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ORIGINAL ARTICLE

Assessment of Geosites and Geotouristic Sites for Mapping Geotourism: A Case Study of Al-Soudah, Asir Region, Saudi Arabia

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Abstract
Geosites and geotouristic in Al-Soudah are considered a geoheritage which enhances geotourism, which includes geomorphological, landscape, archaeological, and historical sites. The presence of geoheritage of high aesthetic value and its assessment is the basis for implementing the strategy of geoconservation. The methodology included the study of natural and cultural heritage of tourist value, using digital mapping tools, as well as information collected from fieldwork. This includes the identification and inventory of geosites and geotouristic sites, geotouristic significance, and geotouristic scientific interpretation by which has created geotourism and tourism itineraries maps. Besides, a SWOT Plus analysis is conducted to suggest strategies to enhance geotourism. The results show that cultural and geodiversity are highly valued as geoheritage for promoting geotourism in Al-Soudah. Accordingly, a geotouristic map was created, which provides an overview of the geoheritage, in addition to the proposed geotouristic itineraries, geohiking trails, and cable car maps. Furthermore, the most interesting sites from both a scientific and touristic outlook—perspectives, in order to highlight the geodiversity to promote and preserve geotourism, through the proposal of Al-Soudah as a UNESCO Global Geopark, in order to increase the tourist attractiveness.

Keywords Geomorphosites · Geotouristic itineraries · Geosites · Geotouristic map · SWOT analysis

Introduction

Al-Soudah is endowed with abundant natural diversity that positions it well to compete in the regional, national, and international tourism market. Natural diversity is represented by various landscapes including extensive mountain ranges, valleys, waterfalls, and natural springs. Nevertheless, there are several tourism niches including geological and geomorphological geodiversity, geoarchaeological heritage villages, archaeological sites, and Al-Qatt Al-Asiri art. Currently, the most internationally accepted definition of geotourism is that of Newsome and Dowling (2018): "Geotourism is a form of natural area tourism that specifically focuses on geology and landscape. It promotes tourism to geosites and the conservation of geodiversity, as well as understanding earth sciences through appreciation and learning. This is achieved through independent visits to geological features, use of geotrails and viewpoints, guided tours, geoactivities, and patronage of geosite visitor centers."

In the last few decades, geotourism has shown considerable growth all over the world (Dowling & Newsome 2018). According to Kubalíková (2019), geotourism is appreciated and accepted as a useful tool for promoting natural and cultural heritage and for fostering local and regional economic development, especially within rural areas. In the 1990s, the concept of geotourism (Hose 1996) appeared as "geological" rather than "geographical" tourism. In the first years of the twenty-first century, the National Geographic Society (Stueve et al. 2020) reported for the first time geotourism as geographical tourism. In general, geotourism can be seen as a branch of tourism based on geographical locations and the geological nature which attributes the "sense of place" to the area (Dowling 2011). Reynard et al. (2003) analyzed the relationship between geomorphology and tourism. Geomorphology may be a tourist resource as part of the primary or original offer (the geomorphological site as an attraction or as a support for tourist activity, e.g. climbing) and the secondary or derived offer, when tourist infrastructures (e.g., didactic trails), instruments (e.g., educational booklets), or

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services (e.g., guided tours) are proposed for effective use of the original offer. Gray (2004) also stated that geodiversity, respectively, geoheritage, was of great value for geotouristic and geoeducational activities—it is one of the functions of geodiversity. It is necessary to do the inventory and evaluation of potential sites.

Fig. 1 Location of the study area

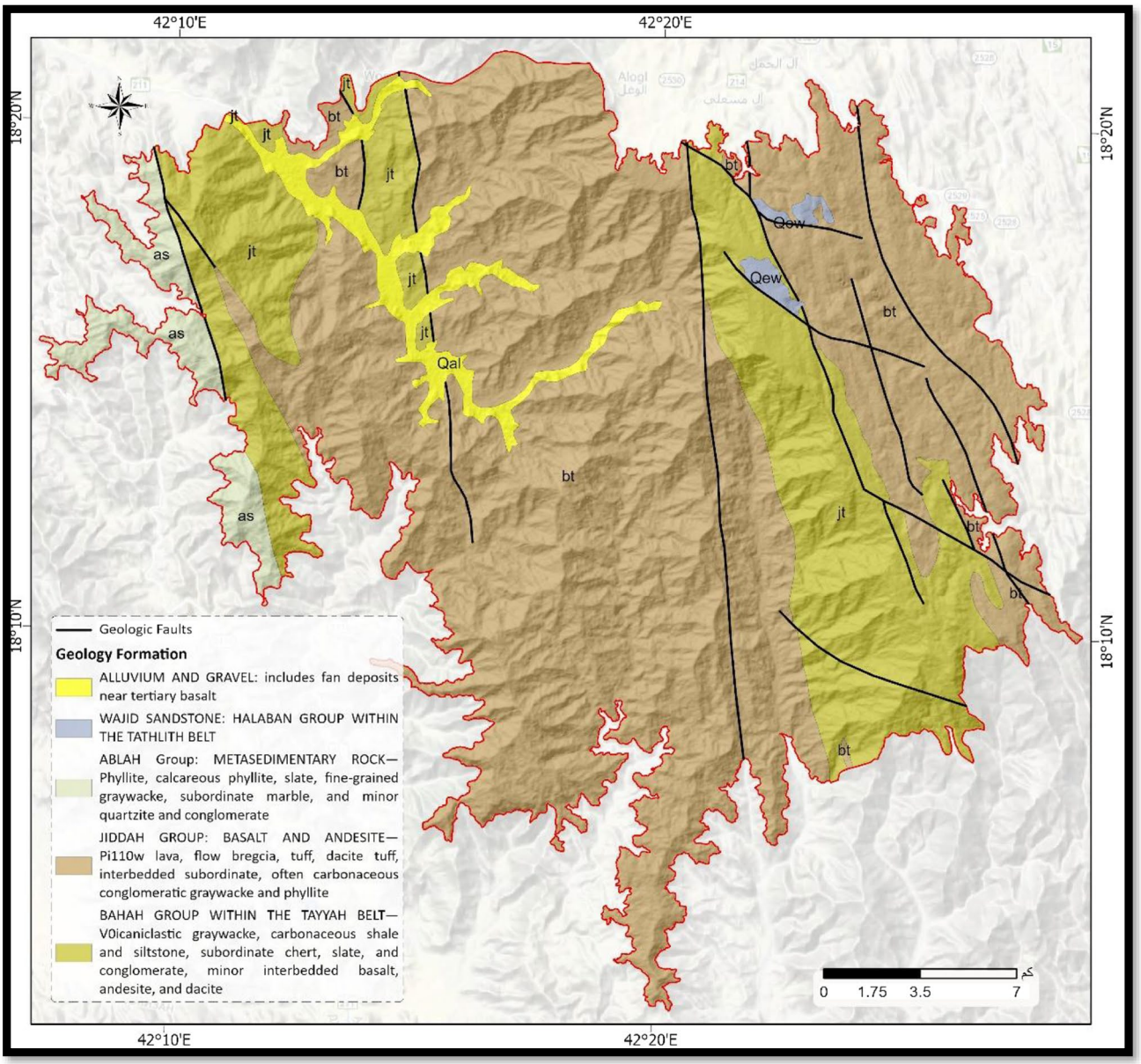

Fig.2 Geological map of the study area

The importance of the tourist sector is cardinal since tourism is the main economic activity that generates local income for the communities. Geodiversity, biodiversity, and sociocultural aspects are associated in the framework; the selected geosites and geotouristic sites are among the most popular sights of the Al-Soudah. Hence, geoheritage is a term used to identify those specific elements of geodiversity that are selected for geoconservation (Brilha 2018). In other words, geoheritage is representative, balanced, and credible of identified geodiversity elements of the earth that are deemed to be worthy of conservation because of their exceptional scientific value and importance in the reconstruction of the earth's history (Gray 2013) and (Elassal 2020). Geoheritage and geotourism are closely related in the fact that the development of the latter increases if the former is rich, diverse, and scenic (Migoń & Goudie 2012).

The main objective of this work is to demonstrate that of Al-Soudah has a significant number of geosites and geotouristic attractions, which can be applied within the future Global Geopark. The settlement pressure caused by the strong development of tourism and services threatens the natural wonders of the described area; therefore, it is proposed to protect its advantages. Determining the direction and limits of development will guarantee the preservation of individual geographical forms and the entire geodiversity of the area. Moreover, the inclusion of geosites, mining sites,

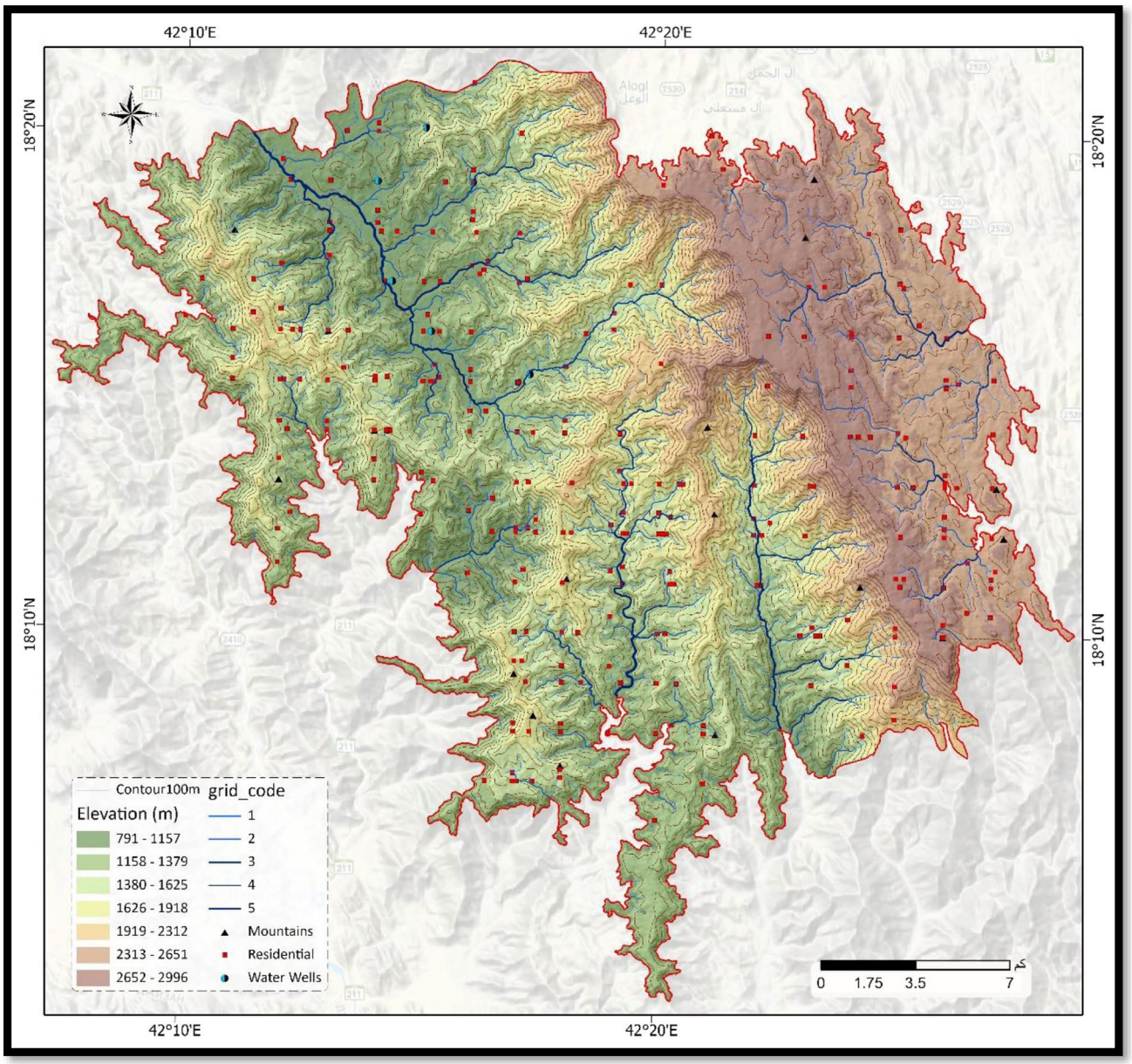

Fig. 3 Topographical map of the study area

and other sites (e.g., cultural and architectural) could have an impact on existing routes of the Al-Soudah, together with a global assessment of these itineraries as a basis for enhancing local development.

It is possible to devise strategies to promote geotouristic development by evaluating sites of interest with scientific methodologies and applying a pragmatic approach. To meet this challenge, while at the same time respecting the desire of the community to use and disseminate ancestral practices, georesources are preferred either for their landscape, economic value, or cultural identity, connecting, therefore, geotourism to other types of touristic applications. Thus, it appears that the Geopark Project has to be related to and enriched with sociocultural aspects, relying on the special features of the territory and the geotourism promotion through the establishment of three new geotouristic circuits and geohiking trails on the geotouristic map. The map combines a simplified geomorphological map, geosites, and geoheritage sites, with these geotouristic itineraries. Moreover, the study enabled the creation of a georoute considering the (a) accessibility to the geosites, (b) the short distance between different geosites, and (c) the good preservation of the site either by the community or by government.

