

Natural Resources for Adventure Tourism in the Western Region of Mongolia

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Abstract

The tourism industry has become one of the major economic sectors and has been contributing significantly to the socioeconomic development of the country. In the recent years, special interest tourism which is driven by one's personal interest, passion and novelty has grown dramatically among the various types of tourism. Out of all special interest tourism types, we selected and researched adventure tourism. The range of adventure tourism services that are currently being developed in Mongolia is limited, not particularly inventive and lacks the ability to take the full advantage of accessible opportunities. This kind of tourism is restricted to only a few types of activities, such as horse and camel riding, cycling, hiking and mountain climbing. According to the researchers, the majority of travelers are more interested in skill-based adventure tourism in remote areas and less skill-based adventure tourism in well-known tourist hotspots. The natural resources found in the western region of Mongolia are uncommon in other countries of the world, which is advantageous for the development of adventure tourism. Nevertheless, it is necessary to study these natural resources carefully to identify opportunities particularly for the development of adventure tourism. Natural resources for adventure tourism are categorized into two primary groups: land and water including elements such as mountains, rocks and sand dunes, rivers and lakes. In this manuscript we present indicators for identifying mountains, each element's potential. As a result, potential natural resources for the growth of adventure tourism industry in the western region of Mongolia were defined.

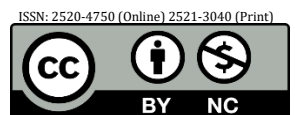


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I. Introduction

Mongolia is a landlocked country in Central Asia, with an area of 1,564,116 km² (Fig1). The territory of Mongolia is administratively divided into 21 provinces and a capital city. From the economic and social perspective 5 main regions are defined, namely, Ulaanbaatar City, Western region, Khangai region, Central region and Eastern (Parliament of Mongolia, 2001). The western region of Mongolia encompasses a total area of 413.9 thousand km², spanning across five provinces (Bayan-Ulgii, Khovd, Uvs, Gobi-Altai and Zavkhan, from west to east). The average elevation in this region is 1580 m above sea level (Sh.Tsegmid, 1969). The primary ridge of the Mongolian Altai extends from the western to the southeastern border of the country, with its branches comprising extensive hollows nestled between the mountains (Figure 1).

The landscape of western region in Mongolia is distinct, featuring high mountain ranges, wide valleys between mountains, vast steppes, sand dunes, big lakes and large rivers with powerful mountain flows. The Khangai Mountains initiates in Zavkhan Province, characterized by limited forest resources. However, it boasts the distinction of being the loftiest mountain range in Mongolia. Notable peaks within this region include Khuiten Mountain in the Altai Mountains, standing at an elevation of 4374 m, and the summit of Khangai Mountains, represented by Otgontenger Mountain, reaching a height of 4031 m. On the eastern flank of the mountains stands Otgontenger Mountain, while on the western side, the Altai Five Bogd, Khuiten Mountain dominates the landscape. Tsagaan Shuwuut Mountain marks the northern boundary, and Alagkhaikhan Mountain stands prominently at the forefront. The geological composition of the mountains predominantly consists of silicon, shale, and granite rocks. These mountains are relatively young, characterized by perpetual snow cover, pointed peaks, and glaciers.

Within the valleys nestled between these mountains, four expansive sand dunes, regarded as the largest in Mongolia: Bor Khyar (5300 km²), Boorog Del (3900 km²), Mongolian Sand (8172.1 km²), and Golden Sand (1775 km²), alongside various smaller sand dunes. Mongolian Sand and Bor Khyar Sand are demarcated by the Khangai Mountain Range and the Altai Mountain Range, situated approximately 100 km apart. To the east of Uvs Lake, Boorog Del Sand and Altan Sand are flanked by small lakes, marking the northern perimeter of Mongolia. Additionally, this region features five significant lakes, including the freshwater Khar Us and Khar Lake, as well as the saline Uvs Lake, Khyargas Lake, and Dorgon Lake, alongside various smaller lakes. The area is characterized by an extreme climate, both in terms of its natural features and weather conditions. Notably, it holds records for the coldest (-55.3°C) and hottest (+43°C) air temperatures in Mongolia (E.Batchuluun, 2020) (Sh.Shagdar, 2011). A distinctive aspect of the region is the existence of rare wild animals, including the argali sheep, ibex, snow leopard, and wild camel. At present, tourism activities are taking place in this region, where professional climbers occasionally climb the mountain, and some unique natural formations are visited by domestic and foreign tourists through challenging routes.

This research aims to identify potential natural resources for the advancement of adventure tourism in the western region of Mongolia, focusing on mountainous, rocky, and sandy resources. In the sphere of this research, we conducted a study to identify a potential of natural resources for the development of adventure tourism in Western 5 provinces Taking into accounts the purpose of the tourists visiting Mongolia, first, to see the nature - 34%, to learn the nomadic way of life - 24%, to go on adventure trip -12%, to observe wildlife - 11%, to know the history -10%, and for other reasons - 9% (B.Bolortuya, 2022).

