concepts like quality of life, and
38
39 often represent larger scale social goals. Instead of simply providing an economic measure (such
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41 as GDP), community indicators consider social and environmental impacts to a community as
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43 well as accounting for the services provided (i.e. the value) by natural and cultural resources.
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45 (Choi & Turk; Phillips & Budruk, 2011). Choi and Turk (2011) suggest a range of indicators for
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47 the six dimensions (economic, social, cultural, ecological, political, and technological) that could
48
49 be used to assess sustainability of tourism in a community. Examples of indicators for each
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51 dimension include: employment growth in tourism (economic), resident involvement in the
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3 tourism industry (social), type and amount of training given to tourism employees (cultural),
4 amount of erosion present on the natural site (ecological), presence of a development control
5 policy (political), and use of low impact technology (technological). These indicators, and others,
6 will be discussed further in the following section, specifically relative to the development of a
7 framework of indicators for measuring tourism dependence in Arctic communities.
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18 **Arctic communities, nature-based tourism, and SES**

19 *Tourism dependent communities as SES*

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22 Within the ecotourism literature, recent research has examined ecotourism as a SES (Gallaher,
23 2010). More broadly within the tourism and resilience literature, researchers have also called for
24 an understanding of tourism systems as SES, particularly when examining or assessing the
25 resilience of these systems (Hall et al., 2018; Hillmer-Pegram, 2018). In the United States and
26 more so in developing countries across the world, people living in rural areas and gateway
27 communities rely on tourism to parks and protected areas for their livelihood, either through
28 revenue resulting from ecotourism, or through direct use of resources (Pimbert & Pretty, 1995).
29 As such, developing and maintaining a sustainable ecotourism or nature-based tourism industry
30 is contingent on sustainable management of the natural resources that draw tourists to the area.
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49 For example, many Arctic communities where nature-based tourism occurs, such as Churchill,
50 Manitoba, depend on a stable, cold climate to maintain the natural resource base (polar bears,
51 beluga whales, and their associated habitat) that attracts tourism to the region. As global climate
52 changes, these communities are facing increased threats to community resilience (Dawson, et al.
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3 2010). While research suggests that some Arctic communities are aware of climate change, they
4
5 are skeptical of the potential impact of climate change on tourism (Saarinen & Tervo, 2006) and
6
7 thus could be reluctant to adopt adaptation strategies. Further, for many communities, climate
8
9 change is not considered the most immediate or highest-priority challenge they face. In some
10
11 Alaskan communities already impacted by climate change, the primary focus is often on
12
13 achieving some stability by maintaining existing infrastructure and other services to improve
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15 quality of life (Loring, Gerlach, & Penn, 2016)
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23 Tourism is not only impacting the natural resource base upon which it depends in Arctic regions,
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25 but also the culture, cohesiveness, and identity of communities that serve as “gateways” to tourist
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27 areas (Bennett et al., 2012). Many gateway communities rely, at least in part, on subsistence
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29 economies derived from the same natural resource base drawing tourism (Puhakka et al., 2009).
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31 Therefore, community members may view tourism as a threat to their way of life. Tourism can
32
33 also result in increases in “outsiders” to the community as people move to the area to work, often
34
35 in seasonal positions, and reap the economic benefits of tourism. These outsiders can also be
36
37 seen as a threat to the cohesion, culture, and identity of a community, resulting in an overall
38
39 adverse or negative opinion of tourism for local residents (Leeming, 2016; Smith & Krannich,
40
41 1998). The interconnected nature of social and ecological factors at play suggest that
42
43 communities that receive income from nature-based tourism *are* SESs. As SESs, these
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45 communities must both protect natural resources and provide a quality visitor experience that is
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47 both resilient (adaptable to changes in environmental and social conditions, as well as changes to
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49 policy) and sustainable (will endure for future generations).
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Potential indicators of tourism dependence