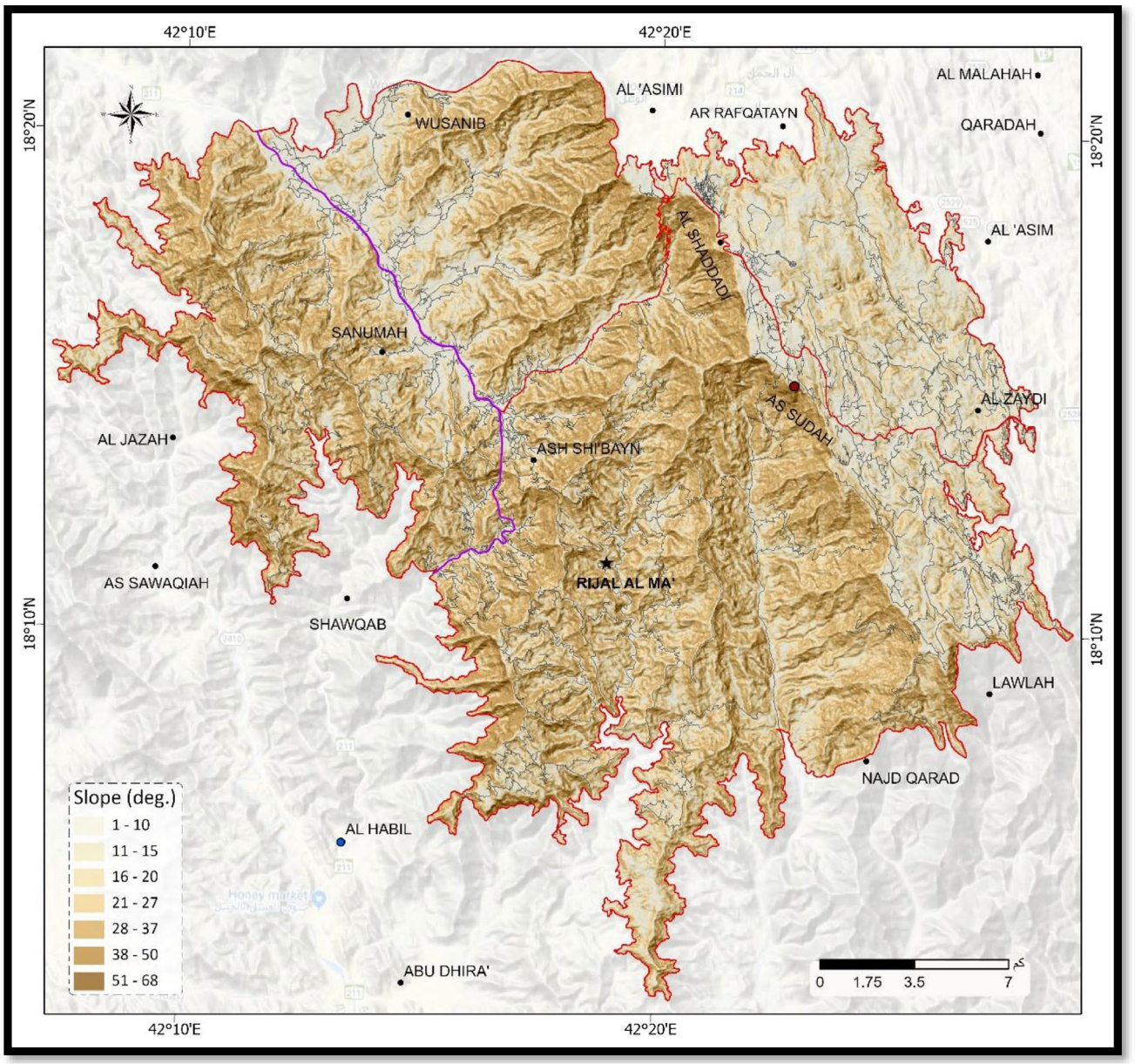

Fig. 4 Slope degree in the study area

This will also enable obtaining geosites and geotouristic evidence to prove the heritage value and touristic attractiveness to develop Al-Soudah as a mountain tourist destination with international standards to serve visitors throughout the year, to provide immersive cultural experiences and to celebrate the picturesque nature. In addition to its economic role in achieving the goals of the Kingdom's Vision 2030 by developing the tourism and entertainment sectors in Saudi Arabia, the strategy to develop the Asir region under the slogan "Qimm and Shim," which aims to achieve a comprehensive and unprecedented development renaissance for the region, relying on its strengths of culture and nature that combine originality and modernity, by exploiting the huge tourism potentials in the region that will be invested through quality tourism projects to highlight its lofty peaks along with its geographical and natural diversity, and to reveal its cultural and heritage richness.

The Natural Characteristics of the Study Area

Al-Soudah is located within the administrative scope of the Asir region, between the latitudes of 18° 25′ north and 18° 25′ north and longitudes of 42° 30′ east and 42° 15′ east. It

Table 1 THI classification standards and assignments of the degree of comfort and discomfort

THI Values	Human sensation	Symbol	Assignment
≤40	Extremely cold	e (extremely uncomfortable)	1
40–45	Cold	d (uncomfortable)	3
45–55	Slightly cold	c (less comfortable)	5
55–60	Cool	b (sub-comfort)	7
60–65	Slightly cool	A (comfort)	9
65–70	Warm	B (sub-comfort)	7
70–75	Hotter	C (less comfortable)	5
75–80	Sultry	D (uncomfortable)	3
≥80	Extremely stuffy	E (extremely uncomfortable)	1

The shaded value is the range of values where the human body feels comfortable

has a total area of about 636.64 km^2. Al-Soudah is located 25 km from Abha city (Fig. 1). It is characterized by its picturesque nature, moderate climate, and its high altitudes, where it includes the highest peak in the Kingdom of Saudi Arabia at an altitude of 3015 m above sea level. Al-Soudah overlooks the Tihama region, and therefore, magnifying binoculars have been installed in some of its parts to observe the wonderful views of those valleys and the neighboring villages located in the Tihama plains as well as a number of heritage sites as it combines all the elements of natural attractions, historical depth, and human values. The rare vegetation cover that characterizes Al-Soudah Mountains with the clouds (fogs) represents a rare aesthetic value. It also links Al-Soudah to the Rijal Almaa heritage village by cable car suspended as it reaches a height of 1600 m. It roams over

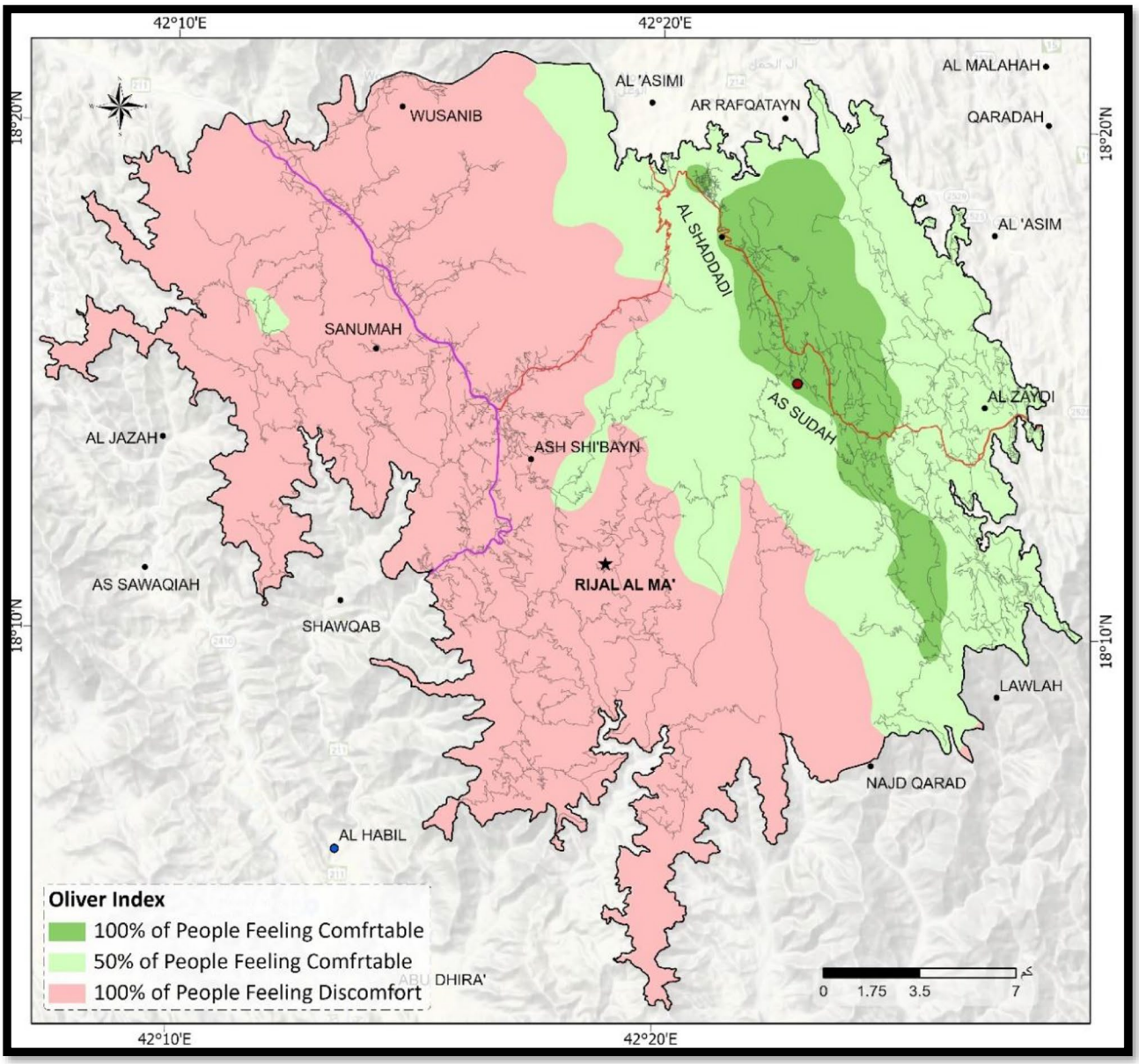

Fig. 5 The degree of comfort and discomfort according to Oliver's index (THI) of the study area

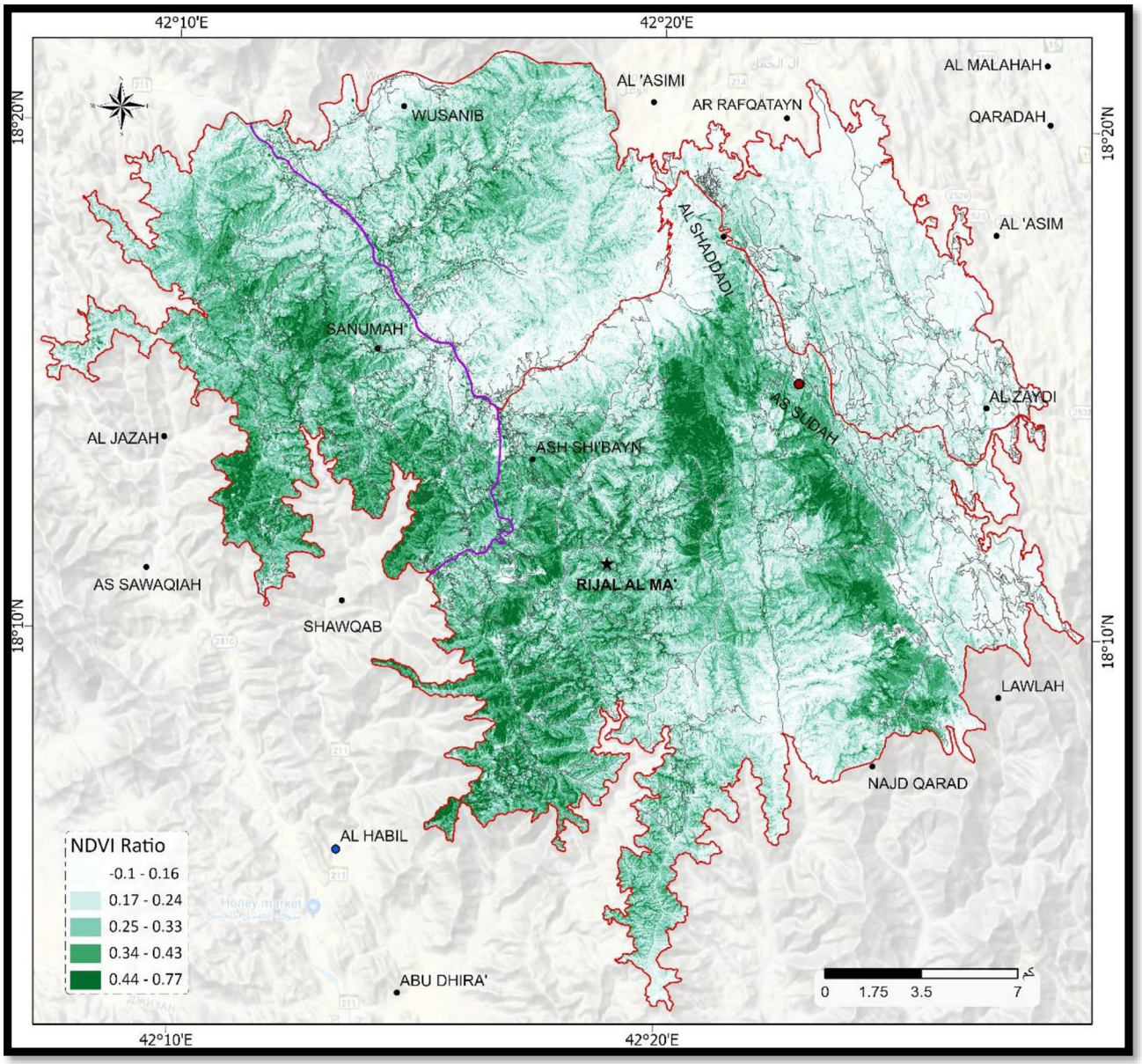

Fig. 6 NDVI ratio of the study area

the whole of Al-Soudah with its wonderful landmarks on a journey that extends to a distance of 5 km, in addition to the practice of paragliding.

