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# Tourism supply and demand in the gateway communities of southeastern Utah (USA)

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## ABSTRACT

Although outdoor recreation and tourism drive the economies of many gateway and natural amenity regions (GNARs), community leaders in these areas often lack a clear understanding of how to strategically invest in resources in ways that lead to a balanced portfolio of assets that meets market demands. This research investigates the relationship between the supply of and demand for outdoor recreation and tourism in GNARs across southeastern Utah. We characterize supply assets using four asset classes: *economic*, *environmental*, *infrastructural*, and *sociocultural*. We quantify the demand for outdoor recreation and tourism using geotagged social media in gateway communities adjacent to national parks and other public lands. Our analysis revealed environmental assets (historic trails, viewpoints, proximity to national parks, and campsites specifically) are highly and significantly correlated with outdoor recreation and tourism demand. The findings can guide local, state, regional, and federal officials in strategically investing in tourism assets that align with market demands. For example, strategic investments across the study area in the development of viewpoints that showcase the region's spectacular red rock and desert landscapes, as well as campsites where visitors can base their explorations, are likely to see significant and positive returns in terms of visitation.

## 1. Introduction

Many small, amenity-rich communities in the U.S. have experienced notable changes in their economies over the last half-century (Gannon, 1994; Hjerpe et al., 2022). Once dominated by industries such as farming and mining, these communities have gradually transitioned towards industries in the service sectors (Freudenburg, 1992). Industries supported by outdoor recreation and tourism are now part-and-parcel of many of these communities' economies (Cave & Dredge, 2020; Hjerpe, 2018). The transition has been welcomed by many local leaders who believe investments in outdoor recreation and tourism can lead to more economic diversification and subsequently, enhanced economic resilience (Park et al., 2023; Singh et al., 2003; Ruiz-Ballesteros & del Campo Tejedor, 2020). However, these small communities in amenity-rich regions often lack adequate capital to invest in the parking lots, restroom facilities, and trails required to provide high-quality experiences (Fang,

2020). Even if these communities have the capital to invest in outdoor recreation and tourism development, they often do not have a clear understanding of *how* they should invest in outdoor recreation and tourism (Lee et al., 2020; Risteskia et al., 2012). Consequently, these communities need strategic guidance about which assets to prioritize for future development efforts.

Gateway communities and their surrounding natural amenities such as parks and protected areas are now being referred to as gateway and natural amenity regions (GNARs). GNAR communities are small towns that serve as "gateways" to adjacent state and national parks, outdoor recreation areas, and other public lands (Stoker et al., 2021). GNARs can be characterized by exceptionally high tourism demand and very small populations. For example, the ratio of non-local visits to residents in Moab, Utah, one of the communities in this study, is 55:1.<sup>1</sup> For comparison, Las Vegas, Nevada, which boasts the highest ratio of non-local visits to residents among urban areas in the Western U.S., has a ratio of

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<sup>1</sup> Calculated by dividing the international visitation to Arches National Park in 2021 (1.81 million total visits × the 16% international visitation rate reported by Freimund and Wheeler (2023)) by the population of Moab City in the same year (5317 people). Arches National Park is the region's most visited destination (Zhang et al., 2021). Because the calculation assumes that all visitors to the Moab region visit the park and that all non-local visitation is from international tourists, it is a very conservative estimate.

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10:1 (ESTA, 2019). Many of the challenges faced by GNAR communities have become particularly acute during the COVID-19 pandemic, which facilitated notable increases in both outdoor recreation participation and amenity migration (Harris et al., 2022; Landry et al., 2021; Nelson & Frost, 2023; Taff et al., 2021). In response, federal and state programs as well as private sector capital have begun to specifically focus on effectively developing outdoor recreation, tourism, and transportation infrastructure in and around gateway communities (Community Development Financial Institutions Fund [CDFI Fund], 2022; Hu et al., 2022). Given the growing interest in investing in outdoor recreation and tourism infrastructure, and the numerous ways that current local, state, and federal funds are being distributed, there is an urgent need for an empirical investigation into how these funds should be invested. What types of infrastructure should be invested in if the goal is to build a balanced portfolio of assets that meets market demands? We are unaware of any research that can guide local, state, and federal officials' efforts to *strategically* invest in outdoor recreation and tourism assets likely to induce demand and facilitate rural economic development.

To strategically develop investment plans, communities need to examine which assets induce outdoor recreation and tourism demand (Chen et al., 2021; Formica & Uysal, 2006; Yoshimura & Hiura, 2017). The academic literature on the relationship between the supply of specific outdoor recreation and tourism assets and the demand for outdoor recreation and tourism opportunities has focused heavily on urban areas (Formica & Uysal, 2006; Kozak et al., 2008; Yoshimura & Hiura, 2017). This urban-centric focus likely overlooks many of the unique ways that outdoor recreation and tourism assets in rural, amenity-rich, destinations drive demand (Hjerpe, 2018). The research that does exist has: (1) measured communities' tourism attractiveness based on tourism supply (Aubert et al., 2013; Formica & Uysal, 2006; Lovingood & Mitchell, 1989); (2) classified the type of outdoor recreation tourism supported by different communities based upon existing assets (Spotts, 1995); and (3) proposed the development of "tourism development potential" indices using measures of both supply and demand (Chen et al., 2021). Although this research has provided a variety of insights into the relationship between the supply of and demand for outdoor recreation and tourism, GNARs as a distinct type of destination have been overlooked (Rumore et al., 2019).

Consequently, this study contributes to the development of a foundational understanding between the supply of and demand for outdoor recreation and tourism within gateway communities. We specifically investigate the relationship between the supply of distinct, economic, environmental, infrastructural, and sociocultural assets in and near gateway communities and the demand for outdoor recreation and tourism within those communities. Our analysis focuses on 47 municipalities in southeastern Utah. Findings from the research can support the efforts of local, state, and federal officials interested in strategically investing in outdoor recreation and tourism assets to provide a balanced portfolio of assets that meets market demands and increases the resilience of local economies.

