Three Landscape-Dominating Mountains of the Western Caucasus: Case Studies of Local Heritage and Cultural Inferences

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Abstract: Geomorphosite inventory remains an urgent task for many geographical domains where it can facilitate the exploration of geoheritage resources. The present study reports a new and sufficient portion of information from Mountainous Adygeya in southwestern Russia, which is a geoheritage-rich area in the western part of the Greater Caucasus Mountains. The Cossack, Monk, and Three Teeth mountains were analyzed qualitatively and semi-quantitatively. Their morphology and geological settings were described, their geoheritage properties were scored by several criteria, and their cultural meanings were considered. It was established that the total heritage values of these geomorphosites are comparable. The challenging accessibility of these landforms is offset by the availability of sites for distant observation. Each proposed geomorphosite has its own cultural meaning reflected by its name. The proposed geomorphosites are constituents of the geoheritage resources of Mountainous Adygeya, and they can be exploited via local product branding and georoute functioning.

Keywords: geocultural heritage; landforms; local goods; tourism; Western Caucasus

1. Introduction

Geoheritage research, which includes not only conceptual and methodological developments, but also national and regional inventories of the related resources, has grown remarkably [1–7]. Particularly, significant attention has been paid to geomorphosites representing geomorphological phenomena (features, processes, events) and, first of all, specific landforms. The idea of geomorphosites and the related concepts, methodologies, and implications have been developed during more than two decades [5,8–20]. It is evident that such localities have not only pure geomorphological and geological properties, but also some geoheritage-specific properties such as accessibility and touristic utility. The understanding of geomorphosites can also be linked to their cultural meanings and interpretations [5,12,21–28]. Some geomorphosites correspond to cultural and historical objects, are linked to people’s traditions, and exhibit peculiarities resembling cultural objects treated in legendary contexts. The existence of geocultural heritage was conceptualized by Reynard and Giusti [5]. They stressed the multidirectional connections between geoheritage (also geomorphological heritage), landscape, and cultural environment. Indeed, comprehension and conceptualization of this kind of geoheritage requires attention to the diversity of its manifestations in the world, as well as on national, regional, and local scales. Principally, this makes for very urgent case studies and inventories of geomorphosites in particular areas. It should be emphasized that geosites and geomorphosites (jointly, it is possible to term them as geo(morpho)sites) can differ by their value [29,30], but this does not mean that geoheritage studies should focus on only those of global importance. Irrespective of its
value, each geo(morpho)site is a constituent of given territorial geoheritage resources, and it makes the latter more valuable.

Mountainous Adygeya in the western part of the Greater Caucasus Mountains (Western Caucasus) boasts outstanding richness of geoheritage and includes such large geomorphological features as the Granite Gorge, the Khadzhokh Canyon, and the Gud and Oshten mountains, which are parts of larger geosites or even serve as individual geosites [30–32]. They represent the dynamics of the mountainous domain with a complex geological setting and very dense hydrological network. The study area is characterized by the presence of both mountain ranges and large, isolated landforms. Their “mosaic” spatial relations create highly heterogeneous geomorphological environments and fragmented but aesthetically attractive landscapes. The rich geoheritage resources of this area are impressive and yet to be fully explored, and it is possible to find several (if not many) geo(morpho)sites which were not considered in previous studies [30]. For such areas, it would be difficult to expect the consideration of all geo(morpho)sites by a single research project, and thus, it is very reasonable that this geoheritage is reported portion by portion. The existence of some geoheritage-related knowledge does not mean that its subsequent extension is unnecessary; in contrast, the earlier established richness of territorial geoheritage resources makes their additional exploration more demanded. Case studies focusing on the particular geo(morpho)sites are not less important than territorial geoheritage inventories because detailing of the related knowledge is always helpful conceptually and practically.

The field investigations permitted attention to three landscape-dominating mountains in Mountainous Adygeya which are potential geomorphosites. They are distinguished by large-size, highly specific shapes and origins. Moreover, they are highly visible to the area’s visitors and are featured in popular stories and legends. These mountains possess some cultural values which must be interpreted properly. Indeed, they deserve examination and systematic description in terms of geoheritage. Moreover, the active scientific, educational, and touristic exploitation of the geoheritage resources of Mountainous Adygeya [30], which is an important tourist destination, makes urgent an increase in the number of easy-to-understand features potentially interesting to visitors.