The adventure tourism services that are currently being developed in Mongolia is limited, not particularly inventive, and lacks the ability to take the full advantage of accessible opportunities. According to the development trends, some types of general interest tourism have certain stabilized markets, which led the development of special interest tourism. Currently, many different forms of special interest tourism have developed and grew rapidly as relatively independent with their own markets, requirements and regulations (Kruja & Gjyrezi, 2011)(Bai & Billy, 2015). Here, we can mention adventure tourism; rural tourism; cultural tourism; religious tourism; ecotourism; culinary tourism; wildlife tourism; heritage tourism and medical tourism. Out of all aforementioned categories, adventure tourism has grown significantly in the global tourism market and have a growing demand.

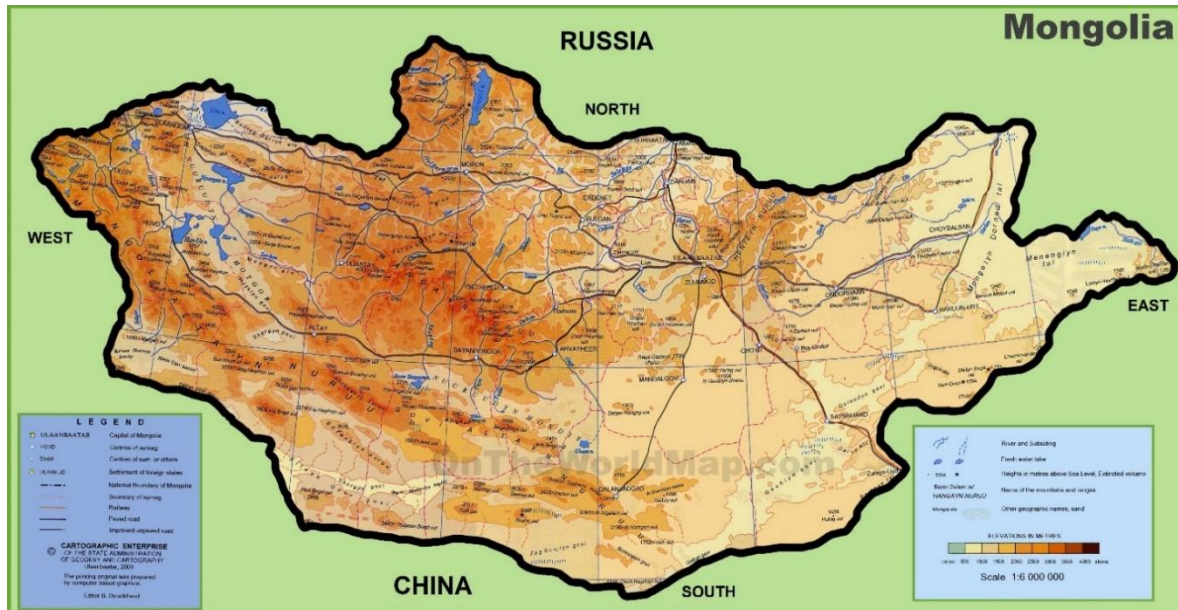


Figure 1. Map of Mongolia

According to the findings of research conducted by the World Adventure Tourism Association in 2023, the adventure tourism sector has fully recovered with increased number of workers, revenue, trip occupancy and is almost back to its 2019 state. There has been a growing demand for a variety of adventure travel experiences that provide a chance to try out new activities in recent years.(Buckley, 2011). Travelers are yearning for embracing unknown experiences by unconventional travel route. Countries are concentrating on expanding the number of unexplored destinations in order to attract travelers who are seeking out unique experiences (Adventure Travel Trade Association, 2023). The global adventure tourism market was estimated to be worth 282.1 billion USD in 2021. Between 2022 and 2023, its compound annual growth rate increased to 15.2%, and it is expected to reach 1009.6 billion USD by 2030 (Grand view research, 2020). The majority of travelers are more interested in skill-based adventure tourism in remote areas and less skill-based adventure tourism in well-known tourist hotspots (Buckley, 2011). Adventure tourism has a tendency to grow more than traditional and mass tourism, due to its capacity to adapt nature, society and culture. It can also support the local economy and promote sustainable development, as well as providing travelers with unique experiences and skills (Adventure Tourism Development Index, 2018).

II. Literature review

An adventure tour is any travel that a traveler considers it adventurous. Different social groups define adventure differently based on their skills, age, experiences and interests (Buckley,

2010). An “adventure” refers to any activities that creates thrills, realism, novelty, challenge, freedom, enjoyment etc., and involve various attributes like abilities, freedom, independence, unknown circumstances and risks (Sulaiman & Rita, n.d.). The characteristics and the content of adventure tourism have been defined by certain scholars. For instance, researcher R. Buckley said that adventure tourism is a broad term including travel and recreation with emotional components in the nature. It is closely associated and somewhat similar to nature based tourism. Nature based tourism products focus on seeing, whereas adventure tourism products emphasize doing and experiencing (Buckley, 2010).

According to Steven J. Hollenhorst, adventure tourism is a recreational activity involving real or perceived danger based on the environment, the outcome of which is often uncertain and based on the will and motivation of the participant (Alan Ewert. Steve Hollenhorst, 1997). Researcher Alan W. Evert defined the adventure tourism as a variety of independent activities that interact with the environment, containing elements of real and apparent danger, and are influenced by participants and circumstances, although the outcome is uncertain (Ewert & Hollenhorst, 1989). H. Dar referred to adventure travelers as those who want to explore new places and experience unexpected challenges, and these activities are typically carried out in unique, isolated and beautiful locations (Dar, 2014). Travel companies sell guided adventurous trip or activity where there is some risk, uncertainty and challenge involved. Clients are actively and physically involved and most people experience strong emotions, such as fear and excitement whilst participating according to researcher McKay (McKay & Donaldson, 2017).