Geological Setting

Al-Soudah is characterized by diverse relief and geological structures. It consists of igneous and metamorphic rocks of various shapes and colors, whose ages exceed hundreds of millions of years, which belongs to the Precambrian, and consists of granitic and crystalline rocks, covered by basalt blocks on its volcanic peaks, dating back to the Tertiary and Quaternary periods (Al-Zahrani 2006, p.14). Including the grooves steep slopes, hills and volcanic plateaus, mountain ridges, valleys, and mountains with soaring peaks, which are often enveloped by clouds and culminate in the peak of Al-Soudah, it is the highest peak in the mountains of Saudi Arabia, where Al-Soudah represents the water dividing line and the source of water for most of the valleys of Asir. Moreover, its geological formation

Table 2 Geosites in the study area

ID	Sites	Type	POINT_X	POINT_Y	Time (minutes)*	Distance (km)*
1	Rijal Alma Museum	Heritage musuem	42.2739 E	18.2126 N	98.0	70.6
2	Al-Sawda	Heritage villages	42.3922 E	18.3224 N	39.7	39.3
3	Najih Palace	Heritage palace	42.4493 E	18.2081 N	33.0	32.5
4	Wazi'a and Aziz Palace	Heritage palace	42.4277 E	18.2207 N	31.3	30.9
5	`Ayn Al-Zibah	Mountain resorts	42.3900 E	18.2793 N	39.1	38.8
6	Al Soudah National Park	Open parks	42.3405 E	18.2145 N	78.6	58.8
7	Al-Sawda	Main Pparks	42.3490 E	18.3206 N	48.4	48.3
8	Sha`F Al Wayman	Main parks	42.3895 E	18.1562 N	65.5	52.2
9	Al-Sawda	Heritage villages	42.3779 E	18.2451 N	38.6	38.6
10	Sha`F Al Wayman	Heritage villages	42.4036 E	18.1851 N	37.3	37.4
11	Al-Saqa Mosque	Heritage mosques	42.4033 E	18.2300 N	34.3	34.1
12	AL Makhat	Heritage villages	42.4386 E	18.1747 N	32.4	33.5
13	AL `Ikas	Heritage villages	42.4489 E	18.2674 N	29.8	29.5
14	Ad Dihiyah	Heritage villages	42.4142 E	18.2221 N	34.2	34.0
15	Al-Soudah Touristic	Main parks	42.3580 E	18.2937 N	43.4	43.3
16	Raidah Sanctuary	Natural protected areas	42.4006 E	18.2092 N	38.5	37.8
17	Rijal Almaʿa village	Heritage villages	42.2796 E	18.2443 N	92.0	66.6
18	Qasabat Al`Awas	Heritage castles and forts	42.3071 E	18.2614 N	86.6	62.4
19	Rijal Almaʿa village	Heritage villages	42.2753 E	18.2161 N	97.0	70.1
20	Eastern Viewpoint	Viewpoint	42.4650 E	18.2323 N	27.8	26.7
21	Valley Viewpoint	Viewpoint	42.4473 E	18.2350 N	29.9	29.4
22	Tabab Rd. Viewpoint	Viewpoint	42.4377 E	18.2545 N	29.3	28.8
23	Al-Tela'a Park	Open parks	42.4063 E	18.2495 N	40.2	35.2
24	Al-Soudah Viewpoint	Viewpoint	42.3633 E	18.2705 N	43.4	43.1
25	Al-Soudah Lookout	Viewpoint	42.3629 E	18.2740 N	43.8	43.3
26	Al-Soudah National P	Main parks	42.3644 E	18.2761 N	43.2	43.0
27	Tahlal View	Viewpoint	42.3550 E	18.2953 N	43.7	43.6
28	Aqabet As-Sammar VP	Viewpoint	42.3355 E	18.3127 N	47.0	47.7
29	Wadi Al-Salel Park	Open parks	42.2754 E	18.1827 N	105.0	75.3
30	Rijal Almaʿa View Point	Viewpoint	42.2608 E	18.2494 N	100.0	71.6
31	Jabal Al-Mazra'a VP	Viewpoint	42.2619 E	18.2393 N	103.0	72.8
32	Aqabet As-Sammar VP	Viewpoint	42.3329 E	18.2887 N	76.6	58.7
33	As-Samma' Park	Open parks	42.3318 E	18.2890 N	77.3	59.1
34	Al Sahab Park	Main parks	42.3962 E	18.2204 N	41.1	39.1
35	Al Sahab Resort	Mountain resorts	42.3953 E	18.2272 N	36.8	35.8
36	Aqabet Habo Tahama	Viewpoint	42.3748 E	18.1489 N	68.7	53.1
37	`Ayn Al-Zibah	Main parks	42.3900 E	18.2793 N	39.1	38.8
38	Jabal Sawda	Mountain resorts	42.3654 E	18.2647 N	39.7	39.8
39	Al-Soudah National Park	Main parks	42.3405 E	18.2145 N	78.6	58.8
40	King Abdulaziz National Park	Main parks	42.3537 E	18.3067 N	45.9	45.8
41	Bahat Rabi`Ah Village	Heritage villages	42.3296 E	18.3359 N	51.7	52.0
42	Al-Soudah Fort	Heritage castles and forts	42.3727 E	18.2696 N	38.8	38.9
43	Al-Soudah 1	Archeological	42.3635 E	18.2840 N	43.8	43.6
44	Al-Soudah 2	Archeological	42.3683 E	18.2668 N	39.8	39.9
45	Al-Soudah 3	Archeological	42.3663 E	18.2659 N	39.7	39.9
46	Al-Soudah 4	Archeological	42.3782 E	18.2609 N	37.8	37.6
47	Al-Soudah 5	Archeological	42.3820 E	18.2524 N	38.0	38.1
48	Al-Soudah 6	Archeological	42.3868 E	18.2500 N	38.7	38.8
49	Al-Soudah 7	Archeological	42.3880 E	18.2475 N	39.7	39.1
50	Al-Soudah 8	Archeological	42.3889 E	18.2432 N	39.1	39.2

Table 2 (continued)

ID	Sites	Type	POINT_X	POINT_Y	Time (minutes)*	Distance (km)*
51	Al-Soudah 9	Archeological	42.3908 E	18.2402 N	36.1	35.5
52	Al-Soudah 10	Archeological	42.3854 E	18.2478 N	38.6	38.7
53	Burj Tayhan	Archeological	42.3395 E	18.3166 N	48.1	48.3
54	Ayn Al-Zibah Waterfall	Open parks	42.3953 E	18.2813 N	39.2	38.9
55	Al-Muhtatabah Lake and waterfall	Open parks	42.4579 E	18.2065 N	28.5	27.8
56	Tahallah Mount	Archeological	42.3655 E	18.2638 N	39.6	39.7

*The distance and time of each point from Abha airport to the site

Fig. 7 Some of the peaks of the Al-Soudah Mountains are covered by fog, and the view was taken advantage of by making a cable car line. Source: https://www.asda.gov.sa/

Fig. 8 Agricultural terraces spread as a result of the severity of the height and slope of the Al-Soudah heights, as they preserve the agricultural soil, in addition to the retention of rainwater, and it has been unique in a diverse and different engineering layout; depending on the slope degree, it is an important heritage of tourist attractions. Source: https://www.spa.gov.sa/1908276

can be considered the main factor in the formation of the landscape and giving the area its attractiveness and distinction in front of tourists. The study area consists of five formations which are as follows (Fig. 2):

- First formation: alluvium and gravel: it includes fan deposits near tertiary basalt (Qal), with an area of about 22 km^2, and a percentage of 3.5% of the study area.

Table 3 Ancient inscription sites in the study area

Archaeological sites	Code	Location	Access to the site	Site status	Site description
Al-Soudah 1	Al-43	18.284015 N 42.363536 E	Easy	Intact and located within the walls of the Asir National Park—observer	It is located on top of Al-Arid Mountain within the wall of Asir National Park. In the middle of the rocks spread on its facades are a number of animal rock drawings (mountain goats), and drawings of six human figures, two of which are believed to be females, and another is drawn in an abstract style and looks like fairy figures, where the body is stretched and drawn in the style of delusion or deep tapping. 3–4 m is one row of medium-sized stones, and in the middle of the two circles there are rubble, some weeds, and a number of rock drawings (mountain goats)
Al-Soudah 2	Al-44	18.266800 N 42.368300 E	Easy	Intact and located within the walls of the Asir National Park—observer	Scattered rocks of different sizes contain animal and human drawings (hubby, ostriches, and human)
Al-Soudah 3	Al-45	18.265900 N 42.366300 E	Easy	Intact and located within the walls of the Asir National Park—observer	About scattered rocks of different sizes, containing animal rock drawings
Al-Soudah 4	Al-46	18.260900 N 42.378200 E	Easy	Intact and located within the walls of the Asir National Park—observer	About scattered rocks of different sizes containing rock (human, animal, tribal tags, and geometric) drawings
Al-Soudah 5	Al-47	18.252367 N 42.382033 E	Easy	Intact and located within the walls of the Asir National Park—observer	They are rocks of different sizes, with animal, human and engineering drawings on their upper facades, tribal markings (horses on a knight, drawing of a man, geometric drawings, one of which represents the sun) and primitive drawings
Al-Soudah 6	Al-48	18.249950 N 42.386750 E	Easy	Intact and located within the walls of the Asir National Park—observer	It is a small rock located at the foot of a very high mountain. On its upper facades, an animal drawing of a caribou is no longer visible except for its long horns. It was painted in a sunken clicking style
Al-Souda 7	Al-49	18.247467 N 42.387967 E	Easy	intact and located within the walls of the Asir National Park—observer	It is a small rock located in the middle of a very high mountain on its upper facades with geometric drawings
Al-Souda 8	Al-50	18.243183 N 42.388850 E	Easy	Intact and located within the walls of the Asir National Park—observer	They are rocks of different sizes located on the top of a very high mountain, and on their upper facades are human, animal, and engineering drawings (a man in a state of readiness to hunt a caribou—a geometric drawing representing the sun) using the method of deep digging
Al-Soudah 9	Al-51	18.240200 N 42.390817E	Easy	Intact and located within the walls of the Asir National Park—observer	It is a medium-sized rock located on the top of a very high mountain, and on its facades on the southern side are geometric drawings, tribal markings, and animal drawings (camels—horns and ibex) using the method of deep digging
Al-Soudah 10	Al-52	18.247817 N 42.385383 E	Easy	Intact and located within the walls of the Asir National Park—observer	It is scattered rocks of different sizes located in a flat land on the top of a very high mountain, and on its facades are geometric drawings, and animal drawings (and long-horned calves) using the method of deep digging

Source: Saudi commission for Tourism & National Heritage (Scth.gov.sa)

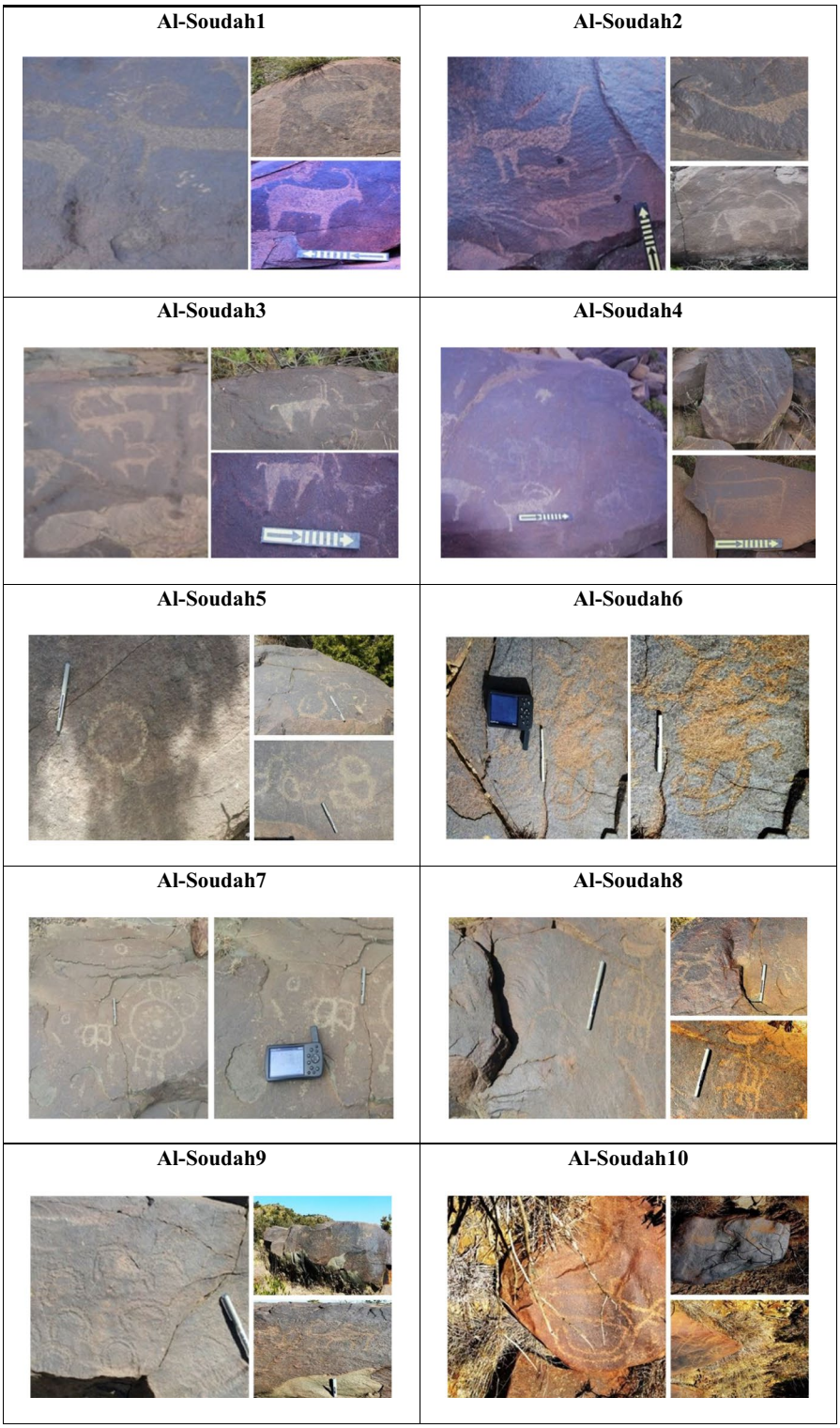

Fig. 9 Ancient stone inscription sites of Al-Soudah. Source: Saudi commission for Tourism & National Heritage