The objective of the present paper is to characterize the Cossack, Monk, and Three Teeth mountains of Mountainous Adygeya in regard to their geomorphological and geological setting and geoheritage potential. Special attention is paid to their properties and cultural meanings. It should be stressed that this paper reports novel descriptions of three large landscape features, which is supplemented by the analysis of their geoheritage importance. The novelty of this study is linked to not only providing a new portion of geoheritage information different essentially from what is already described in the study area, but also to the extension of the vision of geoheritage policy. Mountainous Adygeya is one of the best studied Russian geoheritage-rich areas, so an extension of the knowledge of its features is itself valuable. Moreover, the outstanding geoheritage importance of this area [30] makes it ideal to test various conceptual and methodological ideas. A message of the present work is to demonstrate that the locally ranked geomorphosites with popularized cultural meanings can have significant utility to the entire area despite the presence of more valuable geoheritage features. The idea of geocultural heritage (sensu [5]) extends the understanding of geoheritage and improves the vision of its practical usefulness.

2. Study Area

The study area represents a “core” of the Western Caucasus (Figure 1A). The Greater Caucasus Mountain chain stretches for >1000 km from the northwest, where it is bordered by the Black Sea, to the southeast, where it faces the Caspian Sea. The Western Caucasus includes all mountain ranges of this chain west of Elbrus Mountain (5642 m), which is the highest point of the Greater Caucasus and Russia. The study area is a part of the Russian South, and it is located south of Maykop city (administrative center of the Republic of Adygeya, which is a region of the Russian Federation) and north of Sochi city (a large
city and famous resort in the Krasnodar Region of the Russian Federation), but it is only connected by roads to the former (Figure 1A).

The geomorphological characteristics of Mountainous Adygeya were recently summarized by Bedanokov et al. [31] and Ruban [33]. The area is characterized by the elevations between 450 m (at the bottom of the Belaya River valley) and 2800 m (the highest point is the Oshten Mountain (2804 m) in the very southwest). It is dominated by mountain chains and isolated landforms that form two topographic levels (Figure 1B). The lower topographic level is represented by several relatively small northwest–southeast-trending ranges with relatively steep or gentle slopes (Figure 2A). Their cross-sections are rather symmetrical, and their shapes are rounded. The elevations chiefly do not exceed 1500 m (often <1000 m). The higher topographic level is represented by cuesta-type ranges (sensu [34–36]), which stretch along the western periphery of the area. They have a steep eastern slope with a well-developed scarp (Figure 2B) and a very gentle, almost flat western slope resembling a large “plateau” (Figure 2C). The highest points are found along the scarp, and they are chiefly below 2500 m. Several lower-level ranges join to the cuesta beneath its scarp.

The two-level organization of the local geomorphology can be explained geologically. The cuesta landform is related to a differential weathering and erosion acting on a harder sedimentary rock overlying a softer layer. The landform is characterized by two distinct features: a ridge with a steep escarpment (front scarp) on one side and a gentle back slope on the other. Less resistant siliciclastic rocks are exposed in the lower part of the front scarp. The cuesta is covered by karstified but hard carbonates, which form a kind of northwest-dipping monocline. Where these rocks were denudated, there is active erosion of the underlying, relatively soft siliciclastics (chiefly shales and siltstones), as a result of which the lower ranges are shaped. The development of the lower-level landforms has occurred together with the cuesta’s retreat in the northwestern direction [33].

In addition to mountains, the study area possesses a deep valley of the Belaya River, which flows to the north (Figure 1B). Where it crosses almost perpendicularly some lower-level mountain ranges, this valley is narrow and forms gorges. However, it is wide and well-developed (with terraces) on some other plots where it forms local depressions, namely the Guzeripl and Khamyshki depressions. The tributaries of this river have more or less developed valleys.
Geologically, the study area is dominated by Jurassic deposits [37]. Lower–Middle Jurassic siliciclastics (sandstones, siltstones, and shales, from which the latter are the most abundant) occur everywhere (Figure 3). Their thickness exceeds 2000 m, and they are deformed (folded and faulted) intensively. Upper Jurassic carbonates (limestones and dolostones) with a total thickness of up to 500 m (locally more) are distributed in the western part of the area (Figure 3), and they are slightly inclined to the northwest. These rocks experience intense karstification with endokarst features such as caves and epikarst features such as karren, depressions, and furrows [32,37]. There are also small tectonic blocks uplifted along the major faults. One of them represents the Dakh Crystalline Massif with Carboniferous granitoids in its “core” and Precambrian–Early Paleozoic metamorphics on its periphery. This occurs in the northern part of the area (Figure 3), and the Belaya River cuts the deep and picturesque Granite Gorge in these hard rocks. The other tectonic block is situated in the central part of the area, and it represents Permian siliciclastics, which are classical molassic red beds (conglomerates, sandstones, siltstones, and shales often red and even violet due to iron oxide). Their total thickness exceeds 1000 m. This sedimentary complex is folded. The study area is a part of the Greater Caucasus, which represents a late Cenozoic orogen [38–40]. It appears that the currently visible geomorphological peculiarities were formed in the Quaternary under the influence of tectonic uplift and intense river erosion (cf. [41,42]).