Henceforth, it can be said that risky, uncertain environment, challenging and dangerous activities, unique and thrilling moments are the main characteristics for the travel to be classified as adventurous. Based on aforementioned, adventure tourism is a complex activity (service) that fulfills travelers' wishes, challenges their habits, makes them feel free and autonomous, and gives them a chance, exciting, and unusual impression. Researchers considered tourism resources differently. The World Cultural Heritage Organization defined tourism resources are those elements of any geographical type that are used for pleasure on visits to a special destination (World Heritage center, 2004). Researcher Wen-WeiFu proposed, the tourism resources of tourist attraction are the natural and social scene factors. That is, the tourism resources refers to the development and utilization of all natural resources that can attract people to develop tourism activities (Wen-WeiFU, 1994). There are several restrictions on the use of resources for tourism. These include the consideration of safety and health protection of tourists, amount of used resources, environment degradation, maintaining the authenticity of landscape and natural features (World Heritage center, 2004). All tourism attractions are tourism resources but all tourism resources may not be tourism attractions (Kušen, 2010). As defined by Bulai and Cehan “tourism resources” and “tourism destinations” both have the same meaning and they refer to locations suitable for visiting and can serve as the basis for tourism activities (Cehan & Bulai, 2015). According to Lazik, tourism resources are called tourist attractive phenomena and objects in nature and society which are essential for encouraging tourists (Gjorgievski et al., 2013). M. Gjorgievski, S. Kozuharov and D. Nakovski explained tourism resources as attractive places, cultural resources, products and services and they also represent one of the most important elements of the distance system. To be a tourism resource a phenomenon, object either elements must have at least one attractive feature (Gjorgievski et al., 2013). Moreover, resources are instruments that can be successfully applied to promote tourism in certain areas (Knezevic, 2008), remain as a factor that draws travelers to a destination and attracts their interest (Hua QUAN, 2006).

Tourism resources can be classified in two groups according to their origin (Gjorgievski et al., 2013; Knezevic, 2008). First, endowed resources exist in geographical spaces independent of tourist demand and need. They are confirmed as recreational tourist resource per their characteristics to meet recreational needs. For instance, mountainous areas are independent of the needs and desires of the people, but at the moment when they are used by recreational tourists, they become natural recreational and tourist resources. Second, anthropogenetic recreational resources, specially created for leisure. These resources are built as recreational facilities or spaces in a populated area for tourism purposes.

Beauty and uniqueness of nature; richness of plants; virginity of ecosystem; opportunities to see wildlife; the possibility of carrying out tourism activities; microclimatic conditions; accessibility; chances for challenging and thrilling experiences were defined as qualities of natural resources as recommended by M. Nasa and F. Hassan (Nasa & Hassan, 2016). Although the Adventure Travel Trade Association comprised adventure tourism matters such as resources, safety, and well-being as indices of an Adventure Market Competitiveness, a debate on the types and characteristics of resources hasn't been resolved yet. However, a clear classification and definition of adventure tourism resources haven't been defined yet (Adventure Travel Trade Association, 2020).

Based on the findings of above-mentioned research, we developed a definition and classification of adventure tourism resources (Figure 2). Adventure tourism resources can be defined as a range of natural and geographical formations, infrastructure, technology, human resources, market and combination of organizational capabilities that create a distinctive experience while delivering services which meet the travelers' needs.

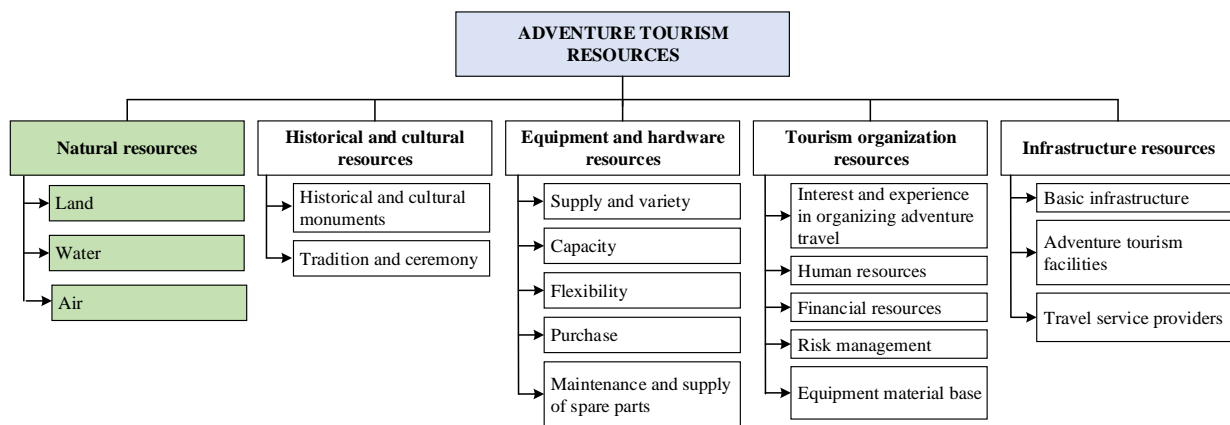


Figure 2. Adventure tourism resources and their classification

Source: Developed by the authors

III. Research methodology

The study carried out within the framework of technical conditions, standards, environmental indicators as well as the result of research made by experts. The indicators to identify adventure tourism natural resources, and their corresponding level are defined in agreement with indicators of previous research and expert descriptions. Reliability coefficients are statistically significant and range from 0.484-0.939 (Table1).