- Second formation: Wajid Sandstone: Halaban Group within the Tathlith Belt (Qew), with an area of about 3.6 km^2, and a percentage of 0.6% of the study area.
- Third formation: Ablah Group: metasedimentary rock—phyllite, calcareous phyllite, slate, fine-grained graywacke, subordinate marble, and minor quartzite and

Table 4 Archaeological sites of the study area

Archaeological sites	Code	Location	Time (minutes)*	Distance (km)*	Site status	Site description
Burj Tayhan	Al-53	18.3166 N 42.339517 E	48.1	48.3	Archeological	An archaeological tower located about 35 km north of the city of Abha, located at the top of a high mountain
Al-Soudah	Al-2	18.322416 N 42.392224 E	39.7	39.3	Heritage villages	The village is a microcosm of the life of the people of Asir in the past. It is a reminder of the aesthetics of the past and its fragrance and distinction. The building of the village is designed from old stones and mud, in the Asiri style, the drawing of the Al-Qatt and the inscription of the Asiri
AL `Ikas	Al-13	18.267401 N 42.44886 E	29.8	29.5	Heritage villages	It is one of the oldest villages in Al-Soudah, surrounded by one of the largest valleys. It is one of the largest villages in Asir and has more than fifty military fortresses and historical houses. There is an archaeological mosque that is 700 years old. The village is surrounded by the famous Mount Faris and overlooks Wadi Asran with its waterfalls
Al-Soudah Fort	Al-42	18.269584 N 42.372668 E	38.8	38.9	Heritage castles and forts	It is one of the largest castles in Asir region as individual castles, and it is distinguished by its architectural style that is still preserved to this day with attractive technical details. It is known as the fortress of Ibn Ali; Abdullah bin Ali bin Ali was 90 years old. The fort was built 600 years ago on a site of very black rocks, surrounded by dense juniper forests, and it is still in the middle of the village, while the rest of the houses were scattered
Bahat Rabi`Ah Village	Al-41	18.3359 N 42.3296 E	51.7	52.0	Heritage villages	It is a virgin agricultural land. It is famous for cultivating grains, vegetables and summer fruits. At the top is the "Aqbat Al Samma" head, which connects Sarat Asir and Tihama Asir. It is a tourist center because it has many military forts and archaeological villages. It was in the past called Al-Moghout. The village of Baha Rabiaa includes the Al-Mahtaba Park, which contains natural waterfalls and a group of lakes formed by rain and permanent water flow. The village also includes King Abdulaziz Park, one of the most beautiful tourist attractions in Al-Soudah
Rijal Alma'a village	Al-19	18.2161 N 42.2753 E	97.0	70.1	Heritage villages	The importance of the historical and archaeological village lies in its cultural depth and prominence in trade and architectural arts, represented in tall fortresses that combine beauty and expertise. The Saudi Commission for Tourism and National Heritage (SCTH) first started registering sites and prepared the file of Rijal Almaa heritage village in Asir and handed it over to the UNESCO World Heritage Center in January 2018
Wazi'a and Aziz Palace	Al-4	18.2207 N 42.4277 E	31.3	30.9	Heritage palace	Each of them consists of 6 floors and is surrounded by yards that were in the past orchards of almonds, as it is surrounded by a wall on its eastern side and is closed by a huge door called "Bab Al-Jami."
Qasabat Al`Awas	Al-18	18.2614 N 42.3071 E	86.6	62.4	Heritage castles and forts	It is one of the archaeological tourist attractions. It has been restored and returned to excellent condition, it was used as a tower to watch and guard the area, the area of the base of the kasbah is about twenty-six square meters, and when you climb to its top you enjoy watching the wonderful landscapes
Rijal Alma Museum	Al-1	18.2126 N 42.2739 E	98.0	70.6	Heritage museum	In the middle of Rijal Alma village, there is a museum called Rijal Almaa Heritage Museum, which takes its headquarters from Al-Alwan Palace. It was chosen because it includes several floors and its construction dates back to more than four centuries. The palace has undergone restoration works in which the people of the village participated. The museum displays the heritage, antiquities, and unique holdings of the village, including manuscripts, tools and weapons, as it includes more than two thousand artifacts and manuscripts spread over nineteen sections in the museum. The museum was established to perpetuate and preserve the ancient heritage of Rijal Almaa, and the museum was built in 1985
Al-Saqa Mosque	Al-11	18.2300 N 42.4033 E	34.3	34.1	Heritage mosques	It is about 170 years old. The walls are stone, and the ceilings are wooden, in addition to the wooden columns that support the ceiling
Tahallah Mount	Al-56	18.2638 N 42.3655 E	39.6	39.7	Archeological	Tahallah Mount is the highest peak in the Kingdom of Saudi Arabia, with a height of 3015 m. It is rich in iron, an old mining site. The people of the Asir region used it in ancient traditional industries, such as the manufacture of knives, daggers, janabi (weapons resembling daggers), and swords. The people of Asir used to extract quantities of the iron product from it, which is called the lunar clouds or the lunar slug in relation to the metal of the Tahallah Mount iron

*Time and distance are the time and distance needed from Abha airport to the location

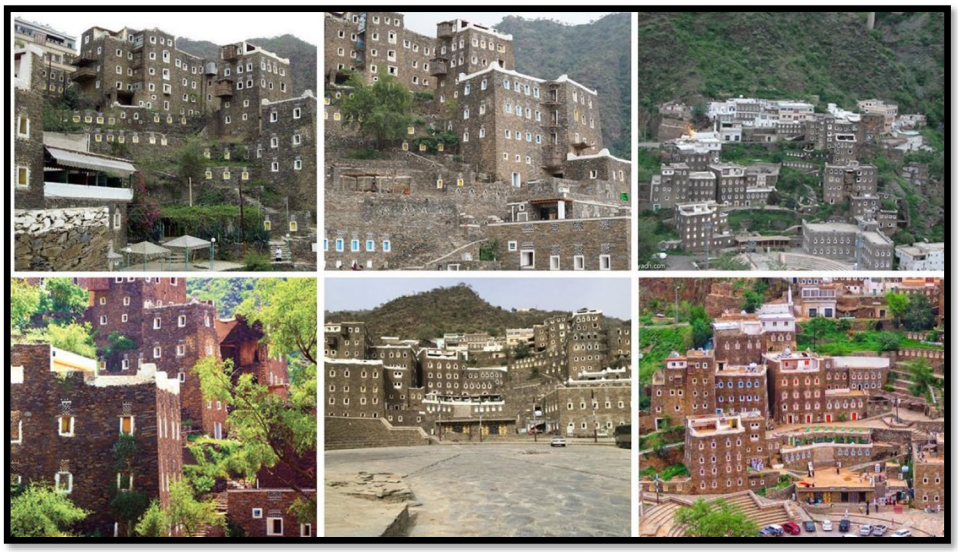

Fig. 10 Rijal Alma'a Heritage Village, which is a group of heritage forts built of stones, its height ranges between 3 and 7 floors, so that each floor represents a housing unit, and the village was considered a military barracks, because of its high fortification. Source: https://arabic.cnn.com/travel/article/2020/10/26/rijal-almaa-village-asir-region-saudi-arabia

conglomerate (as), with an area of about 22.1 km^2, and a percentage of 3.5% of the study area.

- Fourth formation: Jeddah Group: basalt and andesite—Pi110w lava, flow bregcia, tuff, dacite tuff, interbedded subordinate, often carbonaceous conglomeratic graywacke and phyllite (jt), with an area of about 148,6 km^2, and a percentage of 23.3% of the study area.
- Fifth formation: Bahah Group within the Tayyah Belt—Volcaniclastic graywacke, carbonaceous shale and siltstone, subordinate chert, slate, and conglomerate, minor interbedded basalt, andesite, and dacite (bt), with an area of about 440.3 km^2, and a percentage of 69.2% of the study area.

Topographical Characteristics

The mountainous feature is the dominant character in the study area. It is the highest among the regions of the Kingdom, and it also includes a number of short and medium length waterways. Within the study area the altitudes increase from the west to the east, with a maximum of 3000 m, (2652–2996 m northeast part), and a minimum of 800 m (791–1157 northwest part) (Fig. 3).

Such altitudes slope to great degrees and contribute to the danger of the floods caused by heavy rains. The study area is also characterized by the presence of waterfalls. Its waters are falling most of the year as is the case for the waterfall located in the region known locally as Al-Muhtaba. The study area encompasses the ridges and high mountain peaks—the point of Jabal Al-Soudah is more than 3015 m above sea level. Many valleys split their streams in that mountain range, among the most important of which are Wadi Itwad and Wadi Hali.

Al-Soudah is one of the Kingdom's most prized hidden treasures. At 3000 m above sea level, a hidden village above the clouds gives spectacular views on the world below. The village of Al-Soudah offers panoramic 360-degree views of the surrounding paradise on earth consisting of mountains covered in sheets of greenery, dense forests, peaks, and valleys. The region has become a top tourist destination due to its rich heritage, history, culture, and all-year-round good weather (Fig. 4).

Al-Soudah overlooks the Tihama mountains with their stunning valleys and quaint villages dotted along the plains and slopes with terraces hanging from the steep cliffs. The villages are less crowded than other sites but unique in their location.

Climatic Characteristics

The study area is characterized by distinctive climatic features, and perhaps its great height had the greatest impact on the level of temperature and precipitation, which left distinctive plant and animal traces in the area. The annual average temperature is about 19.9°. The annual average maximum temperature is 27.7°, and the annual average minimum temperature is reduced to 13.9° (https://www.tutiempo.net). It is clear how the altitude played a prominent role in the general decrease in temperature values compared with the regions located in the same astronomical location.

The region records high values of precipitation, which is not limited to rain only, if the region receives quantities of cold, the cooling processes are more intense and rapid, and

Table 5 Most remarkable geosites of the study area

Geomorphological sites	Code	Location	Access to the site	Time (minutes)	Distance (km)	Site description
Al-Soudah National Park	Al-6	18.2145 N 42.3405 E	Open parks	78.6	58.8	It is located in the village of Al-Soudah, northwest of the city of Abha, and there is the Thalal Mountain which reaches the highest point in the Arabian Peninsula. All the trees cover the mountains, and clouds appear on the horizon
Raidah Sanctuary	Al-16	18.2092 N 42.4006 E	Natural protected areas	38.5	37.8	It is steep slopes covered with dense vegetation and dominated by juniper trees. There are many water tributaries that descend from the top of the cliff and drain into Sha'ib Raida. This reserve is characterized by the density and diversity of its vegetation cover, as there are juniper forests at the top of the cliff, followed by Al-'atm trees (wild olives), acacia, and several types of cacti to the bottom. As for the reefs, they contain a high percentage of diversity and density in vegetation and contain species of rare animals and birds
Al-Sahab Park	Al-34	18.2204 N 42.3962 E	Main parks	41.1	39.1	Al-Sahab Park is one of the most beautiful and touristic parks because of its wonderful location, as it is located on a high mountain. With clouds, fogs, and rain falling, waterfalls are formed. When you look at the summit, you find that the clouds hug the mountain and the park
Jabal Al-Soudah	Al-38	18.2647 N 42.3654 E	Mountain resorts	39.7	39.8	Jabal Al-Soudah, or what is known as Montenegro, hosts many sports activities such as hiking, mountaineering, camping, paragliding, and other cultural events. Jabal Al-Soudah is one of the most important summer resorts because it has cold and rainy weather in the summer
King Abdulaziz National Park	Al-40	18.3067 N 42.3537 E	Main parks	45.9	45.8	King Abdulaziz Park enjoys a moderate climate because it is located on Mount Al-Soudah and provides all services and recreational facilities, including exciting games, restaurants, cafes, and camping sites. It is considered one of the best Abha parks and the largest park in Saudi Arabia
Ayn Al-Zibah Waterfall	Al-54	18.2813 N 42.3953 E	Open parks	39.2	38.9	It is one of the most prominent natural attractions in the city of Abha. It is located in the picturesque Al-Soudah National Park and includes a group of amazing and freshwater waterfalls, surrounded by a group of distinctive rocky cliffs, and the water reaches it from the top of Mount Tahlal
Al-Muhtatabah Lake and waterfall	Al-55	18.2065 N 42.4579 E	Open parks	28.5	27.8	It is one of the most beautiful series of rugged Abha waterfalls. It enjoys a charming nature of varied terrain, with tall and rugged mountain peaks, grassy plains that visitors use as their council, farms, and pasture gradients, thick fogs in summer, pools made by the flowing waters of waterfalls, flocks of songbirds hovering on the horizon, which makes it one of the most tourist attractions