Indicators are measurable variables that provide a way to quantitatively define, compare, and analyze issues relative to environmental management, including tourism and recreation within and beyond the Arctic (Manning, 2011). Existing literature suggests several socioeconomic indicators which may be useful in determining the relative level of dependence of a given community to nature-based tourism activities. The level of dependence could then be used to assess the resilience or vulnerability of communities to social and ecological change. Several researchers have developed a tourism dependency ratio (Gooch, 1990; Harvey, Hunt, & Harris, 1995; Royer, McCool, & Hunt, 1974; Smith & Krannich, 1998). While the inputs differ slightly, the general formula involves comparing either (or both) per capita lodging sales or gross taxable revenue from eating and drinking establishments to per capita personal income (Gooch, 1990; Smith & Krannich, 1998). These ratios have provided a basic way to roughly judge how economically dependent a given community is on tourism. Data involved is mostly straightforward and directly comparable across communities, but while it is more easily acquired for larger communities such data is difficult to obtain for smaller, remote areas.

Other potential indicators include cost of housing (English et al., 2000; Krannich & Petrzela, 2003), or cost of living (or presence/absence of cost of living subsidies in areas like northern Canada where most housing is publicly owned), percent of houses occupied, and total employment (presumably in number of jobs) in tourism-related facilities or jobs including service-sector and seasonal jobs (Beckley, 1998; English et al., 2000; Krannich & Petrzela, 2003). Total tourism-related income (perhaps more easily measured as tourism-related expenditures that occur within the community) minus spending for business or family travel