Table 1. Reliability analysis results of expert research

№	Indicators	Intraclass correlation coefficient - ICC		Kendall's coefficient of concordance -W		Fleiss' kappa -K		Cronbach alpha
		Value	Significance	Value	Significance	Value	Significance	
1	Mountain	0.860	0.000	0.789	0.009	0.660	0.000	0.931
2	Rock and Ice	0.689	0.000	0.661	0.016	0.484	0.048	0.817
3	Dune	0.760	0.000	0.565	0.024	0.723	0.007	0.738

Source: Developed by the authors

From the perspective of demand, the corresponding levels of mountains and rocks classified into 3 categories: professionals, experienced, and public adventure tourism areas, in accordance to the risk posing to travelers' life and health (Table 2). However, for dunes the indicators are categorized as minimum allowable and appropriate levels (Table 3). We focused on the location-specific natural resources associated with adventure tourism, taking into account sand dunes, mountains, rocks, and other land features. Natural resources of land were examined by three elements, mountains, rocks, and sand dunes. Corresponding levels of each element were assessed by indicators, elevation, slope, and remoteness etc., (Table 2, 3).

Table 2. Summary of indicators (mountains, rocks and ice)

№	Indicators	Weight of importance	Level of proficiency		
			Areas for professionals	Areas for experienced	Areas for the public
I. Natural resources for mountain climbing adventure tourism					
1.	Elevation	10.21	>3000	2000-3000	<2000
2.	Weather variability	9.88	Prohibiting conditions: Storm, blizzard, rain, snow		
3.	Geologic hazard	9.54	Avalanches, rocks, spills, ice chasms	Rocks, snow, ice	-
4.	Popularity	9.24	Popular	Popular	Not important
5.	Land cover type	9.23	Pour eternal snow and rocks	Rocks, snow, ice, forest	Forest, rocks
6.	Routes	8.61	2 хүртэл up to 2	5 хүртэл up to 5	Олон байх Many
7.	Slope	8.27	>40°	20°-40°	15°-30°
8.	The steepest slope	8.02	45°-75°	40°-60°	<40°
9.	The length of the climb	8.00	>15 км	10-15 км	<5 км
10.	Height difference	7.97	>1000	800-1000	<700
11.	Natural scenery	7.36	Not important	Beautiful scenery	Beautiful scenery
12.	Remoteness	3.67	Not important	Up to 300 km from the settlement	Up to 100 km from the settlement
II. Natural resources for rock and ice climbing adventure tourism					
1.	Altitude	12.38	>11 м	>6 м	4-7 м
2.	Rock type	12.34	All kind	Granite rock	
3.	Number of climbing routes	12.20	At least 2	Up to 8	at least 10
4.	Natural scenery	12.14	Beautiful scenery		
5.	Weather variability	11.86	Prohibited conditions: Snow, rain, windstorm, and extreme sun		
6.	Slope	11.37	>85°	60°-85°	40°-60°
7.	Stone stable	11.34	All type	Granite predominates	Granite rock
8.	Popularity	11.30	Popular	Popular	Not important
9.	Climbing surface area	5.07	>1 m wide	>2 m wide	>4 m wide

Source: Developed by the authors

Table 3. Summary of Indicators (sand and dune)

№	Indicators	Weight of importance	Level	
			Appropriate	Minimum allowable
1.	With natural attractions	17.31	Yes	Yes
2.	Space to prevent adverse effects on wildlife and plants	15.98	3 km	0.5 km
3.	Altitude	15.16	>150 m	40-100 m
4.	Sand effect on health	13.28	Dry, wind speed not more than 5 m/sec	Sand moisture and wind speed not more than 5 m/sec
5.	Slope	12.07	>40°	30°
6.	Spacing that can cause serious problems such as soil erosion or compaction	9.25	10 km	3 km
7.	Slope directions	8.54	West and North	North
8.	Size of area	8.41	20 km ²	15 km ²

Source: Developed by the authors

IV. Research results

A list of natural resources of western region was developed based on geomorphological study reports. A study of 62 mountains, 25 rocks, and 34 dunes of western region of Mongolia was carried out. 49 out of 121 natural resources were selected as potential for adventure tourism: 24 mountains, 16 rocks, and 9 sand dunes (Table 4).

Table 4. Summary of natural resource studies for adventure tourism

Resources	Land resources			Total
	Mountain	Rock	Dune	
All potential	62	25	34	121
Available	24	16	9	49

Source: Developed by the authors

I. Survey of LAND RESOURCES for adventure tourism

1. MOUNTAINS: Mongolia has a combination of plains, hills, high and low mountains, however the majority of the country is mountainous. The mountains are oriented in a specific direction, varying from eastern to western regions of the country. The mountains stretch from northwest to southeast in the western region (Sh.Shagdar, 2011). For instance, the Altai Mountains, the longest and highest young fold mountains, stretch along the state border in the western part of Mongolia. They are made up of several rows of mountains with hollow depressions. Although the average height of Mongolian Altai mountains is 2260 meters, there are numerous perpetual snow peaks above 4000 meters with traces of quaternary glaciation (E.Batchuluun, 2020). The elevation of each mountain, the attain elevation or height difference from the climb’s starting point to climbing route, the length of the climbing, the number or climbing routes, and the slope surface degree measured on selected 24 mountains (Table 5).