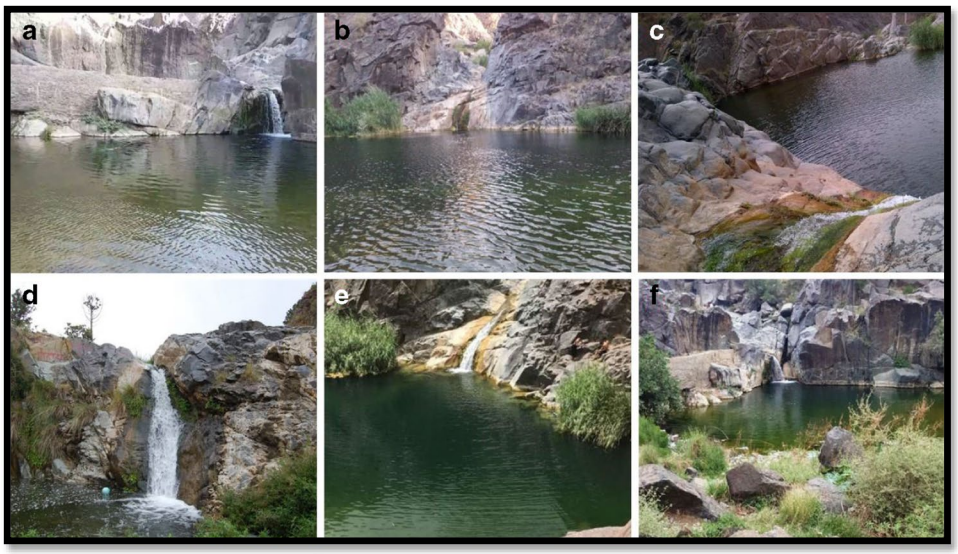

Fig. 11 Lake Al-Mohattaba is a small mountain lake that is a watershed in very rugged rocks. It consists of two (pools) of varying size (**b**, **e**), linked by a rocky slope of water (**c**, **f**). The water descends through the valley into the lake in the form of a waterfall (**a**, **d**, and **e**). Source: https://www.a7walsaudi.com/11753

rain falls most of the year. However, the quantities and continuity vary according to the type of rain. Since winter rains belong to the type of terrain rain, it is affected by the weak flow of cold and moist air masses from the Mediterranean Sea, accompanied by clear effects of the Red Sea. The summer rains are affected by the monsoons, which often makes it fall accompanied by lightning and thunder. The amount of precipitation is estimated at about 220 mm as an annual average.

Oliver's Index (THI)

Temperature and humidity index (THI) indicator reflects the heat exchange between the human body and the surrounding environment through the combination of temperature and humidity (Ma & Sun 2007):

$$\mathrm{THI} = (1.8t + 32) - 0.55(1 - f)(1.8t - 26)$$

where THI is the temperature and humidity index, t is the temperature in Celsius (°C), and f is the relative humidity (%). Conversely, the latter's content depends on the temperature variable directly without the need for the dry thermometer and mileage temperature values that are not available in the stations of the study area. The degree of comfort and discomfort is determined by Table 1 and Fig. 5.

Vegetation Cover

The study area is distinguished by its richness in vegetation since its Juniper forests are dense, almost covering most of the area, and they are perennial. The area has a second layer that consists of dark and shaggy plants. Furthermore,

Fig. 12 Lake Ayn Al-Zibah is Faulted Lake, linked by fault lines (**d**), where one of its edges aligns with that pond with a refractive line, as it appears straight and almost devoid of zigzags (**a**, **c**), The water of the lake consists of the descent of water through the valley into the lake in the form of a waterfall (**b**, **e**). Source: https://www.safarway.com/property/ain-al-zibah#gallery

Table 6 Viewpoint sites of the study area

Viewpoint site	Code	Location	Access to the site	Time (minutes)	Distance (km)
Eastern Viewpoint	Al-20	18.2323 N 42.4650 E	Viewpoint	27.8	26.7
Valley Viewpoint	Al-21	18.2350 N 42.4473 E	Viewpoint	29.9	29.4
Tabab Rd. Viewpoint	Al-22	18.2545 N 42.4377 E	Viewpoint	29.3	28.8
Al-Soudah Viewpoint	Al-24	18.2705 N 42.3633 E	Viewpoint	43.4	43.1
Soudah Lookout	Al-25	18.2740 N 42.3629 E	Viewpoint	43.8	43.3
Tahlal View	Al-27	18.2953 N 42.3550 E	Viewpoint	43.7	43.6
Aqabet As-Sammar	Al-28	18.3127 N 42.3355 E	Viewpoint	47.0	47.7
Rijal Almaʿa	Al-30	18.2494 N 42.2608 E	Viewpoint	100.0	71.6
Jabal Al-Mazra'a	Al-31	18.2393 N 42.2619 E	Viewpoint	103.0	72.8
Aqabet As-Sammar	Al-32	18.2887 N 42.3329 E	Viewpoint	76.6	58.7
Aqabet Habo Tahama	Al-36	18.1489 N 42.3748 E	Viewpoint	68.7	53.1

types of junipers grow in the gorges of waterways, such as altar, Al-Jib, and Al-Qaboor. Where moisture opportunities increase in valleys, the plants become denser, and the sizes of juniper trees are larger. The current area of vegetation cover is estimated to be about 125 km^2 (Fig. 6).

Materials and Methods

The methodology that led to the realization of this paper has started from the current bibliographic (geological, geomorphological features, and cultural–historical, literary or tourism geography) references. Several steps have been taken to achieve the proposed objectives. The next step was dedicated to field research, where geosites and geotouristic sites were identified and located using the method developed (Reynard et al. 2007).

A database was created in which the attributes that characterize the geosites and geotouristic sites were introduced. This comprises the following elements: general data (name, location, type, property, topographic representation, and photos); qualitative data about the scientific, ecological, cultural and aesthetic values; the presence of some man-made tourism attractions; and the existence of some management measures. Selected geosites and geotouristic sites were finally included within the proposed routes.

In the strategic phase, a SWOT Plus analysis was performed to identify strategies for fostering geotourism. A classic SWOT matrix was adapted from an extended design in Nazarko et al. (2017) as a prospective instrument to categorize significant factors by integration of the occurrence of factors in time (existing vs. potential), their origin (internal vs. external), and their impact (favorable vs. unfavorable). In addition, the following categories are taken into consideration: strengths and weaknesses. SWOT Plus is an assessment method that allows us to describe and analyze strategies for the development of geotourism in the area.

Results and Discussions

The city of Al-Soudah, with a history of more than 3000 years, has many tourist attractions that attract tourists. The attractiveness of the area for geotourism depends on the number of valuable and accessible geosites and geotouristic sites that need to be properly described and evaluated. Al-Soudah is rich in water and is crossed by many watercourses, relatively accessible. It includes many heritage villages and tourist and recreational facilities, including a number of nature parks; 56 sites were studied in the Al-Soudah area, ranging between geoarchaeological, ancient inscription, archaeological sites, and heritage villages (Table 2). The

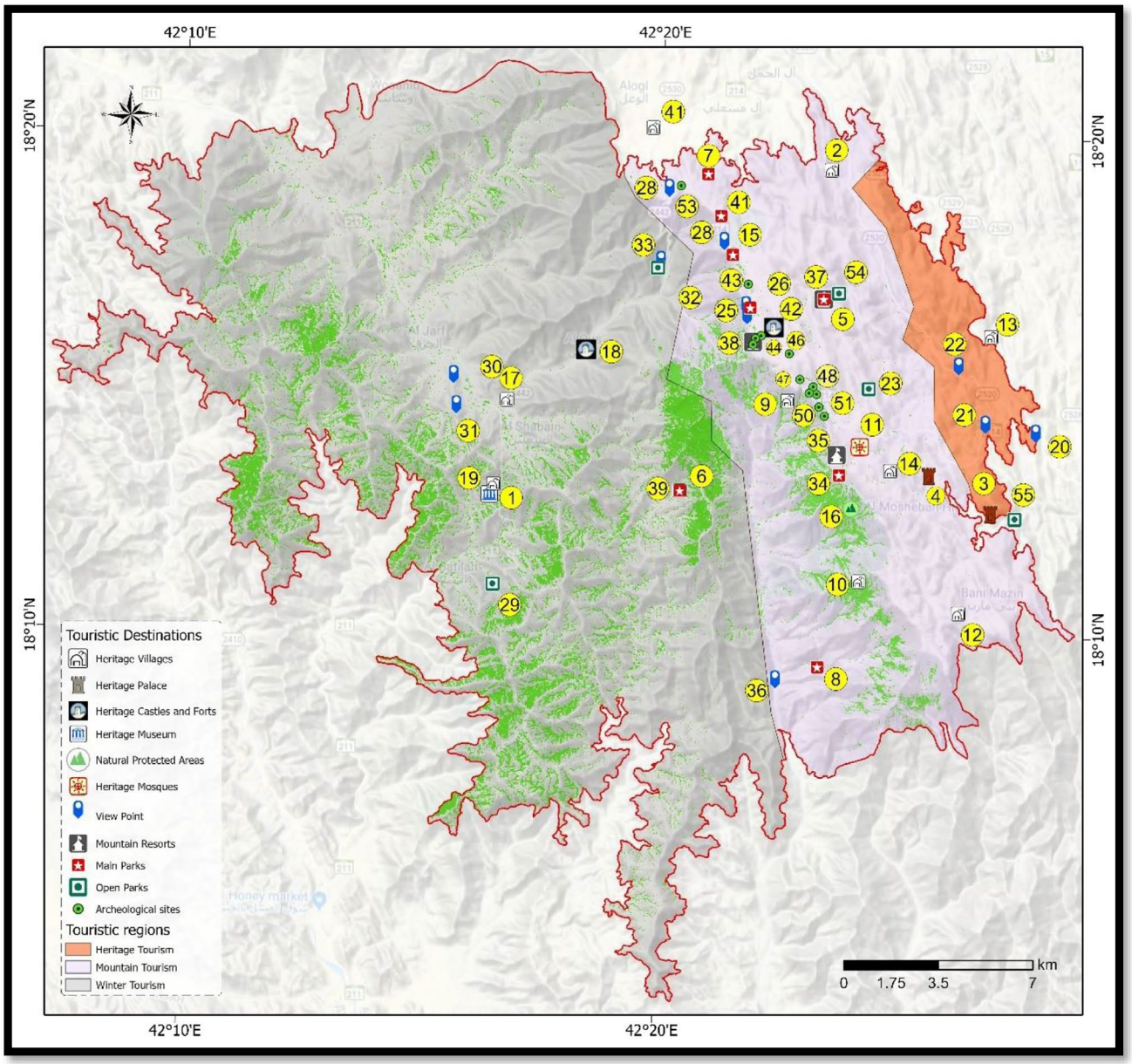

Fig. 13 Site of the touristic destinations in the study area

city has a mild climate in summer and winter compared with the surrounding areas. There are many picturesque forests that cover the slopes of the mountains and are surrounded by fogs (Fig. 7), so it is called "the Lady of Fog."

It is an important area of agricultural production. Much of the ongoing cultivation takes place on the terraces. The cultivated terraces create diversity relief of slopes and represent the salient characteristic, emblematic feature to Al-Soudah. Scenic man-made terraces have been recognized by Archaeological Cultural Landscape of worldwide importance and they are expected to become a part of the list of UNESCO-ICOMOS World Heritage Cultural Landscapes (Fig. 8).