## 2. Literature review

### 2.1. Outdoor recreation and tourism asset investments in GNAR communities

Since the 1970s, the economies of small communities near natural amenities have transitioned away from resource extraction and towards the service industries (Sears & Reid, 1992). In response to this economic restructuring, local, state, and federal government agencies have been actively investing in outdoor recreation, tourism, and transportation infrastructure, workforce training, and tourism-focused marketing to improve the economic diversification and resilience of gateway communities (Bennett et al., 2012; Ezzell et al., 2020). Over the past 10 years in particular, there has been increasing political support and fiscal contributions to support the development of GNAR communities in the

U.S. (CDFI Fund, 2022; Ezzell et al., 2020). In the eastern U.S., for example, the Appalachian Regional Commission (ARC) has prioritized investments and supported hundreds of grant projects every year since 2007 (Appalachian Regional Commission, 2007, 2022). Likewise, western gateway communities have heightened the need for the development of housing, transportation, and other public resources as visitation and in-migration have increased rapidly (Four Points Funding, 2022; Stoker et al., 2021). In Colorado alone, over \$60 million has been allocated to gateway community development (Four Points Funding, 2022). Furthermore, with the signing of the Great American Outdoors Act in 2020, attempts to improve access to federal lands through infrastructure development have accelerated (U.S. Department of the Interior, 2022).

Strategies for investing local, state, and federal infrastructure monies are anything but consistent across the U.S. Some states have boards that allocate legislative funding to outdoor recreation and tourism infrastructure projects (Loris, 2020), while others distribute monies directly from state agencies (such as departments of transportation and governors' offices of economic development) that have the legal authority to do so. Still others distribute funds through a combination of different mechanisms such as state boating and off-highway vehicle programs funded via registration monies (Trout & Smith, 2023). Even when statewide strategies for tourism infrastructure do exist, they are often vague, lacking specific direction on what types of projects infrastructure funds should be used on. Federal funding for infrastructure investments is similarly distributed through numerous channels (e.g., grants administered by the Economic Development Administration; Land and Water Conservation Funds administered through the National Park Service, etc.), each of which has their own priorities and regulatory mandates (Smith & Trout, 2023). Collectively, regional, state, and federal entities can benefit from data, analysis, and knowledge on how to make infrastructure investments in ways that support a balanced portfolio of outdoor recreation and tourism assets that meets market demands.

### 2.2. The supply of and demand for outdoor recreation and tourism

Outdoor recreation and tourism activity does not happen randomly (Formica & Uysal, 2006). Certain communities are more successful in attracting visitors than others (Kirilenko et al., 2020; Wilson et al., 2001). Previous research has examined the supply of and demand for outdoor recreation and tourism for the purposes of informing tourism development planning efforts. This work has tended to focus on: (1) the supply of outdoor recreation or tourism assets (Huang, 2018; Kozak et al., 2008; Marcouiller & Prey, 2005; Spotts, 1997); (2) the demand placed on these assets (Uysal, 1998; Wood et al., 2013; Yang et al., 2011; Zhang et al., 2021); or (3) the relationship between the supply and demand (Aubert et al., 2013; Chen et al., 2021; Formica & Uysal, 2006; Yoshimura & Hiura, 2017). Descriptive characterizations of the supply of and demand for outdoor recreation and tourism, as well as inferential investigations into the relationship between supply and demand, can all aid community leaders, as well as local, state, and federal agencies in understanding what types and where outdoor recreation and tourism investments are needed.

The supply of outdoor recreation and tourism assets provides the physical infrastructure that supports the demand for outdoor recreation and tourism activities, and this process generates economic, environmental, infrastructural, and sociocultural value in communities (Cavalheiro et al., 2019; McGehee et al., 2010; Stone et al., 2022). Previous research has noted the importance of separately quantifying economic, environmental, infrastructural, and sociocultural assets to develop tourism and outdoor recreation management plans (Bennett et al., 2012; Frauman & Banks, 2011) and measure tourism attractiveness (Hawkins, 2004; Hu & Ritchie, 1993). Table 1 documents how previous research has characterized distinct types of outdoor recreation and tourism assets within municipalities across these four broad asset classes.

**Table 1**  
Tourism supply analyses in prior studies.

Index or other measure	Author	Study area	Unit of analysis	Elements
Tourism development stage	Mwongoso et al. (2021)	Gateway communities in Burunge, Lake Natron and Loliondo in Tanzania	Individual (Tourism experts)	<p><b>Sociocultural:</b></p> <ul style="list-style-type: none"> <li>- Status and accessibility of cultural tourism resources and programs</li> <li>- Residents' attitude towards tourism</li> </ul> <p><b>Infrastructural:</b></p> <ul style="list-style-type: none"> <li>- Number of tourism facilities</li> </ul> <p><b>Environmental:</b></p>
County's capacity for sustainable tourism initiatives	Boley et al. (2017)	Counties in Virginia, USA	Individual (Residents)	<ul style="list-style-type: none"> <li>- Status and accessibility of natural tourism resources</li> </ul> <p><b>Sociocultural:</b></p> <ul style="list-style-type: none"> <li>- Preservation of culture and heritage</li> <li>- Land zoning policies</li> <li>- Partnerships amongst community members</li> <li>- Residents' quality of life</li> </ul> <p><b>Economic:</b></p> <ul style="list-style-type: none"> <li>- Tourism job opportunities</li> <li>- Development of four-season available tourism destinations</li> </ul> <p><b>Environmental:</b></p> <ul style="list-style-type: none"> <li>- Conservation of natural environment</li> <li>- Protection of air quality</li> <li>- Development of green certified tourism businesses</li> </ul>
Community capacity for tourism development	Bennett et al. (2012)	Gateway communities around Labrador, Ontario, and the Pacific Rim National Park Reserve, Canada	Individual (Residents, and tourism operators)	<p><b>Sociocultural:</b></p> <ul style="list-style-type: none"> <li>- Social resources (e.g., support for tourism development)</li> <li>- Education</li> <li>- Political support for tourism development</li> <li>- Access to cultural resources</li> <li>- Engagement in cultural activities</li> </ul> <p><b>Economic:</b></p> <ul style="list-style-type: none"> <li>- Financial resources for tourism development (e.g., available funding resources and access to financial resources and opportunities)</li> </ul> <p><b>Infrastructural:</b></p> <ul style="list-style-type: none"> <li>- Tourism-related infrastructure (e.g., transportation and accommodations)</li> </ul> <p><b>Environmental:</b></p> <ul style="list-style-type: none"> <li>- Uniqueness of natural heritage</li> <li>- Attractiveness of natural values</li> <li>- Environmental stewardship plans and strategies</li> </ul>
Tourism development performance	Frauman and Banks (2011)	Watauga County, North Carolina, USA	Individual (Residents)	<p><b>Sociocultural:</b></p> <ul style="list-style-type: none"> <li>- Safety</li> <li>- Healthcare facilities</li> <li>- Noise</li> <li>- Shopping facilities</li> <li>- Historical buildings</li> <li>- Entertainment</li> </ul> <p><b>Economic:</b></p> <ul style="list-style-type: none"> <li>- Local taxes</li> <li>- Affordable housing</li> <li>- Income</li> <li>- New buildings</li> <li>- Attractiveness to invest</li> <li>- Hotels</li> <li>- Restaurants</li> <li>- Jobs</li> </ul> <p><b>Infrastructural:</b></p> <ul style="list-style-type: none"> <li>- Bicycle and pedestrian trails</li> <li>- Traffic</li> </ul> <p><b>Environmental:</b></p> <ul style="list-style-type: none"> <li>- Pollution</li> </ul>