Table 5. Characteristics of selected mountains

№	Mountain range	The name of a mountain	Peak	Province	Elevation	Attain elevation	Altitude (m)	Surface slope		Surface type	Length of climbing route (km)	Number of climbing routes
								Average	The sharpest			
1.	Mongolian Altai Mountains	Altai tavan bogd	Khuiten	Bayan-Olgii	4374	2983	1391	25-30	55	Snow, ice, rock, pour	14	3
2.			Nairamdal		4082	2983	1099	15	20	Snow, ice, rock, pour	10.1	2
3.			Burged		4068	2983	1085	50	70	Snow, ice, rock, pour	5.8	3
4.			Ulgii		4050	2983	1067	45	65	Snow, ice, rock, pour	6.8	2
5.			Malchin		4037	2983	1054	37	50	Snow, ice, rock, pour	5.8	2

6.			Naran		3900	2983	917	45	65	Snow, ice, rock, pour	4.5	2
7.		Tsengel khairkhan	Tsengel khairkhan	Bayan-Olgii	3967	2852	1115	30-55	65	Snow, ice, rock, pour	3.0	2
8.		Tsambagarav	Tsambagarav	Khovd, Bayan-Olgii	4165	2900	1267	21	52	Snow, ice, rock, pour	10-13	3
9.	Tsast ula		4193		2953	1240	25-41	60	Snow, ice, rock, pour	5.4-8.3	3	
10.		Sair ula	Sair ula	Bayan-Olgii	3984	2659	1325	15-28	56	Snow, ice, rock, pour	7.5	3
11.		Mönkhkhairkhan	Sukhbaatar	Khovd, Bayan-Olgii	4204	3050	1154	25-37	80	Snow, ice, rock, pour	6.5-7.8	2
12.			Barilgachin		4169	3050	1119	25-37	80	Snow, ice, rock, pour	4	2
13.			Jamyangarav		4117	2955	1162	27-35	46	Snow, ice, rock, pour	5.8	2
14.			Yamaat		4020	2955	1065	27-35	46	Snow, ice, rock, pour	7.6	2
15.			Bugat		4041	2845	1196	27-45	50	Snow, ice, rock, pour	8.7	2
16.		Alag khairkhan	Alag khairkhan	Govi-Altai	3738	2847	891	21-45	61-70	rock and pour	2.35-5.0	3
17.		Sutai khairkhan	Sutai	Khovd, Govi-Altai	4090	3230	860	30-59	68	Snow, ice, rock, pour	3.8-5.0	4
18.			Baga bogd		4013	3230	783	30-59	68	Snow, ice, rock, pour	3.3-4	2
19.		Baatar khairkhan	Khoid tsast bogd ula	Khovd	3994	2180	1814	28-40	51	Snow, ice, rock, pour	8.5	2
20.		Türgen	Deglii tsagaan	Uvs	3965	2593	1372	28-36	75	Snow, ice, rock, pour	7.8	3
21.		Harhiraа	Must ula	Uvs	4037	2813	1224	25-42	51	Snow, ice, rock, pour	4-5.8	4
22.		Tsagaan shuvuut	Tsagaan shuvuut	Uvs	3496	1834	1662	15-36	56	rock and pour	11.8-14	2
23.		Hasagt Hairhan	Khasagt bogd ula	Govi-Altai	3379	2450	929	20-31	64	rock and pour	6.5-9.3	4
24.	Khan gayn mountains	Otgontenger	Otgontenger	Zavkhan	4031	3150	881	20-34	70	Snow, ice, rock, pour	3.5-8	3

Source: Developed by the authors

The Alag Khairkhan, Tsagaan Shuvuut, and the Khasagt Bogd Ula in the western region are anticipated to feature climbing routes of similar difficulty levels. These routes may potentially fall within the domain of public tourism areas. Nevertheless, in Tsengel Khairkhan and the Sair Mountains, a distinction can be made between routes tailored for experienced climbers and those designated for public use. It is conceivable that the summits of these mountains might necessitate distinct markers to cater to the needs of seasoned and professional climbers. For instance, the pinnacles of Altai Tavan Bogd Mountains, Otgontenger, and Munkhkhairkhan Mountains are enveloped by perpetual snow, precipitous cliffs, and dense forests. These features, coupled with limited routes and challenging ascents, creating conditions demanding climbing expertise, exceeding a distance of 10 kilometers.

2. ROCKS: The rocks that can be used for adventure tourism were identified and based on the requirements that rocks be examined geographically, not contain historical or cultural artifact and not included in the protection zone of specially protected area. The factors of rock height, ice and rock slope, rock quality, climbing surface area, popularity, type of rock, number of well-protected climbing routes, scenery, weather phenomena are identified as indicators for organizing rock climbing activities in adventure tourism. As a result, adventure tourism can be arranged at 16 rocks out of 25. Location, coordinate, height, and the average slopes were documented (Table 6).