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3 could also be a useful indicator (Beckley, 1998; English et al., 2000). These expenditures should
4 include lodging, food and drink purchased at restaurants, recreation and amusement services and
5 other tourism-related retail purchases. While arguably important, total expenditures may be
6 potentially difficult to calculate.
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16 Rates of population growth could help determine the potential importance of tourism on
17 community economy (Krannich & Petrzela, 2003), whereas understanding levels of community
18 identity and connectedness can help determine the level of community “buy-in” to and
19 desirability of tourism as an economic driver (Schweinsberg, Wearing, & Darcy, 2012).
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23 Measuring spatial distribution of income can help determine the amount staying in the local
24 community (Nord, 1994). Factors like economic growth in tourism, resident involvement in the
25 local tourism industry, the type and training given to tourism employees, the condition of natural
26 resources in the area (e.g. the amount of erosion occurring), the presence of a tourism
27 development policy in the community, and whether or not low-impact technology is being
28 utilized could serve as indicators of the sustainability of tourism in a community (Choi & Turk,
29 2016). Participation rates in tourism and recreation activities of both visitors to and residents of
30 the community have also been posited as potential indicators of tourism dependence (Beckley,
31 1998).
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50 One consideration when determining potential indicators is the scale of analysis and available
51 data. As Beckley (1998) points out when examining the “nestedness” of forest dependence, more
52 readily available county level or regional data (such as that compiled in many socio-economic
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3 datasets) may not reveal differences in vulnerability on the scale of individual communities. The
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5 scale of available data can be particularly problematic when examining or applying indicators
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7 across different countries. In their analysis of potential social indicators for examining the effects
8
9 of climate change on Arctic tourism, Fay & Karlsdóttir (2011) found that none of the
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11 jurisdictions they examined within Alaska, Canada, Greenland, Iceland, Finnish Lapland, and
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13 Norway collected data consistently, or in such a way that it is comparable across locations.
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15 Similarly, Maher (2017) notes the difficulty in comparing tourism growth due to lack of
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17 consistency in how, where, and when data are collected. Further, the data collected are often not
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19 at a fine enough resolution (i.e. the community level) to examine the indicators in less-populated,
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21 rural, remote, areas where Arctic tourism often occurs. The authors called for development of a
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23 program to monitor indicators, consistently, at the community-level so as to better assess the
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25 impacts of climate change on Arctic tourism in the future (Fay & Karlsdóttir, 2011).
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34 ***Frameworks for analysis: Measuring resilience or vulnerability to resource dependence***
35 ***among Arctic communities***
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39 Despite the challenges described above, a framework to guide inquiries into the relative
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41 resilience or vulnerability to resource dependency of Arctic communities is necessary. To date,
42
43 no such framework exists. However, a general conceptual framework does exist which suggests
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45 concepts to include when examining resilience and the impacts of protected area tourism on
46
47 communities (Strickland-Munro, Allison, & Moore, 2010). In this framework, authors suggest
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49 that the Resilience Assessment Process (as adapted from the Resilience Alliance (2007)) be used
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51 to investigate resilience of communities impacted by protected area tourism (Figure 1).
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6 <Figure 1 about here>
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12 Further, Kaján (2013) presents a methodological framework for tourism development and
13 community adaptation specifically related to climate change. The framework is designed to aid
14 data collection and assessment of community vulnerability to “climatic risks” (p. 289),
15 combining elements of climate-change adaptation and disaster risk reduction (Kaján, 2013).
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19 While this framework aids in measuring and understanding vulnerability of tourism dependent
20 (or driven) Arctic communities, it is lacking in that it does not identify specific quantifiable,
21 measurable indicators of vulnerability or resilience that could be applied comparatively, across
22 communities, to better understand how differences in community structure may influence the
23 resilience of a tourism-dependent community in the face of global change. We further these ideas
24 by advancing a conceptual framework that more specifically delineates tourism dependence
25 factors (Figure 2) and a suite of practical indicators (Table 1) that provide a way to
26 comparatively measure the degree of dependency.
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43 <Figure 2 about here>
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49 This framework places dependence or resilience of a community in the center to illustrate
50 potential pathways of local development, where resilience is defined as adaptability of the
51 community *and* surrounding environment to change. This includes the ability of the natural
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3 resource base to withstand changes in policy and economics, as well as ability of policy and the
4 local economy to withstand changes in the natural resource base. In order to understand the
5 relative resilience or vulnerability of tourism-dependent communities, a suite of measurable
6 indicators of tourism dependence, derived from tourism dependency literature, is presented
7 (Table 1) that could be compared across Arctic communities that rely to some degree on nature-
8 based tourism as an economic driver. These indicators are broken into “tourism related factors”
9 (income from tourism, participation rates in tourism, tourist perceptions of the natural resource
10 base, and tourist motivations for visiting an area) and “community related factors” (per-capita
11 income/purchasing power, quality of the natural resource base, community control over tourism,
12 and community perceptions of tourism).
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36 While some of the data necessary to assess the indicators provided in Table 1 is readily available
37 from public or government sources, other data, including tourism participation rates, condition of
38 the resource base, visitor perceptions of the natural resource base, and community perceptions of
39 tourism, though measurable, are not currently being collected or publicly available. These
40 indicators would require development and implementation of protocols for collection within
41 most Arctic communities. Though per capita income or purchasing power data is often readily
42 available, this data can be difficult to acquire at the community level for many Arctic countries,
43 such as Finland, which collects and reports this data at the country level (Statistics Finland,
44 2018). As noted by Fay & Karlsdóttir (2011), publicly available data varies widely from country
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to country, and data at the scale of the municipality is often lacking. As such, this data would also need to be collected in the field until a program is developed to consistently monitor these indicators across Arctic communities.

For Peer Review

Conclusions

As global tourism continues to increase, and “last-chance tourism” brings tourists from around the world to Arctic communities to see polar environments and their inhabitants before they are gone forever, Arctic communities may be becoming increasingly dependent on tourism for their development, making these communities more vulnerable to boom-bust cycles and potentially altering community structure and cohesion. This dependence may be the result of communities actively pursuing tourism business opportunities, simply allowing these opportunities to occur, or the result of decisions that are not made locally. In some cases, nature-based tourism may be the only economically viable option to sustain a community. No matter the cause, the concepts of tourism dependency, community resilience, and tourism as SES are relatively under-examined in the context of Arctic communities. However, research in other locations suggests that communities exhibiting these dependencies may be less resilient to change. In a time when global changes (increasing tourism, globalization, and changes to global climate) are influencing Arctic communities, understanding the relative dependence of these communities is important to help determine steps that can be taken to maintain or increase resilience and decrease vulnerability of these communities.