(continued on next page)

Table 1 (continued)

Index or other measure	Author	Study area	Unit of analysis	Elements
Tourism dependency	Marcouiller and Prey (2005)	Wisconsin, U.S.	County	<ul style="list-style-type: none"> <li>- Uncontrolled development</li> <li>- Quality of natural environment</li> <li>- Erosion</li> <li>- Wildlife</li> <li>- Open space</li> <li>- Undeveloped mountain tops and slopes</li> </ul> <p><b>Infrastructural:</b></p> <ul style="list-style-type: none"> <li>- Campsites</li> <li>- Ski hills per capita</li> <li>- Amusement parks per square mile</li> </ul> <p><b>Environmental:</b></p>
Destination competitiveness	Hawkins (2004)	Gateway communities in Indonesia	Municipality	<ul style="list-style-type: none"> <li>- State parks per capita</li> <li>- Water acreage per square mile</li> <li>- Public land per square mile</li> </ul> <p><b>Sociocultural:</b></p> <ul style="list-style-type: none"> <li>- Heritage sites</li> <li>- Tourism products</li> </ul> <p><b>Economic:</b></p> <ul style="list-style-type: none"> <li>- Hotels</li> <li>- Receptive tour operators</li> <li>- Restaurants</li> <li>- Retails</li> <li>- Entertainment</li> </ul> <p><b>Infrastructural:</b></p> <ul style="list-style-type: none"> <li>- Transportation</li> </ul> <p><b>Environmental:</b></p> <ul style="list-style-type: none"> <li>- Environmental management programs</li> <li>- National parks</li> </ul>
Regional analysis of tourism resources	Spotts (1995)	Michigan, U.S.A.	County	<ul style="list-style-type: none"> <li>- Urban tourism resources</li> </ul> <p><b>Infrastructural:</b></p> <ul style="list-style-type: none"> <li>- Canoeing/ORV riding tourism resources</li> </ul> <p><b>Environmental:</b></p> <ul style="list-style-type: none"> <li>- Parkland tourism resources</li> <li>- Lake Michigan coastal tourism resources</li> <li>- General wildland tourism resources</li> <li>- General coastal tourism resources</li> </ul>
Tourism attractiveness of a destination	Hu and Ritchie (1993)	Hawaii, Australia, Greece, France, and China	State or country	<p><b>Sociocultural:</b></p> <ul style="list-style-type: none"> <li>- Historical attractions</li> <li>- Local people's attitudes toward tourists</li> <li>- Uniqueness of local people's life</li> </ul> <p><b>Economic:</b></p> <ul style="list-style-type: none"> <li>- Availability/quality of accommodations</li> </ul> <p><b>Environmental:</b></p> <ul style="list-style-type: none"> <li>- Scenery</li> <li>- Climate</li> </ul>
Tourism supply resources	Lovingood and Mitchell (1989)	South Carolina, U.S.	County	<p><b>Sociocultural:</b></p> <ul style="list-style-type: none"> <li>- Historical sites</li> <li>- Population</li> <li>- Festivals</li> </ul> <p><b>Economic:</b></p> <ul style="list-style-type: none"> <li>- Hotels and hotel rooms</li> <li>- Restaurants</li> </ul> <p><b>Infrastructural:</b></p> <ul style="list-style-type: none"> <li>- Boat ramps</li> <li>- Campgrounds and campsites</li> <li>- Golf courses</li> </ul> <p><b>Environmental:</b></p> <ul style="list-style-type: none"> <li>- State parks and natural sites</li> </ul>

For economic outdoor recreation and tourism assets, researchers have frequently quantified the number of businesses within the accommodation and food service sectors, this includes hotels, motels, and restaurants (Bennett et al., 2012; Frauman & Banks, 2011; Hawkins, 2004; Hu & Ritchie, 1993; Lovingood & Mitchell, 1989). Measures of environmental assets have varied widely, including measures such as the quality and accessibility of natural resources (Boley et al., 2017; Lovingood & Mitchell, 1989; Marcouiller & Prey, 2005; McGehee et al., 2010; Spotts, 1997). Previous research on infrastructural assets tends to focus on easily quantifiable metrics such as the number of developed camp sites or boat ramps as measures of supply (Bennett et al., 2012; Frauman & Banks, 2011; Hawkins, 2004). In terms of sociocultural outdoor recreation and tourism assets, researchers have usually focused on the number and types of attractions, events, and services, including festivals, historical places, and museums (Bennett et al., 2012; Frauman & Banks, 2011; McGehee et al., 2010; Mwangoso et al., 2021). A few studies have also considered the characteristics of local residents in a host community, such as the size of the population and their attitudes toward outdoor recreationists and tourists, to understand supply (Boley et al., 2017; Mwangoso et al., 2021). Across these four assets, investigations have focused on a broad range of specific questions ranging from strategic planning efforts and resource allocation decisions to the development of marketing strategies.