Table 6. Characteristics of selected rocks

№	Rock	The name of the mountain, nearby river and lake	Province	Soum	DMS Coordinate	Altitude (m)	Width (m)	Slope (°)	Rock type
	Rashaan rock	Hasagt Hairhan	Govi-Altai	Jargalan	46°46'06.90"N 95°58'39.21"E	64	30-70	80-90	Sediment
	Bogd river waterfall	Bogd river	Zavkhan	Aldarkhaan	47°41'10.48"N 97°12'30.48"E	37	80	90	Silicon
	Eej khairkhan	Eej khairkhan mountain	Govi-Altai	Tsost	44°55'43"N 96°12'54"E	100-400	300-2500	45-85	Granite
	Senjit rock	Bodonch canyon	Khovd	Altai	45°53'26.32"N 93°11'06.49"E	50	20	85	Shale
	Shuurkhain gelen canyon	Mönkhkhairkhan mountain	Khovd	Monkhkhairkhan	46°54'57.99"N 91°35'00.52"E	300	500	65-90	Shale
	Senjit rock	Senjitiin khyar	Zavkhan	Erdenekhairkhan	48°13'13.10"N 96°09'00.62"E	6-10	1000	65-110	Granite
	Khetsuu had	Khyrgas lake	Uvs	Khyrgas	49°02'07"N 93°28'47.89"E	10-20	7000	65-85	Marble
	Baraan khotol rock	Khoshoot valley	Khovd	Darvi	46°45'11.41"N 93°26'48.89"E	30	60	90	Shale
	Elgen khad canyon	Khar azarga mountain	Govi-Altai	Khaliun	45°49'56"N 95°47'32"E	50-253	700	90	Silicon
	Khaalga tsahir rock	Khaalga tsahir mountain	Govi-Altai	Biger	45°24'08.36"N 97°09'30.63"E	25-100	70-120	70-90	Marble
	Altan tevsh canyon	Ikh khairkhan mountain	Zavkhan	Erdenekhairkhan	47°54'14"N 95°00'48"E	50-96	80-350	80-90	Marble
	Mongot tsakhir rock	Mongot tsahir canyon	Uvs	Davst	50°45'31"N 92°55'55"E	30-71	100-1000	75-90	Marble
	Baga khairkhan rock	Baga khairkhan mountain	Zavkhan	Erdenekhairkhan	47°56'86"N 94°54'33"E	50-81	85-350	70-90	Marble
	Uushig canyon	Uushgiin ulaan mountain	Khovd	Bulgan	45°35'53"N 90°49'36"E	50-100	200-600	65-90	Silicon
	Three children mount	Three children mountain	Khovd	Bulgan	46°00'58"N 91°02'03"E	56-80	300-700	60-80	Granite
	Mongot khyasaa	Bogd river	Zavkhan	Aldarkhaan	47°38'53.86"N 97°06'20.03"E	30-91	340	90	Silicon

Source: Developed by the authors

For expert tourists, all the rocks are suitable for climbing, except for 2 rocks: Senjit and Three Children. Shuurkhain Gelen canyon and Elgen Khad canyon, on the other hand, pose unsuitable conditions for both experienced and general climbing enthusiasts due to heightened risks associated with their elevation and rock structure. With regard to the remaining rock formations, excluding the aforementioned exceptions, adept tourists can ascend using carefully planned routes that prioritize safety. Conversely, for the broader tourist population, it is more conducive to consider climbing Senjit Rock, Senjit, Khetsuu Khad, Khaalga Tashir, Mongot Tashir Khad, and Three Children Mountain Rocks. These rocks boast granite formations, rendering the rock slopes less precarious and thereby facilitating the establishment of safer climbing routes.

3. DUNES: Organizing adventure tourism based on dunes’ parameters such as sand height, length, width, area, slope and shape are significant. We selected dunes that are suitable for adventure tourism based on the sand shape (hillock sand, cover sand, fossil sand inappropriate) and the level of geographical information. As a result, 9 sand dunes out of 34 were considered suitable for adventure tourism. Dunes were categorized by altitude, length, width, area, and slope angle (Table 7).

Table 7. Characteristics of selected dunes

№	Dunes	Province	Altitude (m)		Length (km)	Width (km)	Area (km ²)	Slope (0°)	Nearby rivers	Nearby lake
			High point	average height						
	Boorog del dune	Uvs	910	3-50	180	20-50	3900	8-41	Tes, Guramsan, Nariin	Uvs, Doroo, Bayan
	Altan els dune	Uvs, Zavkhan	50	4-20	80	25	1775			Small lakes
	Bor hyar dune	Zavkhan	170	10-50	350	16-70	5300	8-10 - 34	Khungui, Galuutai, Mukhart, Teeliin	Khyrgas, Airag, Ulaagchnii khar etc 6 lake
	Mongol sand dune	Govi-Altai, Zavkhan	149	5-60	300	17-58	8172.1	8-32	Zavkhan etc 5 river	Dorgon, Ereen, Khar etc 12 lake
	Buduun tsakhir sand	Zavkhan	20	0.8-5	38	20	466	8-28	Zavkhan	
	Borkh sand	Zavkhan	10	4-8	56	10-21	847	8-25	Zavkhan, Shuursiin	
	Achit lake black sand	Uvs	4	0.5-1.5	8	1.7	22	8-9-32		Achit
	Biger five sand	Govi-Altai	12	8-12	10	0.6-1.6	10	6-32	Zuun river	Biger
	Buur lake sand	Govi-Altai	8	7-8	2.5	0.2	8	8-24		Buur