SES approaches suggest that key factors to examine when determining the relative level of dependence of a community on nature-based tourism include policy and governance, the global economy, and the natural resource base. These factors, when examined within the context of a number of indicators of tourism dependence, can provide an understanding of the resilience, or

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3 lack thereof, of the community. The framework we have presented will enable an examination of
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5 potential tourism dependence in Arctic communities where nature-based tourism is the major
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7 focus. Understanding tourism dependence within the context of Arctic communities as SES can
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9 identify the extent to which the resilience of a community may be threatened by dependence on
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11 tourism, and disconnected from traditional and local ecological knowledge when managing the
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13 natural resource base upon which the tourism in these areas depends.
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20 **Declaration of interest statement**

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23 No potential conflict of interest was reported by the authors.
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Tables

42 Table 1

43
44 *Measurable indicators of tourism dependent community resilience, operationalization, and*
45 *potential data sources*

46 Indicators	47 Operationalization (Measurement)	48 Potential Data Sources
49 <u>Tourism-related indicators</u>		
50 Tourism-related income 51 (lodging, expenditures)	52 Annual income generated by 53 businesses providing tourism-related 54 services	55 Lodging 56 establishments, 57 guides, gear outfitters, 58 vehicle rentals, lodges, 59 spas

Tourism participation rates	Total annual visitation numbers	Adjacent national parks, hotels, ski resorts, guides/outfitters, Airbnb stays, vehicle rentals, cruise boats, and other tourist-specific activities
Tourist perceptions of the quality of the resource base	Survey questions (scales) evaluating tourist perceptions	Questionnaires administered on-site
Tourist motivations for visiting an area	Survey questions (scales) evaluating tourist motivations	Questionnaires administered on-site
<u>Community-related indicators</u>		
Per capita income/purchasing power*	Per capita household income = Total household income/Total population	Census data (US, Canada); country-level statistics (e.g. Statistics Finland)
Condition of the natural resource base	Standardized resource inventory such as that used by national parks and protected areas in the US (see National Park Service, 2018)	Resource inventory collected on-site
Community control over tourism	Proportion of tourism-related businesses in a community a) run by local residents and b) whose profits remain entirely within the local community, as well as decision control over taxes, licenses and access to sites, tourism infrastructure, and planning, or presence of a tourism development control policy	Ratio of local/non-local businesses; Policy analysis of regulations and decisions** or key informant interviews
Community perceptions of tourism	Survey, interview, or focus group questions of community member perceptions of tourism indicating impacts on culture, cohesiveness, and identity	On site surveys, interviews or focus groups

* Measures of purchasing power are often more adapted to the peripheral areas in the Arctic. This measure uses fuel prices to control for cost levels (Schmidt et al., 2015)

**This could be conducted by quantitative analysis of decisions/policy indicators similar to Engen et al. (2018), Hausner et al. (2017).

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Figures

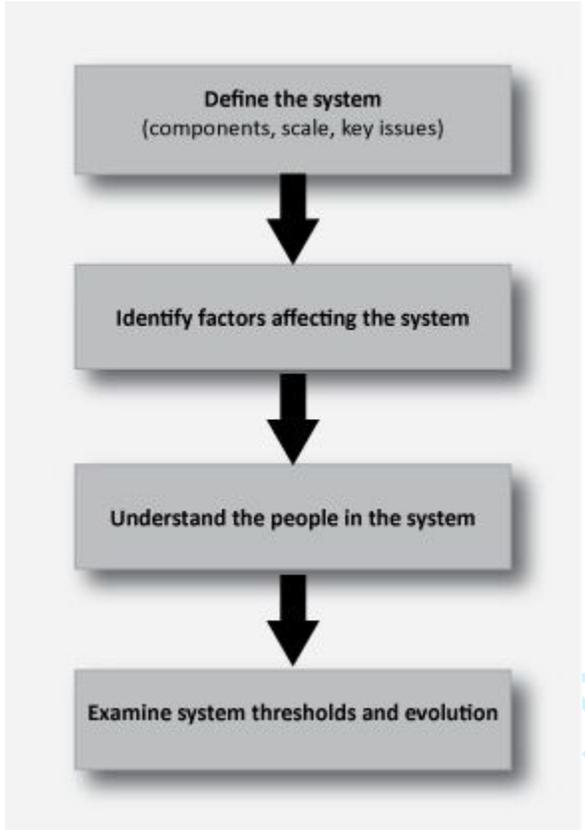


Figure 1.