Broadly, the demand for outdoor recreation and tourism is the willingness of people to participate in outdoor recreation and tourism activities (Dwyer et al., 2020). As shown in Table 2, the demand for outdoor recreation and tourism has been measured in a variety of different ways. Previous research has quantified demand through: (1) the number of non-locals arriving and/or departing from a certain area (Kirilenko et al., 2020; Kozak et al., 2008; Song et al., 2010; Yang et al., 2011; Zhu et al., 2018); (2) tax receipts (Aubert et al., 2013; Yang et al., 2021); (3) local expenditures at establishments that cater to outdoor recreationists and tourists (Au & Law, 2002; Hjerpe, 2018; Law & Au, 2000; Mules, 2005; Song et al., 2010); (4) average lengths of stay (Kozak et al., 2008; Yang et al., 2011); (5) occupancy rates (Law, 2004; Supak et al., 2015); and most recently (6) posts on social media (Wood et al., 2013; Zhang et al., 2021). Social media have now been used widely to characterize visitation to outdoor recreation and tourism destinations within cities (Ilieva & McPhearson, 2018; Wood et al., 2013) as well as park and protected areas (Wilkins et al., 2021a,b).

Investigations into the relationship between the supply of and demand for outdoor recreation and tourism are necessary to understand the specific assets highly and significantly associated with demand (Rice et al., 2019; Tardieu & Tuffery, 2019). Many studies have explored how outdoor recreation and tourism supply and demand are related in urban

areas (Bing et al., 2021; Encalada-Abarca et al., 2022). However, few studies have focused on the supply of, and demand for, outdoor recreation and tourism in GNARs (Table 3). The research which has occurred has varied in its goals and objectives, from attempting to determine how to most effectively brand rural communities (Ageeva and Foroudi; 2019) to quantifying “tourism development potential” (Chen et al., 2021; Gazoni & Silva, 2022; Liu, 2003; Souza, Thapa, Rodrigues, & Imori, 2019; Yoshimura & Hiura, 2017) and tourism attractiveness (Aubert et al., 2013; Formica & Uysal, 2006). Dunning’s (2005) research on gateway communities is one of the few investigations to explicitly focus on tourism supply and demand systems in GNARs. However, her work focused exclusively on the relationship between transportation infrastructure supply and tourism demand, ignoring other asset types which can affect tourism demand. There is an acute need for data, analysis, and insights into how GNARs can build a balanced portfolio of outdoor recreation and tourism assets that respond to market demands.

### 3. Methods

#### 3.1. Study area

47 municipalities, located in the six southeastern-most counties of Utah (U.S.A.) met the criteria of what a GNAR community is (Stoker et al., 2021). These criteria include having a population of between 150 and 25,000, being within 10 miles (16.1 km) of national parks and other protected and public areas, and being more than 15 miles (24.1 km) from an urban area. With abundant natural and cultural resources, gateway communities are known for outdoor recreation and tourism activities, such as boating, hiking, paddling, and off-highway vehicle riding. Although outdoor recreation and tourism have become one of the main economic drivers of the gateway communities of southeastern Utah (Smith & Miller, 2020), they are still facing numerous challenges for effectively developing outdoor recreation and tourism resources in ways that will bolster local economic development and resilience (Rumore et al., 2019). The names and locations of the 47 gateway communities of southeastern Utah are shown in Fig. 1.

#### 3.2. Variables

Table 4 summarizes variables used in this study. The dependent variable—outdoor recreation and tourism demand—reflects visitation to a municipality for the purposes of participating in outdoor recreation and tourism. To measure this demand, we utilized Flickr data, which captures individuals’ photo-sharing behavior between 2019 and 2021. While the number of Flickr posts may not precisely indicate the exact

**Table 2**  
Tourism demand analyses in prior studies.

Index or other measure	Author	Study area	Unit of analysis	Elements
Visitation	Zhang et al. (2021)	Utah, U.S.	County	Visitation (Flickr & Panoramio)
Regional economic impacts of tourism	Hjerpe (2018)	Northeastern Minnesota, USA	Individual (Visitors)	Expenditures
Overnight accommodation reservations	Supak et al. (2015)	Federal lands in the U.S.	Zip Code	Overnight accommodation reservations
Visitation rates	Wood et al. (2013)	836 sites in 31 countries around the world	Photo-user-days	Visitation (Flickr)
The length of stay	Yang et al. (2011)	Yixing, China	Individual (Visitor)	Traveling distance, Age, Transportation, Motivation, Assessment of accommodation, Past visits
Tourism demand forecasting	Song et al. (2010)	Hong Kong	Individual (Tourist)	Tourist arrivals, Tourist expenditure
Multiple demand measures	Kozak et al. (2008)	80 cities in Turkey	Municipalities	Average length of stay in nights spend by foreign and domestic visitors, Occupancy rate for foreign visitors, The number of foreign visitors, The number of domestic visitors
Economic impacts of tourism on gateway communities	Mules (2005)	Gateway communities around Kosciuszko National Park, Australia	Individual (Visitor)	Expenditures