Source: Developed by the authors

In the western region, there exist nine sand dunes designated for adventure tourism, distinguished by variations in both size and area. Notably, four of these dunes encompass an expansive area exceeding 1000 km². The orientation of these sand dunes extends from west to east, a geographical characteristic that mitigates potential hazards for tourists. Given the proximity of these sand dunes to substantial lakes, it becomes imperative to meticulously assess and address environmental considerations when orchestrating adventure tourism activities. Environmental impact considerations are vital to ensure the sustainable management of these natural resources and the preservation of the surrounding ecosystems. There will be different forms of adventure tourism suited to the various natural resource types in Mongolia's western area. As part of this study, we attempted to identify the types of adventure tourism that can be organized in Mongolia, keeping in mind the natural resources characteristics, geographical formations, and species of flora and fauna of the western region of Mongolia.

There are 31 different types of adventure tourism, including mountain biking, acrobanching, snow shoeing, dog sledding, camel rides, and zorbing, can be planned in Mongolia's western area based on three elements of land resources (Table 8).

Table 8. Types of adventure tourism

№	Types	№	Types	№	Types
1	Mountaineering	12	Rock climbing	23	Sandboarding
2	Mountain biking	13	Ice climbing	24	Skiing
3	Hiking	14	Glacier walking	25	Blokart sailing
4	Trekking	15	Abseiling	26	Snow shoeing
5	Running tours	16	Sand biking	27	Snow mobiling
6	Bouldering	17	Quad Biking (ATV)	28	Dog sledding
7	Horse riding	18	Motorcycle tours	29	Orienteering
8	Snowboarding	19	Dune skiing	30	Zip lining
9	Canyon swinging	20	Acrobranching	31	Zorbing
10	Racing cars	21	Bicycle tours		
11	Camel rides	22	4x4 (Jeep) Tours		

In the western region of Mongolia, there exists the potential to cultivate a diverse array of adventure tourism, encompassing 31 distinct types, including six specifically tailored for winter activities. The winter tourism offerings may include snowboarding, ice climbing, skiing, snowshoeing, snowmobiling, and dog sledding. The natural topography of the western region, characterized by the high mountains of Altai and expansive valleys, forms the foundation for adventure tourism, predominantly centered around high-altitude mountainous activities. Moreover, the region is home to the three largest sand dunes in Mongolia, thereby fostering the development of 11 sand-based adventure tourism options. These include hiking, off-road racing, camel rides, sand biking, quad biking (ATV), motorcycle tours, dune skiing, 4x4 (Jeep) tours, sandboarding, zorbing, and running tours. The diverse landscape of the western region serves as a unique canvas for a broad spectrum of adventure tourism experiences.

CONCLUSION

Adventure tourism can be defined as a complete activity (service) that gives travelers exciting, unexpected impressions, fulfills the traveler's expectation, challenges their habits, provides them with a sense of inspiration, independence and the freedom. The growth of this kind of tourism is mostly dependent on natural resources. By studying and identifying the natural resources for adventure tourism more clear decision, either entrepreneurial or political, can be made. Natural resources for adventure tourism can be classified into three categories: land (mountains, rocks, sand dunes), water (rivers and lakes) and the atmosphere according to geographical locations (Figure 3).

This study of natural resources in the western region involved the examination of 49 resources, comprising 24 mountains, 16 rocks, and 9 sands. Total of 29 indicators were used to determine suitability of the natural resources for adventure tourism. The distribution of the resources reveals 15 reserves in Khovd province, 9 in Gobi-Altai province, 8 in Uvs province, 8 in Bayan-Olgii province, and 9 in Zavkhan province respectively. In terms of natural resources for adventure tourism, Gobi-Altai, Uvs, and Zavkhan provinces assert a diverse array of resources coexisting harmoniously. Notably, Gobi-Altai, Uvs, and Khovd provinces exhibit a higher abundance of rock resources. Nevertheless, both Khovd and Bayan-Olgii provinces lack sand dune resources.

Adventure tourism development is viable in all provinces of the Western Region, each offering mountains suitable for such endeavors. Zavkhan and Gobi-Altai provinces stand out with their prevalence of experienced and mass-oriented adventure tourism resources. In contrast, Hovd, Uvs, and Bayan-Olgii provinces present opportunities for the development of adventure

tourism tailored to professional and experienced tourists, considering the distinct characteristics of these regions.