Peer Review

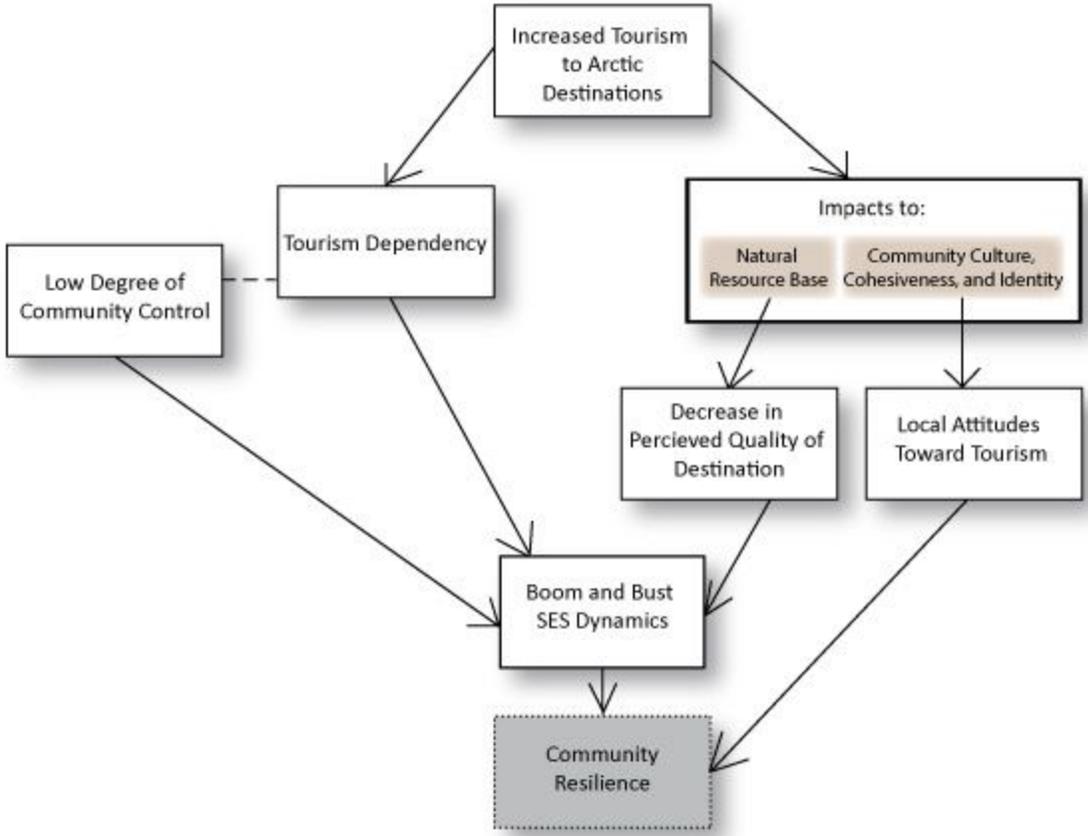


Figure 2.

Review

Figure captions

Figure 1. Conceptual framework for assessing impacts of nature-based tourism on community resilience. Adapted from Strickland-Munro et al., 2010.

Figure 2. A conceptual framework for understanding the factors influencing resilience of Arctic communities dependent on nature-based tourism. Increased nature-based tourism in the Arctic depends on global markets and could influence community resilience through lack of diversification of community revenue sources. According to the staples thesis, tourism dependency could result in boom and bust cycles that could negatively impact local communities (illustrated with black arrows; see Lemelin et al., 2010 and Schmallegger & Carson, 2010). We amend this model and propose that the impacts to the natural resource base can also influence the perceived quality of the destination by tourists and the local attitude towards tourism influencing socio-ecological dynamics. Such a negative spiral could also be influenced by the lack of local infrastructure to support tourism, as well as through adverse sociocultural impacts in the community (culture, cohesiveness, and identity). Finally, we argue that community resilience depends on the potential to regulate tourism locally, for example by being able to regulate traffic through licenses or by having the financial and institutional capacity to build appropriate tourism infrastructure, or even make investments that are not tourism related.