**Table 3**  
Measures of the relationship between tourism demand and supply in previous research.

Index or other measure	Author	Study area	Unit of analysis	Elements
Tourism development potential index	Chen et al. (2021)	Hainan (Belt and Road), China	Provincial administrative division	<b>Supply:</b> Direct supply and consumption, Indirect supply and consumption, Value of landscape resources, Value of climate resources, Economic contribution, Employment contribution <b>Demand:</b> Demand potential, Purchasing potential
Potential dependence on nature-based tourism	Sisneros-Kidd et al. (2019)	Communities in the Arctic	County and individual (Residents and visitors)	<b>Supply:</b> Tourism-related businesses and quality of tourism resources <b>Demand:</b> Tourism-related income (lodging), visitation
Visitation potential	Souza, Thapa, Rodrigues, and Imori (2019)	Federal protected communities in Brazil	Individual (Tourism experts)	<b>Supply:</b> Natural/cultural variety, scenic attractiveness, diversity of activities, recreational facilities, visitor services, budget for protected areas, roads and trails, tourist attractions, population density, lodging and restaurants <b>Demand:</b> Visitor density, no. of visitors
Relationships between demand and potential supply	Yoshimura and Hiura (2017)	Hokkaido, Japan	Municipality	<b>Supply:</b> Naturalness (e.g., vegetation types), Water (e.g., distance from lake, rivers, and coastline), Topography (e.g., distance from volcanic/non-volcanic topography) <b>Demand:</b> Visitation (Flickr)
Tourism index	Aubert et al. (2013)	Hungary	Settlement	<b>Supply:</b> Attractions, Dominant tourism products, Tourist information office, Accommodations <b>Demand:</b> Tourism tax
Tourism attractiveness	Formica and Uysal (2006)	Virginia, U.S.	County	<b>Supply:</b> Tourism services/facilities, Cultural/historical, Rural lodging, Outdoor recreation <b>Demand:</b> The availability of attraction dimensions rating by the 40 experts
The impacts of transit on regional economies in gateway communities	Dunning (2005)	Gateway communities around Cape Cod National Seashore, Acadia/Hot Springs/Bryce Canyon/Zion/Yosemite/Denali National Parks	Individual (Tourism and outdoor recreation stakeholders)	<b>Supply:</b> Public roads and transit services <b>Demand:</b> Visitation and ridership

number of tourism visitations, numerous studies have demonstrated a strong correlation between estimated visitor numbers based on *Flickr* data and the actual number of visitors (e.g., Wilkins et al., 2021a,b; Wood et al., 2013; Zhang et al., 2021). Additionally, social media platforms, including *Flickr*, have been extensively used to quantify visitation to and mobility within communities (e.g., Donahue et al., 2018; Hamstead et al., 2018; Ilieva & McPhearson, 2018). This approach allows us to capture trends in outdoor recreation and tourism activity, providing valuable insights into the number of visitors over time. Using the literature review above as a guide, we compiled data for 22 explanatory variables reflecting the supply of outdoor recreation and tourism assets; these supply measures were categorized by the four distinct asset classes used frequently in the literature (economic, environmental, infrastructural, and sociocultural).

### 3.3. Data processing analysis

To assess the relationship between outdoor recreation and tourism assets and the demand for those assets, data processing occurred in two stages. First, we retained only one *Flickr* post per user, per day within the same municipality (i.e., gateway community) to avoid oversampling users who posted several photos on the same day within the same municipality. This follows the standard practice within research using social media to estimate visitation to municipalities or park and protected areas (Wilkins et al., 2021a,b). Subsequently, we compiled the outdoor recreation and tourism visitation data per day in each gateway community. To stabilize the representation of tourism visitation and mitigate the impact of outliers in the visitation data, we calculated the annual average number of *Flickr* posts over the three-year period from 2019 to 2021.

Second, we examined all independent variables for normality, log-transforming those with skewness values below  $-2$  or above  $+2$  and

kurtosis below  $-7$  or above  $+7$  (Hair et al., 2010). After data processing, we constructed four ordinary least squares regression models, each of which was fit with independent variables of a distinct asset class (economic, environmental, infrastructural, and sociocultural). We chose to fit asset class specific models as it can provide insights into which specific resources, *within each of the asset classes*, are significantly and most closely related to demand. Some decision makers and stakeholders within the region may only have an interest in, or influence over, one particular type of asset. Fitting asset class specific models minimized instability in model estimates that would have arisen from using a single model with all 22 independent variables. Within each model, we used the Variance Inflation Factor (VIF) to identify multicollinearity amongst independent variables; variables with values greater than 10.0 were selectively removed (Hair et al., 2010). Finally, we constructed a composite model comprised of only those assets which were significantly related to demand in each of the asset class specific sub-models. Each of the regression models can be expressed as:

$$Demand_m = \alpha_m + \sum_{i=1}^I \beta_s Supply_{ms} + \varepsilon_s$$

where the demand for outdoor recreation and tourism in municipality  $m$  is a function of a set supply measures  $s$  and their associated estimated coefficients  $\beta$  across of range of asset classes  $I$ .  $\alpha$  and  $\varepsilon$  are the intercept and error, respectively.

## 4. Results and discussion

### 4.1. Descriptive statistics

Table 5 shows descriptive statistics for all variables used in the analysis. The total count of shared photos within each community ranged from 0 to 92; these values reflect the variation in demand for