Geoarchaeological Sites

The study of geoarchaeological sites, thus, focuses on the history of landscapes inhabited by our predecessors and utilizes them for pedagogical purposes, including the local community by creating new jobs and opportunities in the tourism sector (Vijulie et al. 2014). Geoarcheotourism is a form of educative tourism that focuses on changing human

Table 7 SWOT Plus matrix

Existing factors	
Internal factors	External factors
Favorable factors	Favorable factors
• The historical and traditional infrastructure • Tourism infrastructure • More of visits by national tourists than other provinces of the Saudi Arabia • Legal protection due to tangible and intangible heritage values • Cable cars and paragliding	• Availability of distinctive tourist destinations in Al-Soudah • Asir development project 2021, which was launched under the name of "Qimm and Shim," including the development of Al-Soudah • The "Humanizing" heritage villages project, in September 2020, which is to develop and restore a number of heritage villages • The World Tourism Organization has approved the village of Rijal Almaa as one of the best global tourist villages 2021
Unfavorable factors	Unfavorable factors
• Unfamiliarity of the local and global public with the geosites and geotourism in Al-Soudah • The need for living quarters • The need for points responsible for the interpretation of geoscientific data • The need for data on the geosites proposed in the data for each point • The lack of surveillance centers and patrol posts in the geoscientific and geotourism concerned sites	• Loss of traditions and knowledge inherited from the ancestors, especially at a young age • The scarcity of public transportation
Potential factors	
Internal factors	External factors
Favorable factors	Favorable factors
• Extension of the tourist tendency to have obtain explanations of the geoscientific data • Opportunities to the protection of geosites and the geodiversity of the land • Experts to explain the geoscientific and geotourism data of the area • Inclusion of motivation in the geopark • The authors' suggestion to include the Al-Soudah as a geopark	• Promotion of local economic activities such as ancestral gastronomy and crafts in stone, ceramics, and Al-Qatt Al-Asiri, inscribed on the Heritage List of the United Nations "UNESCO" Preservation and strengthening of ancestral practices for community growth and conservation of resources
Unfavorable factors	Unfavorable factors
• No connections with other forms of national heritage: cultural, historical and preserved sites, tourist quarters and so on many advantages and characteristics • The need for rules to administrate and protect the geosites	• Low temperatures in the winter, and high fogs, which causes lack of visibility at times • The area is a water line division, so high rainfall leads to the occurrence of torrential flows, especially as they spread over cliffs and cause several landslides and hazards

adaptation with materialistic evidence. Apart from intrinsic values, geoarchaeological sites possess economic, cultural, scientific, and aesthetic values attracting visitors (Gray 2004). Museums, inscriptions on rocks, heritage villages, castles, and forts that exhibit the relationships of our predecessors with the environment are the principal attraction of the geoarchaeosites (Comşa, 1987). Geotourism development in such geoarchaeosites may raise the fund for geoconservation and assure the involvement of the members of host community, who get benefitted economically from archeotourism. The scientific interest, recreational and aesthetic significance, accessibility, and level of exposure of the landscape for geotourists are among the crucial enticement factors in this context (Bentivenga et al. 2017; Palladino et al. 2013). The study region is endowed with a number of outstanding hills from where a number of artifacts have been discovered. Apart from inscription, there are 10 sites (Table 3, Fig. 9). There are also 13 archeological sites and heritage villages (Table 4, Fig. 10) that, with evident interest, were subjected to a more detailed study.

Geosites

Al-Soudah geomorphology and diversity of landforms that are the immediate result of many geomorphological agents, fluvial, waterfall, and lake, have led through time to the shaping of a vivid landscape in the area. The geosites located in scattered places, best known by their population and covering Al-Soudah area approximately, will be analyzed. Many of them encompass an important cultural component, linked to anthropic tourist (cultural, historical, religious, artistic, and architectural) sites. In

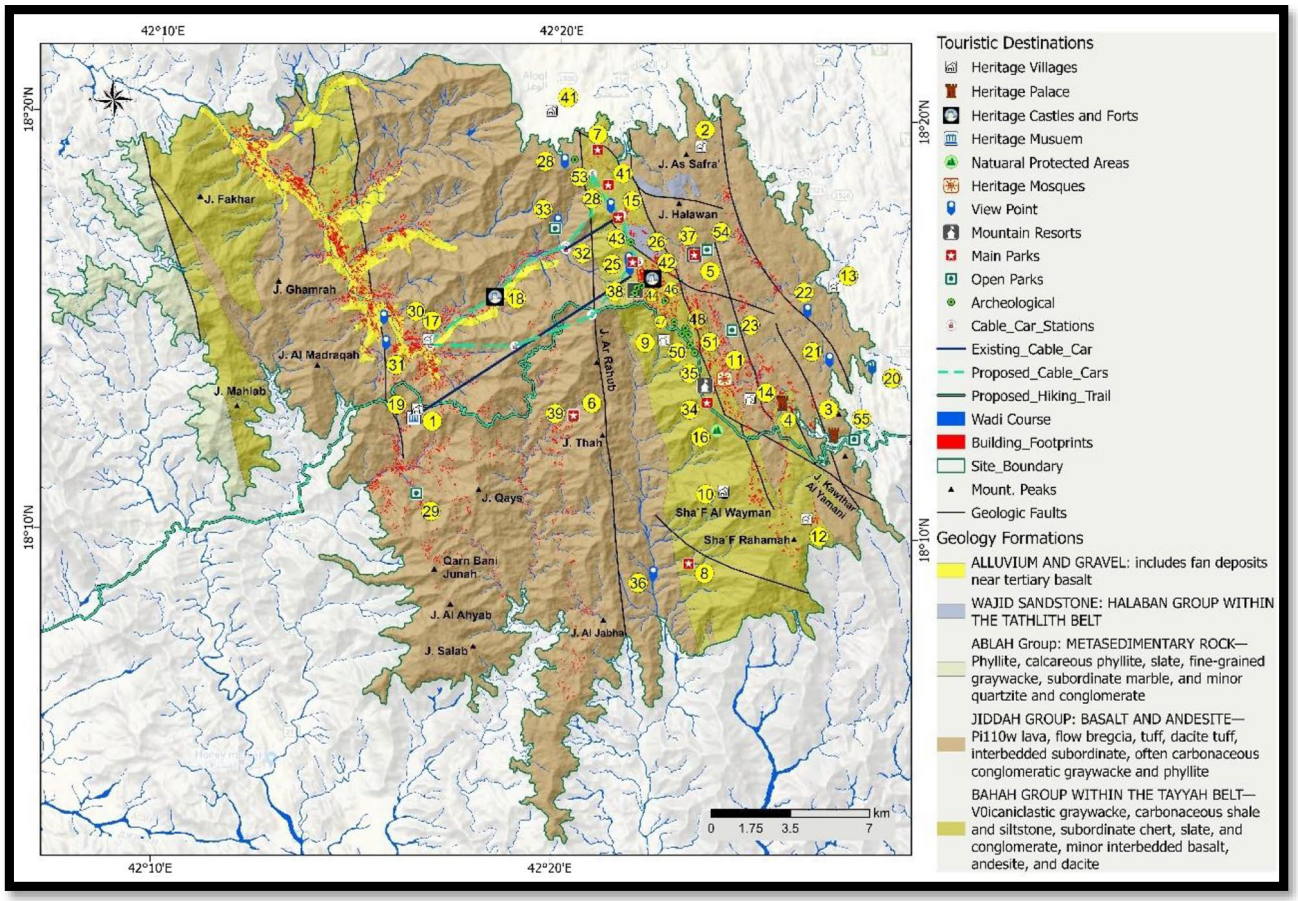

Fig. 14 Geotouristic map of the study area

the analyzed area, seven geosites have been identified and localized, with scientific, cultural, and site description. Al-Soudah has numerous rapids and waterfalls and the most remarkable geosites (Table 5, Figs. 11 and 12).

Viewpoint Sites

The most popular touristic places are viewpoints, where almost one can observe most of the city of Abha and Al-Soudah. They are among the most attractive areas for locals and tourists. They have been counted as eleven points (Table 6, Fig. 13).

SWOT Plus Analysis

The classic SWOT Plus matrix analysis was conducted to identify geotourism promotion strategies in Al-Souda; it has been adapted from an extended design (Nazarko, J.; et al. 2017), as a potential tool for classifying significant factors, through the integration of the occurrence of factors in time (existing vs. potential), their origin (internal vs. external), and their impact (favorable vs. unfavorable) (Table 7).

Based on the factors in time (existing vs. potential), their origin (internal vs. external), and their impact (favorable vs. unfavorable), in addition, strengths and weaknesses, in order to develop the quality of the geosites and geotouristic sites in order to diversify the resources of tourism in Al-Soudah, there are techniques concerning the improvement are introduced:

- Involve local communities in the sustainable control of geological resources for the mutual exchange of geological, cultural, and historical experiences through diverse social activities.
- Encouraging scientific research in the field of geosciences and geotourism to value the potential of tourism through conducting national and international research.
- Establishing and activating information centers in the geosites, where various forms of materials on the cul-

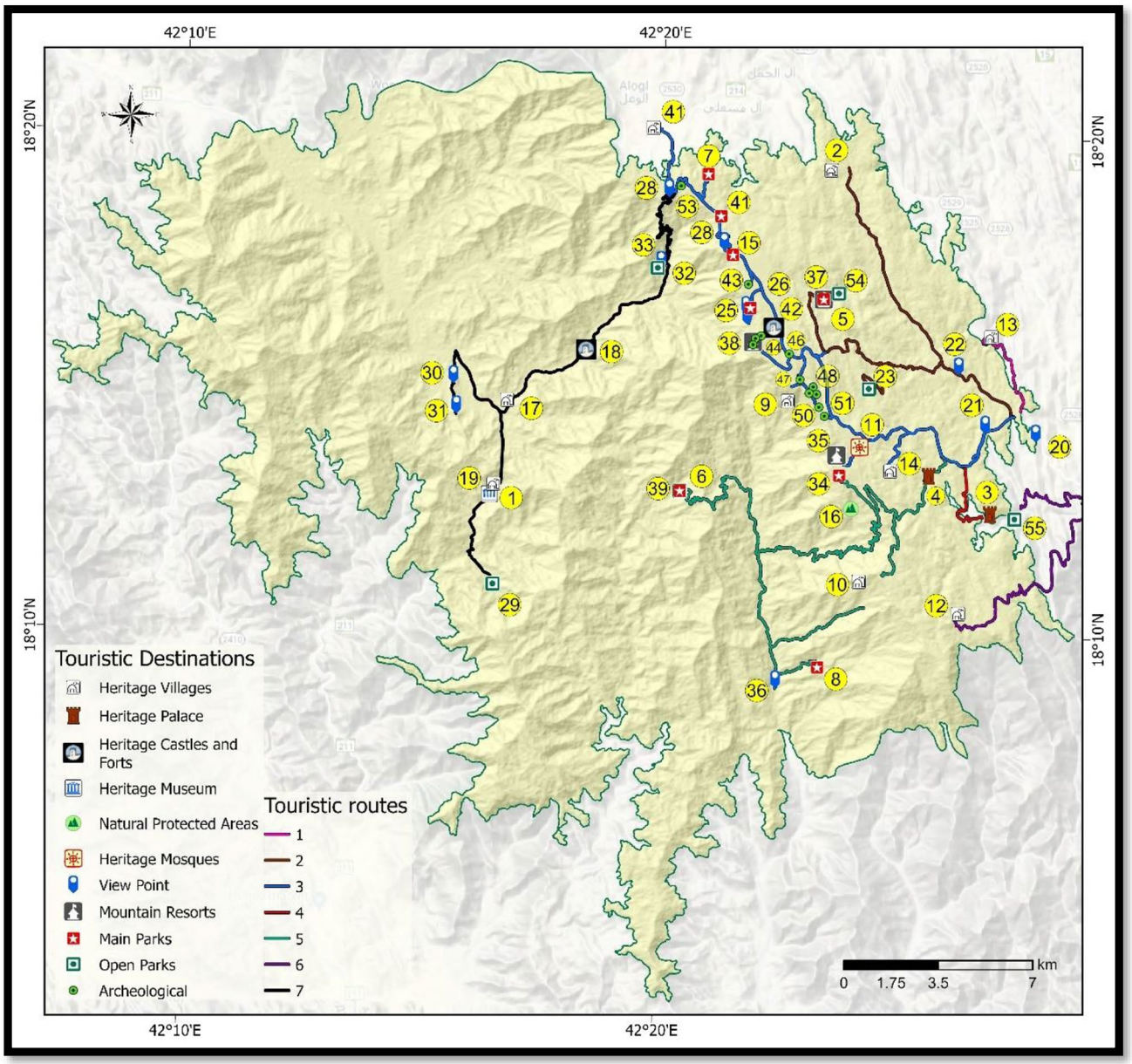

Fig. 15 The map of proposed geotouristic itineraries

ture and history of the sites are provided to the arriving tourists.

Therefore, it is necessary to highlight Al-Souda to develop a website, in which tourists are likely to find data about the region, and thus place it on the map of domestic and foreign tourism. Below are the actions that must be taken into account to ensure the sustainable development of the region in the short term.

- Citizens of Al-Soudah, especially those in connection with tourists, should be geoeducated.
- Follow up the tourist's behavior and how far they are satisfied with the recorded trips.
- The application of proportional aspects of geoconservation: sewage management, hygiene, watching touring trails, and waste segregation.
- Creating a database on the geoheritage and the state of the environment and developing strategies to preserve Al-Soudah.