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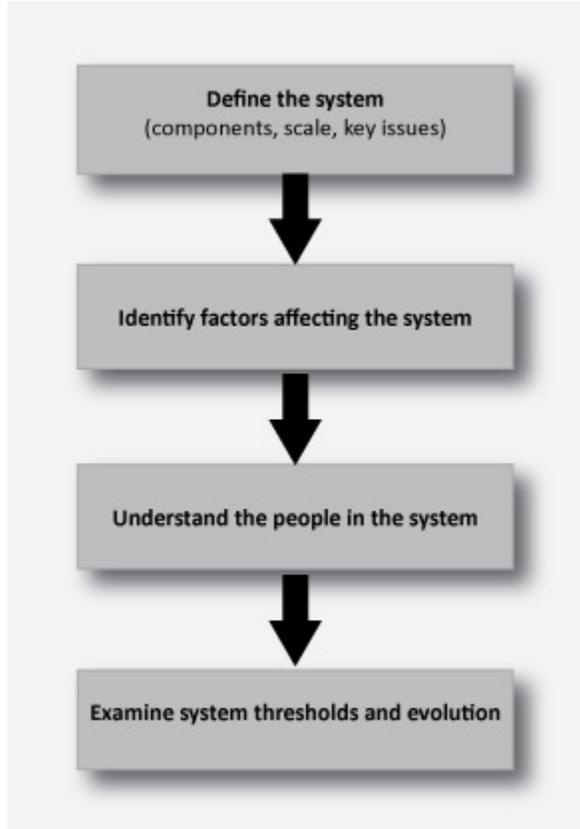


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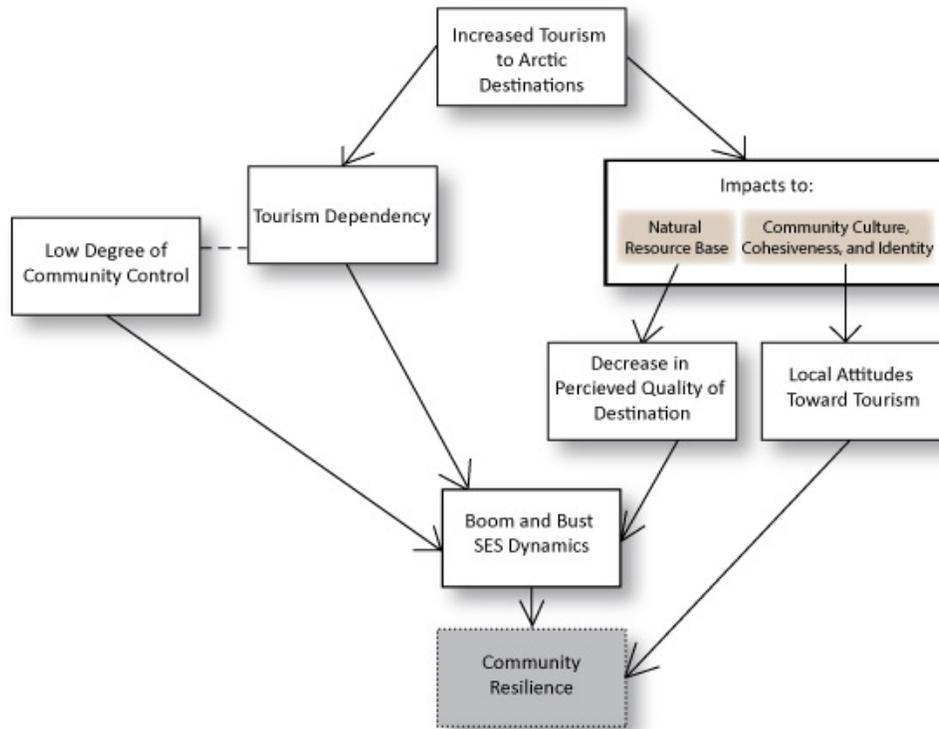


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