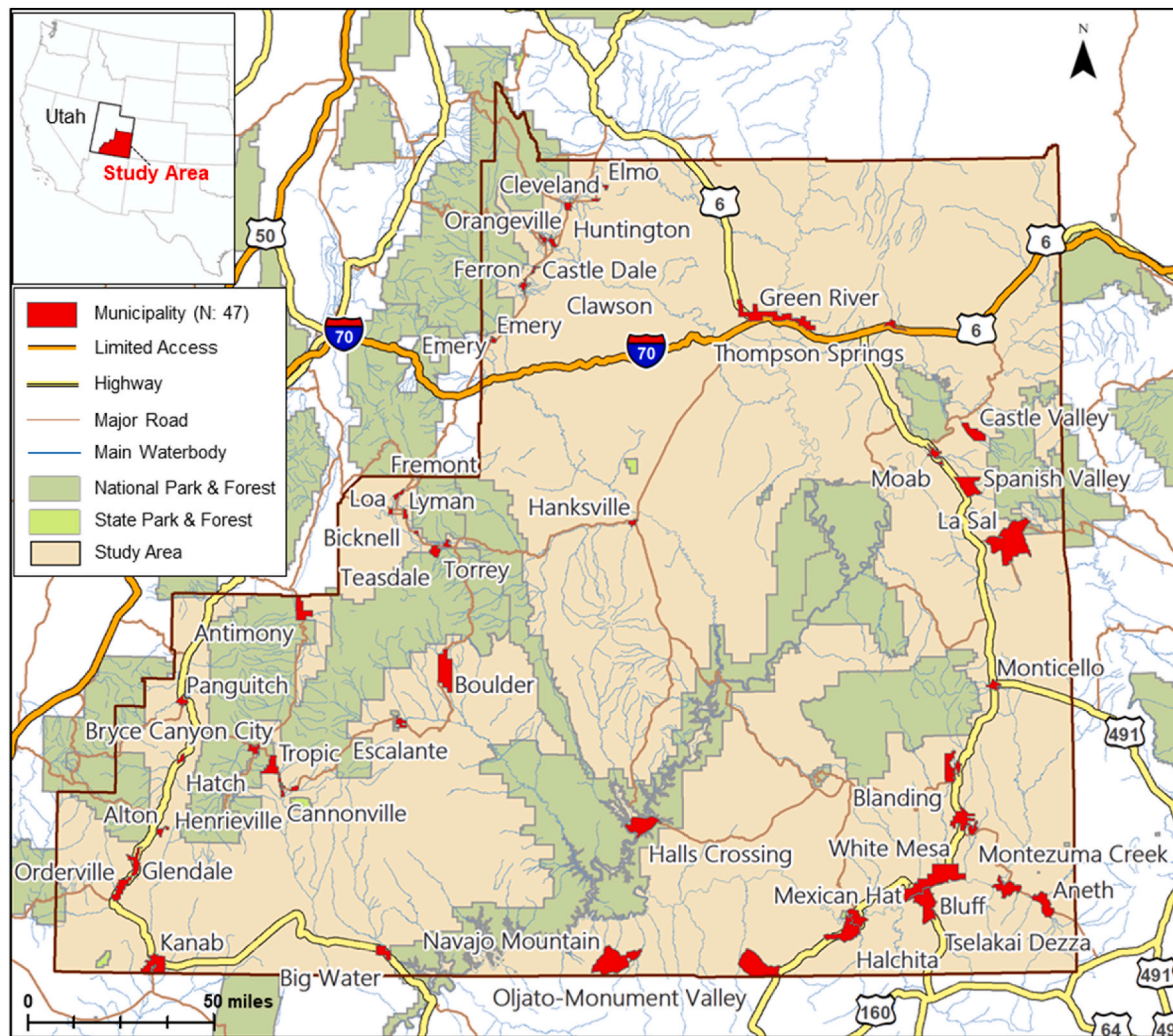


Fig. 1. Study area.

outdoor recreation and tourism from 2019 to 2021 within the study communities of southeastern Utah. The population sizes of the areas ranged from 6 to 6009; which is on the lower end of the population range criteria of GNARs established by [Stoker et al. \(2021\)](#). Across all of the independent variables, a considerable number of assets, including hotels/motels and restaurants, were not present in many of the gateway communities within our sample, suggesting these municipalities do not currently offer a full array of outdoor recreation and tourism assets.

#### 4.2. Outdoor recreation and tourism supply determinants of visitation

[Table 6](#) shows the results obtained from the four asset class specific models as well as the composite model. The adjusted  $R^2$  values of the five models ranged from 0.31 to 0.70 ([Table 6](#)), indicating moderate goodness-of-fit. The environmental model ( $R^2 = 0.55$ ; Adjusted  $R^2 = 0.50$ ) and infrastructural model ( $R^2 = 0.56$ ; Adjusted  $R^2 = 0.47$ ) showed relatively higher explanatory power than the economic ( $R^2 = 0.49$ ; Adjusted  $R^2 = 0.46$ ) and sociocultural ( $R^2 = 0.30$ ; Adjusted  $R^2 = 0.21$ ) models, suggesting environmental and infrastructural assets explain more of the outdoor recreation and tourism demand within these gateway communities than sociocultural and economic assets. These findings support prior research suggesting investments in the infrastructural and environmental assets of gateway communities can induce outdoor recreation and tourism demand ([Souza et al., 2019](#)).

In the economic model, hotels and motels were positively and

significantly associated with outdoor recreation and tourism demand ( $\beta = 0.58$ ,  $p < 0.05$ ), suggesting these are key assets which attract and support visitation. These results are expected and consistent with the findings of previous research indicating overnight visitors to national and state parks and other public lands usually stay in nearby gateway communities ([Back et al., 2021](#); [Bonn et al., 1992](#); [Lockyer & Roberts, 2009](#)). Meanwhile, unlike prior studies' findings that restaurants are key resources attracting visitors in gateway communities ([Frauman & Banks, 2011](#); [Hawkins, 2004](#)), our findings showed the number of restaurants were not significantly related to outdoor recreation and tourism demand in the gateway communities of southeastern Utah. This result may stem from the widely dispersed nature of outdoor recreation and tourism destinations around gateway communities and the resulting spatial behavior of visitors. More simply, visitors to parks and public lands in the study region may tend to begin and end their trips within a gateway community, but infrequently return to that community to use local restaurants.

In the environmental model, viewpoints, parks, proximity to a national park, and proximity to public lands were significantly associated with demand ( $\beta = 0.45$ ,  $p < 0.001$ ;  $\beta = 0.51$ ,  $p < 0.001$ ;  $\beta = -0.35$ ,  $p < 0.05$ ;  $\beta = 0.29$ ,  $p < 0.05$ , respectively). The variable of distance to the closest national park yielded a negative regression coefficient; the closer the municipality is to the national park, indicating that municipalities in closer proximity to national parks tend to experience an increase in demand for outdoor recreation and tourism. This heightened demand is

**Table 4**  
Summary of variables.

Variable	Description	Source	Date
<b>Economic tourism supply</b>			
Hotels and motels	Log-transformed number of hotels and motels	OSM, DMO	2021
Restaurants	Log-transformed number of restaurants, cafes, fast foods, and pubs	OSM, DMO	2021
Residential areas	Number of populations	UGRC	2011
<b>Environmental tourism supply</b>			
Viewpoints	Log-transformed number of viewpoints	OSM	2021
Water body	Length of the water body	USGS, NHD	2020
Parks	Log-transformed number of local, state, and national parks	PAD-US	2018
Proximity to a national park	Log-transformed road-based network distance from municipalities to the closest national park	NPS, PAD-US	2018
Proximity to a public land distance	Log-transformed road-based network distance from municipalities to the closest public land	BLM, PAD-US	2018
<b>Infrastructural tourism supply</b>			
Roads and highways	Length of roads and highways	UDOT	2021
Pathways	Log-transformed length of trails and pathways	SGID	2021
Healthcare facilities	Number of healthcare facilities	SGID	2017
Camp sites	Number of camp sites	OSM	2021
Boat ramps	Number of boat ramps	SGID	2009
Scenic byways	Length of scenic byways	UDOT	2021
Golf courses	Log-transformed area of golf courses	SGID	2016
Railroads	Log-transformed length of railroads	SGID	2021
<b>Sociocultural tourism supply</b>			
Historic districts	Log-transformed area of historic districts	SGID	2021
Historic trails	Log-transformed length of historic trails	SGID	2021
Historical monuments	Number of historical monuments	UGRC	2021
Visitor centers	Number of visitor centers managed by federal land management agencies	SGID	2020
Museums	Number of museums	OSM, DMO	2021
<b>Tourism demand</b>			
Recreation and tourism visitation	Annual average number of photos uploaded to Flickr	Flickr	2019–2021