Table 8 Proposed geotourism routes and stop points

No	color	Routes	Difficulty
1	Fuchsia	AL `Ikas Heritage Villages (13)-Eastern Viewpoint (21)	Easy
2	Brown	Al-Sawda Heritage Villages (2)- Ayn Al-Zibah Main Parks (5)-Ayn Al-Zibah Waterfall (55)-Tabab Rd. Viewpoint (23)-Al-Tela'a Park (24)	Easy
3	Blue	Al-Sawda Main Parks (7)-Al-Sawda Heritage Villages (9)-Al-Saqa Mosque, Heritage Mosques (11)-Ad-Dihiyah Heritage Villages (14)-Al-SoudahViewpoint (25)-King Abdulaziz National Park (41)-Bahat Rabi`Ah Village (42)-Al-Sawda Fort (43)-Ancient inscription sites of Al-Souda 1:10 (44–45-46–47-48–49-50–51-52–53)-the archeological site of Burj Tayhan (54) the archeological site of Tahallah Mount (57)	Easy
4	Red	Najih Palace Heritage Palace (3)-Al-Muhtatabah Lake and waterfall open parks (56)	Easy
5	Green	Wazi'a and Aziz Palace Heritage Palace (4)-Al-Soudah National Park (6)-Sha`F Al Wayman Heritage Villages (8)-Raidah Sanctuary Natural Protected Areas (16)-Al-Sahab Park (35)- Aqabet Habo Tahama Viewpoint (37)	Easy
6	Purple	Al-Soudah National Park (40)-Al-Makhat Heritage Villages (12)	Easy
7	Black	Rijal Almaʿa village, Heritage Villages (17)- Qasabat Al`Awas Heritage Castles and Forts (18)- Aqabet As-Sammar Viewpoint (29)-Wadi Al-Salel Park open parks (30)-Rijal Almaʿa Viewpoint (31)-abal Al-Mazra'a Viewpoint (32)-Aqabet As-Sammar Viewpoint (33)-As-Samma' Park (34)	Easy

Geotouristic Map

The present study has produced the geotourism map that summarizes the most important geoheritage elements of Al-Soudah and that could be used to promote and advertise the local geotourism. The produced map shows seven geotouristic itineraries connecting 56 of the most spectacular geomorphosites of the area (Bouzekraoui & Ferhane), geological and geomorphological objects, landforms, and high mountain landscapes. Knowing that there is no specific methodology aimed at the implementation of this geotourism map, the latter was developed from the simplification of the geomorphological map of the Al-Soudah, following the steps taken by Coratza and Hobléa (2018), Bissig (2008), Coratza and Regolini-Bissig (2009), and Ilies et al. (2011). Such sources are adopted to create the map legend, guided by the methodologies proposed by Bertacchini et al. (2007), Coratza and Hobléa (2018) Erhartič (2010a and 2010b), Regolini-Bissig Reynard (2010) Comănescu et al. (2013), and Bouzekraoui et al. (2018).

The legend of the established map has been simplified so that it would be easily read and understood by the different categories of tourists, mainly a public of nonspecialists, and to help them improve their understanding of geoscientific terms. The colored circles were further used to designate the location of the main geosites that constitute the main theme in the proposed itineraries. The basic information for tourists was also included: parking lots, information panels, geotourist itinerary, and the material cultural sites. A digital terrain model (DTM) has also been used as a base map in order to show the relief (Fig. 14).

The activity of geotourism necessarily involves interaction with the natural environment. Yet, the degree of interaction will vary depending on the geotourist cultural background and the physical ability as mentioned by Swarbrooke et al. (2003) and Newsome and Dowling (2010). These interactions are mainly prevalent in mountainous areas where several natural hazards are abundant as stated by Coratza and De Waele (2012). Al-Soudah is located on the top of the Sarawat Mountains, i.e., it is among risky areas. Thus, it is recommended to survey the potential hazards and the geomorphological features that could impede progress during tourist itineraries in order to facilitate and allow tourists to enjoy the landscape and avoid any potential dangers, as indicated by Bell (1999), Piccazzo et al. (2007), Reynard (2008), and Pelfini et al. (2009). Responding to this claim, it is noted that the itineraries and trails in Al-Soudah cross a series of torrents, which can be potentially dangerous for tourists in periods of long or heavy rain. Further, geotouristic itineraries are going along slippery slopes caused by the presence of unstable materials and rock fall in some places on the trail's destinations is very difficult.

Proposed tourist routes

Geotouristic Itineraries Al-Soudah is distinguished by its unique and rich natural and cultural heritage whose features are still evident in the surrounding landscape and heritage villages. Considering the previous stages of the study and the relationship between geomorphosites and the anthropic tourist sites, seven geotourism routes (Fig. 15) were established. Their main characteristics are summarized in Table 8. In Al-Soudah, geotourism maps have been made and such tours have been proposed. These are the proposals for such routes which try to cover both the existing and inventoried geomorphosites within Al-Soudah and the main cultural tourist attractions located in this area.

The seven itineraries described connect the 56 geotouristic with the high mountain landscapes. The proposal of these

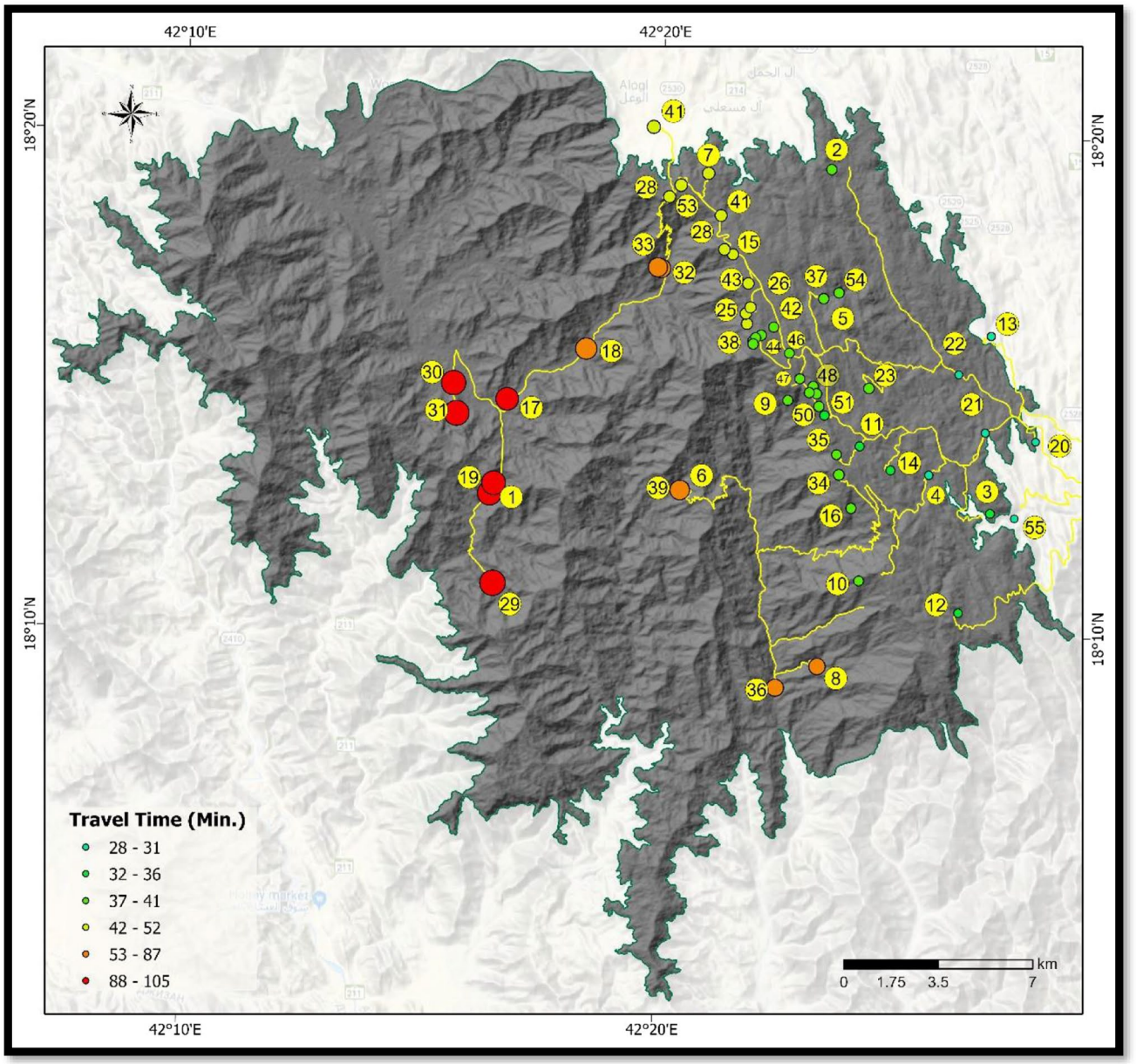

Fig. 16 Time required from Abha Airport to the location of the study area

itineraries aims at creating an opportunity to raise awareness of the geological, geomorphological, and archaeological features existing in the Al-Soudah area that requires both protection and promotion.

A proposed map was drawn showing the time and distance which the tourist takes to be covered between the different touristic facilities and sites in the study area from Abha airport. The time required from Abha Airport to the location is shown in Fig. 16, and distance required from Abha Airport to the location is illustrated in Fig. 17. Moreover, tourists and visitors can benefit from extra information about access conditions to the different geosites of the region. Besides, a map of the accessibility from Abha Airport–Isochrone (minutes) to the study area is indicated in Fig. 18. These maps are an important guide for the international, local, and regional visitor since they show the distance, time and accessibility taken from Abha Airport and to the site he/she wants to visit.

Geohiking Trail A geohiking trail has been proposed within the study area to revitalize the tourist sites and to

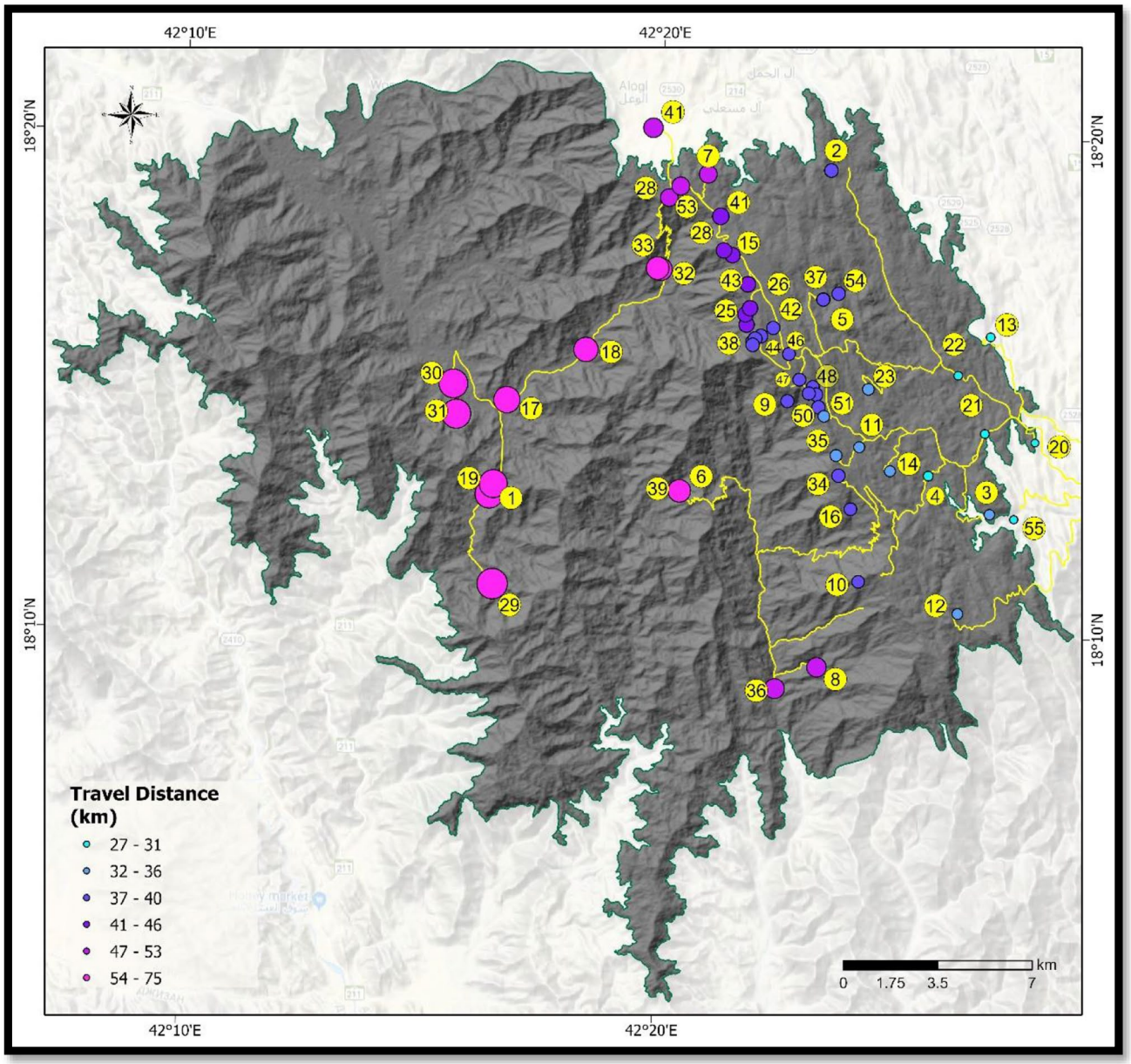

Fig. 17 Distance required from Abha Airport to the location of the study area

increase the opportunity for their investment. The proposal of this geohiking trail aims to enjoy seeing the landscape and geography by creating an opportunity to raise awareness of the geosites and geotouristic sites existing in Al-Soudah. The proposed geohiking trail covers eleven geosites. The length of the geohiking trail inside Al-Soudah is 45.1 km (Fig. 19).

Cable Cars Al-Soudah has two cable cars: Route 1 with a length of 2.85 km, and Route 2 with a length of 11 km. They do not cover the vision of all geosites and geotouristic sites in the area, shown in a blue line (Fig. 14). Therefore, three cable cars have been proposed. They cover the largest number of landscapes in the study area: Route 3 with a length of 11.1 km, Route 4 with a length of 4.50 km, and Route 5 with a length of 10.60 km. The three proposed cable car lines contain ten stations, which gives more opportunity for tourists to enjoy and choose between cable car lines and start from any station, shown in a purple line (Fig. 20).