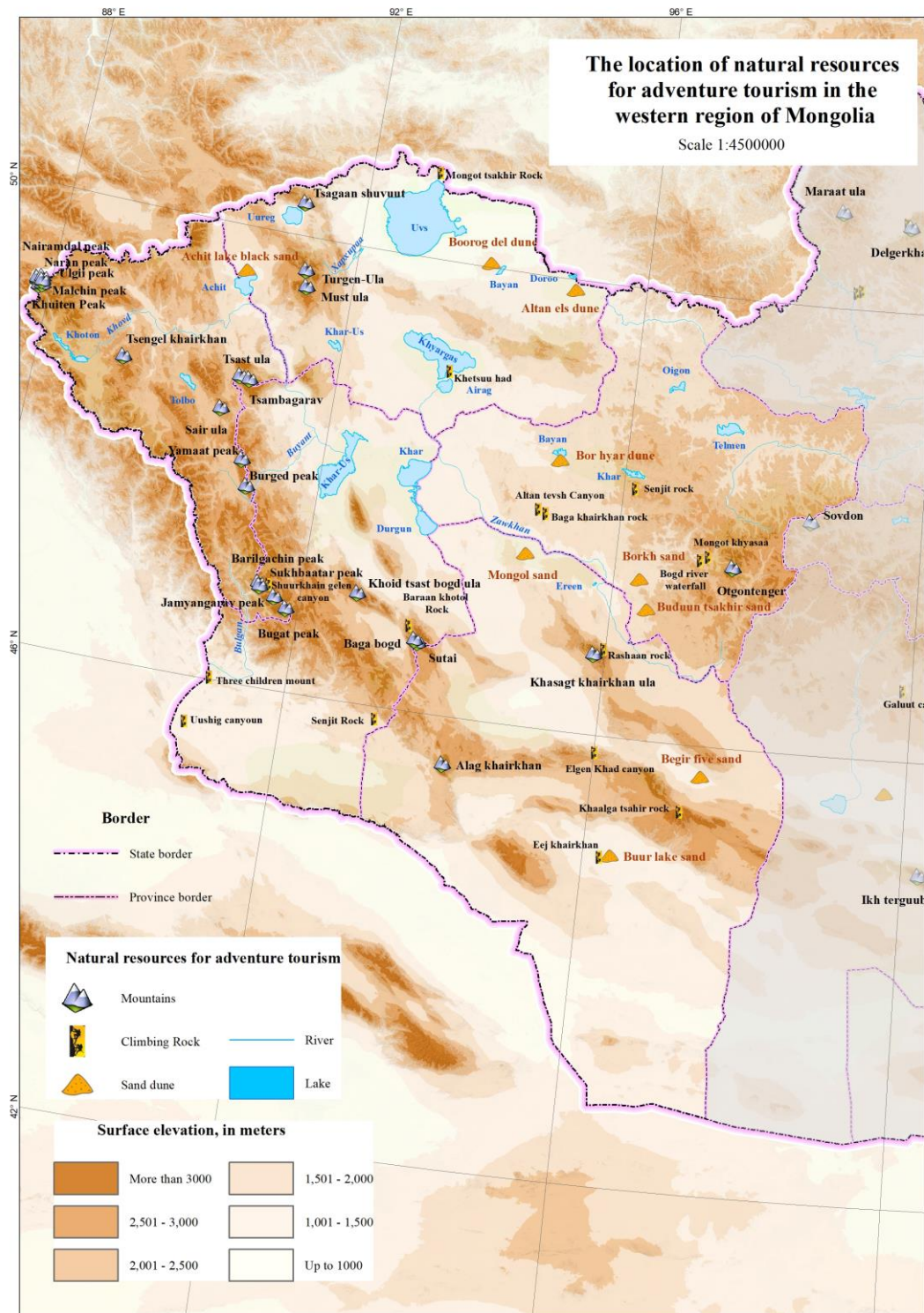


Figure 3. Location of natural resources for adventure tourism

Mountains in all provinces are suitable for both experienced and mass tourists. However, for professional tourists, specific mountains such as Khuiten, Nairamdal, Burged, Ulgii, Malchin, Tsambagarav, Tsast Ula, Sukhbaatar, Barilgachin, Jamyangarav, Sutai, Khoid Tsast Bogd Ula in Uvs, Khovd, and Bayan-Olgii provinces, as well as Deglii Tsagaan, Must Ula, and Otgontenger

mountains, offer opportunities for the development of adventure tourism. Based on the characteristics of selected natural resources we recommend 31 types of adventure tourism that can be arranged at the region. Calculating the economic benefits of travel while simultaneously preserving natural resources necessitates a strategic approach, particularly in environments like sand dunes where constant change and vulnerability to environmental degradation are prevalent. For instance, when organizing climbs in perpetually snow-covered mountains, it is crucial to differentiate between experienced tourists, professional tourists, and mass tourists, considering the varying difficulty of the routes. Concerning sand dunes, their morphology is in a perpetual state of flux, shaped and displaced by the forces of wind and water. Moreover, the active impact of human activities on these formations may expedite the processes of environmental degradation and desertification. Consequently, it is prudent to strategize adventure tourism with the consideration of these factors.

The implementation of clear markings, for example, will ensure the preservation of the dune area, preventing adverse effects. The markings can be used to prohibit entry into springs, rivers, and lakes within specific areas, including Bayan lake of Boorog Del sand, Guramsan River, Muhart River of Bor Hyar sand, Ulaagchnii Khar lake, Ereen of Mongolian Sand Dune, Sangiin Dalai, Tsookhor lakes, East River of Begir Five Sands. Furthermore, it is imperative to refrain from burying pastures and green walls with sand, and careful consideration must be given to the planning of trips around sands following a comprehensive assessment of sand migration and potential collapse. In addition, certain portions of the sand area merit special protection. This includes safeguarding the pine forest grass of the Khankhohi ridge within the Golden Sand, preserving the grass along the east river of the Biger Sand Sand, and protecting the thick sea buckthorn grass of the Zavkhan river within the Mongolian sand. These protective measures are integral to the sustainable management of these delicate ecosystems.

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