Note: OSM: OpenStreetMap; SGID: State Geographic Information Database; UDOT: Utah Department of Transportation; UGRC: Utah Geospatial Resource Center.

not limited to community residents but extends to visitors attracted to the area as well. This finding may not be too surprising given the strong ties between the national parks of southern Utah and visitation to the gateway communities outside these parks (Depew, 2023; Drugova et al., 2021). The significance of viewpoints to outdoor recreation and tourism demand is also not surprising given the region is well known for its iconic scenic vistas.

The infrastructural model revealed camp sites ( $\beta = 0.54, p < 0.001$ ) and scenic byways ( $\beta = 0.33, p < 0.05$ ) were significantly associated with outdoor recreation and tourism demand. These findings, again are expected, given visitation to the gateway communities of southeastern Utah is commonly defined by nature-based outdoor recreation and tourism experiences like camping throughout the year and scenic drives (Husarik, 2008). Importantly however, our analysis did reveal the total extent of the local road network (i.e., km of roads and highways) was not

**Table 5**  
Descriptive statistics.

Variable	Minimum	Maximum	Mean	Median	Std. Dev.
<b>Economic tourism supply</b>					
Hotels and motels	0.00	38.00	3.45	1.00	6.62
Restaurants	0.00	35.00	3.49	1.00	6.38
Residential areas	6.00	6009.00	828.15	382.00	1188.22
<b>Environmental tourism supply</b>					
Viewpoints	0.00	1.00	0.04	0.00	0.20
Water body	0.00	17.85	5.99	4.55	4.92
Parks	0.00	9.00	0.91	0.00	1.67
Proximity to a national park	0.61	323.00	45.52	33.71	50.14
Proximity to a public land	0.00	23.68	1.53	0.56	3.75
<b>Infrastructural tourism supply</b>					
Roads and highways	8.91	165.51	37.02	28.75	32.91
Pathways	0.00	52.87	4.51	0.38	9.87
Healthcare facilities	0.00	10.00	1.00	0.00	2.05
Camp sites	0.00	3.00	0.47	0.00	0.88
Boat ramps	0.00	1.00	0.09	0.00	0.28
Scenic byways	0.00	19.36	3.09	1.08	4.64
Golf courses	0.00	0.45	0.02	0.00	0.07
Railroads	0.00	26.48	0.68	0.00	3.92
<b>Sociocultural tourism supply</b>					
Historic districts	0.00	1.19	0.06	0.00	0.23
Historic trails	0.00	16.58	1.33	0.00	3.82
Historical monuments	0.00	5.00	1.40	1.00	1.56
Forest services	0.00	1.00	0.13	0.00	0.34
Museums	0.00	3.00	0.23	0.00	0.60
<b>Tourism demand</b>					
Photo user days (2019–2021)	0.00	92.00	11.00	3.00	18.65

related to outdoor recreation and tourism demand; this is consistent with the findings of Dunning (2005). This finding, in conjunction with the noted significant association between scenic byways and visitation, suggests the *designation* of roadways as scenic, as opposed to just the presence of extensive access roads, is an important factor in visitors' travel decisions.

In the sociocultural model, historical trails and museums were positively and significantly associated with outdoor recreation and tourism demand ( $\beta = 0.28, p < 0.05$ ;  $\beta = 0.40, p < 0.05$ , respectively). These findings are in line with the belief that historic trails enhance accessibility to cultural and historic sites while also being important for visitors (Moore & Shafer, 2001). Previous survey- and interview-based research has suggested historic districts and monuments are important to visitors (Frauman & Banks, 2011; Hawkins, 2004; Hu & Ritchie, 1993). However, our analysis revealed these assets are not associated with outdoor recreation and tourism demand in the gateway communities of southeastern Utah.

Finally, in the composite model, historic trails ( $\beta = 0.20, p < 0.05$ ), viewpoints ( $\beta = 0.46, p < 0.001$ ), proximity to a national park ( $\beta = -0.23, p < 0.05$ ), and camp sites ( $\beta = 0.38, p < 0.05$ ) were all significantly associated with outdoor recreation and tourism demand. These results highlight the importance of environmental attributes in influencing demand in gateway communities throughout the region. Strategic investments in the development of viewpoints that showcase the spectacular red rock and desert landscapes of the Colorado Plateau, as well as campsites where visitors can base their explorations, are likely to see significant and positive returns in terms of visitation.

When comparing the results between the composite model and each asset class-specific model, notable disparities emerged, particularly in the economic model. While hotels and motels exerted a significant influence on outdoor recreation and tourism demand in the economic model, their impact notably declined and became statistically