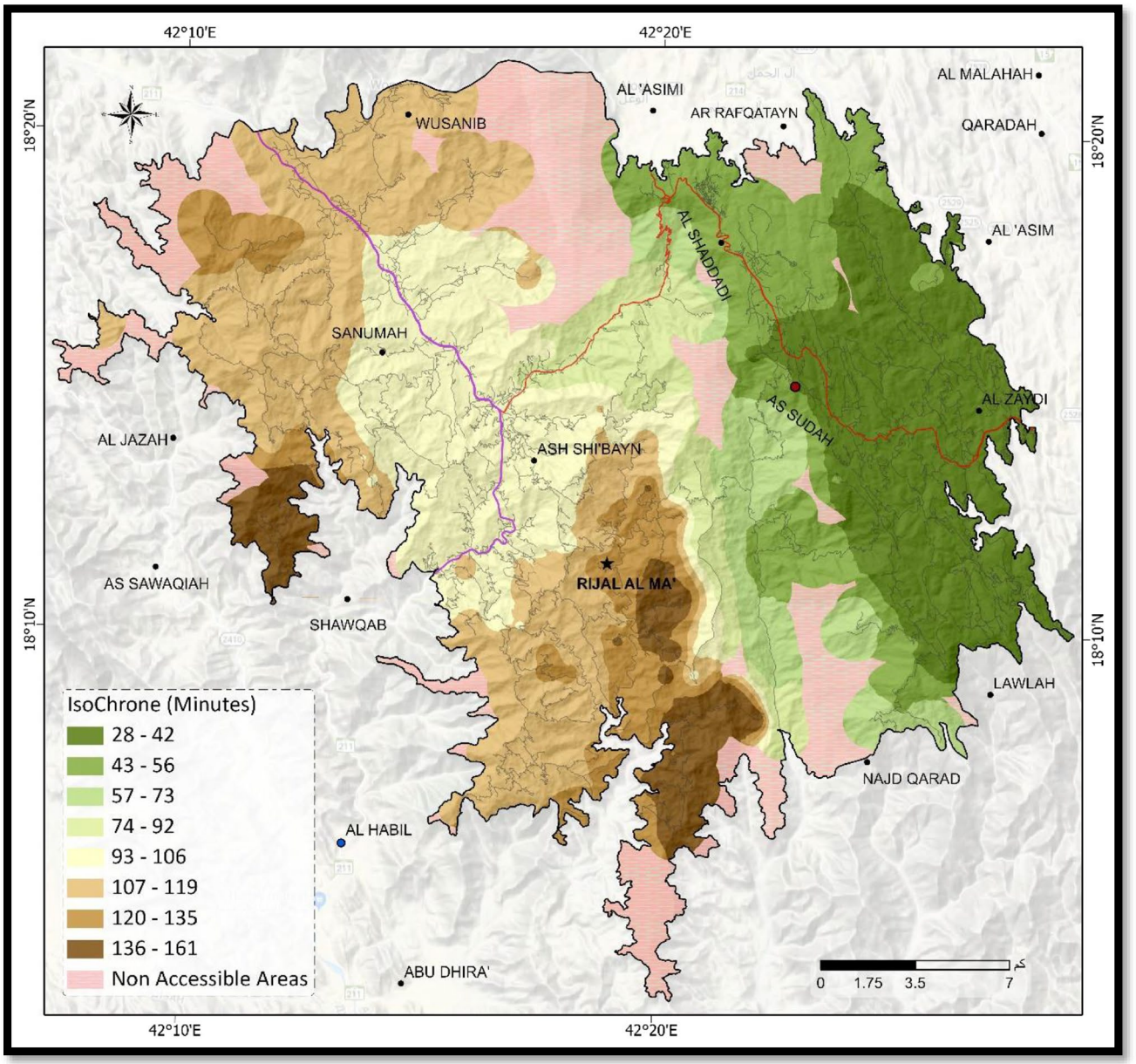

Fig. 18 Accessibility map from Abha International Airport–Isochrone (minutes) to the study area

Conclusions

This paper is the starting point for a larger process aimed at identifying and evaluating of geosites and important tourist cities in the Asir region. The main purpose is to make them known and popular to highlight their scientific (including educational), aesthetic, and cultural value in the light of the Asir development strategy. It was launched under the slogan "Qimm and Shim" which pays more attention to the preparation of actions for geoconservation measures to the development of geotourism and achieve a comprehensive and unprecedented development renaissance for the region. The authors estimate that this area could be a candidate for a geopark in Al-Soudah. This is due to the unique natural and cultural attractions that also have include high scientific, educational, and tourism values. The display of geodiversity and other natural values of the area should be combined with educational activities among the population. There is an urgent need to raise awareness and to take appropriate measures to protect

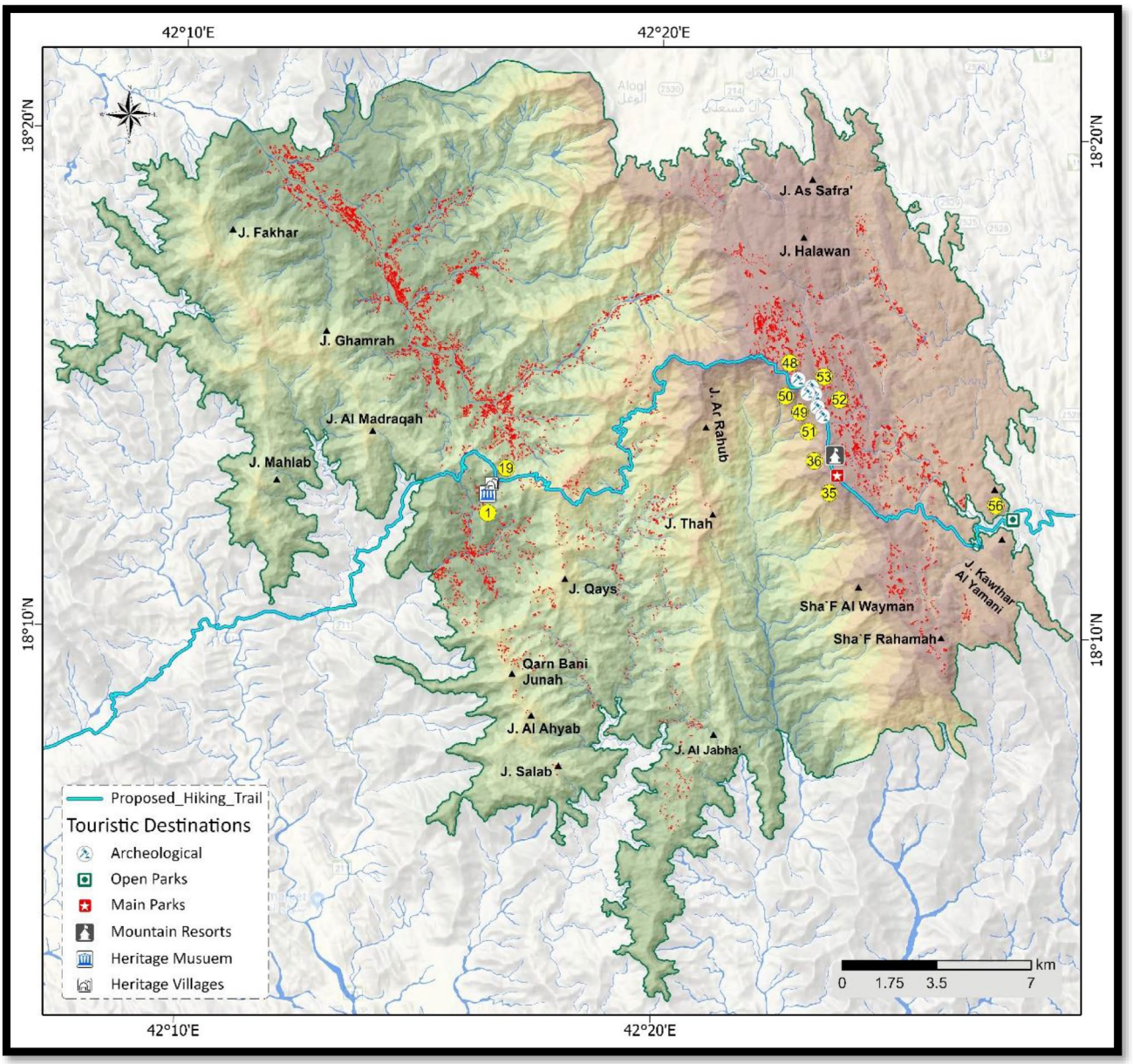

Fig. 19 The map of proposed geo-hiking trails of the study area

geoheritage, the remaining natural heritage and cultural heritage: tangible and intangible.

The SWOT Plus analysis of Al-Soudah has led to the following conclusions: it is possible to expand the understanding of the existing and potential factors that have (or may have) an impact on the development and protection of geotourism in the region; it is a valuable strategic tool for analyzing local development and its vision towards the future.

The Geopark project in Al-Soudah, the concept of geosites and geotouristic looks to be suitable for this purpose, because it includes a lot of evaluation methods for the geosites and geotouristic from different points of view. Al-Soudah proud to have natural, historical, touristic, and cultural geosites as valuable resources for geotourism. Moreover, the inventory and the assessment of geosites of interest based on technical criteria are basic and expected to become a member of the UNESCO Global Geoparks, where inclusion

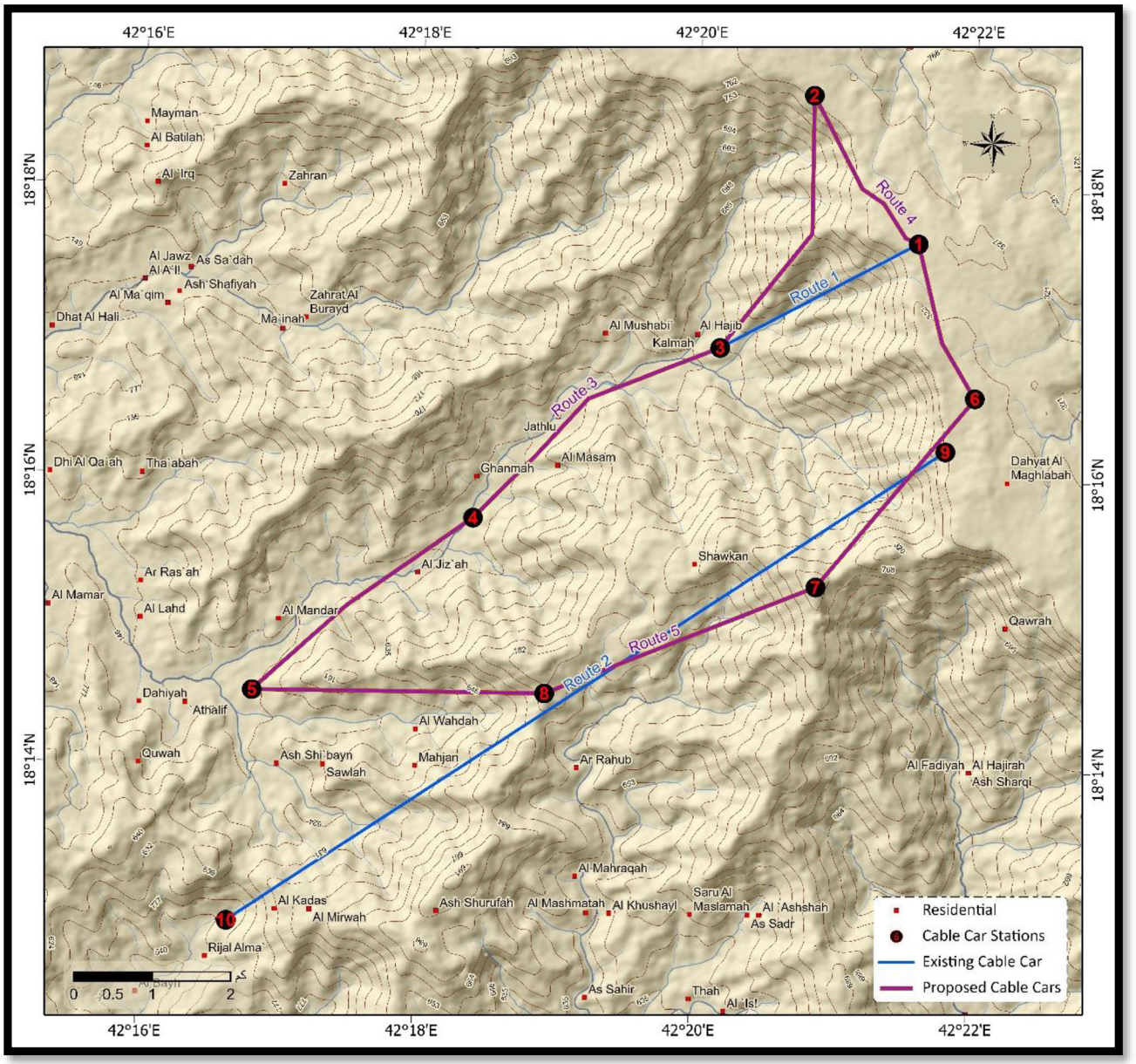

Fig. 20 Map of the proposed cable cars of the study area

leads to of the UNESCO Global Geopark would allow for ensuring the protection of unique geoheritage.

The reinforcement of this geopark project will allow for the development of the citizens in this area, and will provide understanding of the uniqueness and real value of the area they inhabit. Knowledge of geoheritage would bring more involvement into proper conservation and enhancement of the georesources and would also allow for the potentiation of the regions' cultural, natural, and social resources. In the end, the proposed digital mapping for instance: geotouristic, geotouristic itineraries, geohiking trails, and cable car maps, to appraise value and importance of geosites and geotouristic heritage of Al-Soudah.

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Declarations

Conflict of Interest The authors declare no competing interests.

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