**Table 6**  
Outdoor recreation and tourism asset determinants of recreation and tourism visitation.

Asset Class	Model	Std. B	t	Sig.	VIF	R <sup>2</sup>	Adjusted R <sup>2</sup>	SE
Economic	Constant		-0.24	0.82		0.49	0.46	13.75
	<b>Hotels and motels</b>	<b>0.58</b>	<b>2.06</b>	<b>0.04</b>	<b>6.59</b>			
	Restaurants	-0.01	-0.04	0.97	7.21			
Environmental	Residential areas	0.20	1.39	0.17	1.71	0.55	0.50	13.21
	Constant		1.94	0.06				
	<b>Viewpoints</b>	<b>0.45</b>	<b>3.96</b>	<b>0.00</b>	<b>1.18</b>			
	Water body	0.18	1.60	0.12	1.16			
	<b>Parks</b>	<b>0.51</b>	<b>4.85</b>	<b>0.00</b>	<b>1.02</b>			
	<b>Proximity to a national park</b>	<b>-0.35</b>	<b>-2.94</b>	<b>0.01</b>	<b>1.32</b>			
Infrastructural	<b>Proximity to a public land</b>	<b>0.29</b>	<b>2.34</b>	<b>0.02</b>	<b>1.41</b>	0.56	0.47	13.64
	Constant		-0.53	0.60				
	Roads and highways	0.11	0.64	0.53	2.63			
	Pathways	0.03	0.15	0.88	2.70			
	Healthcare facilities	0.15	0.97	0.34	2.18			
	<b>Camp sites</b>	<b>0.54</b>	<b>3.55</b>	<b>0.00</b>	<b>1.97</b>			
	Boat ramps	-0.05	-0.33	0.74	1.65			
	<b>Scenic byways</b>	<b>0.33</b>	<b>2.54</b>	<b>0.02</b>	<b>1.43</b>			
	Golf courses	-0.15	-1.18	0.24	1.30			
	Railroads	0.03	0.23	0.82	1.65			
	Sociocultural	Constant		0.88	0.38			
Historic districts		0.04	0.29	0.78	1.25			
<b>Historic trails</b>		<b>0.28</b>	<b>2.10</b>	<b>0.04</b>	<b>1.05</b>			
Historical monuments		0.11	0.75	0.46	1.32			
Forest services		0.10	0.69	0.50	1.10			
<b>Museums</b>		<b>0.40</b>	<b>2.95</b>	<b>0.01</b>	<b>1.10</b>			
Composite	Constant		1.47	0.15		0.77	0.71	10.06
	<b>Historical trails</b>	<b>0.20</b>	<b>2.28</b>	<b>0.03</b>	<b>1.26</b>			
	<b>Viewpoints</b>	<b>0.46</b>	<b>4.81</b>	<b>0.00</b>	<b>1.44</b>			
	Museums	0.09	0.90	0.38	1.66			
	Hotels and motels	0.11	0.78	0.44	3.34			
	Parks	0.19	1.76	0.09	1.73			
	<b>Proximity to a national park</b>	<b>-0.23</b>	<b>-2.29</b>	<b>0.03</b>	<b>1.60</b>			
	Proximity to a public land	0.15	1.40	0.17	1.90			
	<b>Camp sites</b>	<b>0.38</b>	<b>2.74</b>	<b>0.01</b>	<b>2.97</b>			
	Scenic byways	0.09	0.94	0.36	1.58			

insignificant in the composite model. This suggests that while the number of hotels and motels are important for facilitating outdoor recreation and tourism across the region, their *relative* importance to environmental assets such as historic trails, viewpoints, and campsites is marginal.

## 5. Conclusion and implications

This work focused exclusively on the supply of and demand for outdoor recreation and tourism in gateway communities, a unique type of municipality which has been overlooked in previous investigations. We argue these communities need more focused attention in the future, given they have many options when choosing how to invest in outdoor recreation and tourism, but often lack the data and information necessary to make empirically-grounded decisions. Do these communities invest in new museums? Incentivize the establishment of new bed and breakfasts? What about funding the development of more trailheads and trails? All of these are options for gateway communities looking to build their local outdoor recreation and tourism economy. But they are not all options that the small, underfunded, and understaffed municipal governments in gateway communities can explore through trial and error. Each takes significant investments in time and resources.

Our research, which has been informed by previous case studies of individual GNARs (e.g., Dunning, 2005; Hu et al., 2022) as well as other more regional research (Stoker et al., 2021), has been guided by the proposition that GNARs can make strategic investments in outdoor recreation and tourism assets to build a balanced supply portfolio that meets market demands. Specifically, our approach outlines how categorizing outdoor recreation and tourism assets into four distinct classes (i.e., economic, environmental, infrastructural, and sociocultural) can guide the supply and demand management efforts of destination development and marketing professionals. Our findings suggest

practitioners in southeastern Utah should prioritize strategic investments in specific types of environmental and infrastructural assets that are significantly correlated with demand in their efforts to build balanced supply portfolios. In southeastern Utah's gateway communities, a prioritization of developing viewpoints, campsites, and scenic byways can stimulate outdoor recreation and tourism demand.

The implications of our findings go beyond southeastern Utah's GNARs and can contribute to the broader literature on destination resilience and competitiveness. Drawing upon concepts prevalent in the destination marketing and management literature, such as destination competitiveness, branding, and visitor experience optimization, our findings highlight the importance of aligning asset development with demand patterns. This alignment is vital for destination management organizations everywhere and underlines the universal relevance of our approach to asset categorization for strategic investment and marketing decisions. This framework facilitates a systematic analysis of strengths, weaknesses, opportunities, and threats to diverse tourism and outdoor recreation assets, thereby informing tailored strategic development plans that resonate with both visitor demands and destination identity.

Local and regional officials can use similar approaches in other GNARs to analyze and subsequently *strategically* invest in distinct types of outdoor recreation and tourism assets that ultimately enhance the economic resilience of their regions. Our study addresses the critical need for evidence-based decision-making in resource allocation within destination marketing and management. This is particularly relevant in the context of limited budgets, where prioritizing investments are needed to yield positive returns on investment and community impacts. There remains a significant amount of research to be done on outdoor recreation and tourism promotion efforts in GNARs. Future investigations into the unique ways that marketing and promotion efforts benefit *and harm* the economies and residents of these communities is needed. Similarly, more work is needed on how GNARs can overcome

the limitations of their small municipal government budgets and staff by leveraging regional networks of technical expertise and shared experiences (e.g., Powell et al., 2022). These are just a few of the many avenues that tourism scholars, geographers, sociologists, and other academicians can consider to help focus their efforts to assist GNARs. Through more focused scholarship on these communities, we can gain a more comprehensive understanding of the dynamics shaping outdoor recreation and tourism demand within them, and also inform the development of strategic planning for community development and promotion.

### CRedit authorship contribution statement

**Eunjung Yang:** Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Jordan W. Smith:** Writing – review & editing, Supervision, Investigation, Funding acquisition, Conceptualization.

### Declaration of competing interest

None.

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