The climate of the study area is temperate with rather mild, snowy winters and hot summers; the annual rainfall is significant and exceeds 1500 mm locally [37]. The hydrological network is very dense. The biggest area’s river is the Belaya, which receives several tributaries, each with its own multiple tributaries (small rivers and streams) (Figure 1B). The vegetation of the study area is represented by coniferous, deciduous, and mixed forests, as well as meadows on the flat cuesta’s slopes, on some mountain summits, and in the above-mentioned depressions.
3. Methodological Outline

Mountainous Adygeya is a large and geologically and geomorphologically rich territory, and it is also a test area for Russian geoheritage research. A tourism-driven development in this area has made it possible to investigate the potential presence of many geoheritage features, which was nearly impossible to do before. Therefore, it is natural that more geo(morpho)sites can be reported there than mentioned by Ruban et al. [30]. Although the examination of each mountain considered in this paper can be understood as an additional case study to the previous geoheritage inventory, the present work allows us to recognize a new and distinct portion of the geoheritage resources of Mountainous Adygeya, which is important for the development of an optimal and sustainable geoheritage policy.

In this study, geomorphosites are understood as a specific kind of geosite distinguished by any geomorphological rarity and/or exceptionality (uniqueness). Indeed, this rarity can be fixed on different scales, and thus, geomorphosites do not necessarily represent world-unique features. They can be rare on regional and even local scales, and they should be recognized among geoheritage features even in such cases (alternatively, a lot of objects valuable to particular territories and communities can be missed). Of course, not all geomorphological features, including mountains, can become geomorphosites, and making a choice is always necessary. For instance, a high, well-visible, and/or unusually shaped mountain can dominate a local landscape with dozens of mountains, and thus, it would be reasonable to choose only it as a geomorphosite. Proposed geomorphosites can be understood as those reported and characterized (described and assessed) as constituents of territorial geoheritage for the first time, i.e., they are the same as newly identified (established) geomorphosites, and the word “proposed” is used only to stress their novelty in the work where they are reported. Indeed, this is a provisional terminology.

The present study is based on the field investigations of three landforms in Mountainous Adygeya. Each of them is described (generally and regarding the criteria specified below). The plots from which these geomorphosites can be observed distantly were speci-

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**Figure 3.** Geological scheme of the study area.
fied and visited for the better comprehension of the landforms’ morphology. Experience with geoheritage investigations in this area [30] was helpful to characterize the new localities properly. As this study deals also with cultural interpretations, the stories about the considered landforms told by the residents and available on tourism-focused webpages were considered.

Many approaches were proposed for studying geo(morpho)sites [5,7–9,13,16,29,30,43–48]. They differ depending on particular research tasks and the regional/national contexts of their application, and it would be difficult to judge one of them universally (cf. [47]). Nonetheless, they all have something, if not a lot, in common. Particularly, it is clear the studies should start with general geomorphological and geological descriptions of the promising objects (landforms in this case), which should be followed by examination of the geoheritage-specific properties. The latter can be assessed semi-quantitatively on the basis of specially developed scoring systems [29,30,47]. Different reasons can be taken into account to choose the proper assessment approach and the related scoring system. For Mountainous Adygeya, the main reason is the consistency of the ongoing geoheritage inventory and assessment, and thus, the approach employed earlier by Ruban et al. [30] for the other geosites of this area should be followed in the present work. Principally, it is a norm when one particular approach is used in multiple research projects. On one hand, this contributes to consistency in the knowledge. On the other hand, this allows us to test this approach and to realize its strong and weak characteristics. Geoheritage studies have already become a mature research direction with well-developed instruments, and thus, attention to the quality and limits of applicability of available assessment approaches is at least not less important than new methodological developments.

Three basic procedures were utilized in the present study. Two of them are qualitative, and one is semi-quantitative. First, each mountain was characterized generally: its location, size, shape, dynamics, and geological setting and origin of the relevant landform were described. These characteristics were identified on the basis of field observations and panoramic photography. Importantly, these characteristics allowed us to understand whether these mountains are ordinary geomorphological objects or if they differ from many other mountains of the study area. In only the latter case, they can be proposed as geomorphosites. If so, the qualitative characteristics are essential to argue the selection of the studied mountains as geomorphosites. Second, the geomorphosites were assessed by several geoheritage-specific criteria such as rank, number of geoheritage types, accessibility, vulnerability, need for interpretations, and scientific, educational, touristic, and aesthetic importance (Table 1). This procedure included two steps. The first step was an analysis of the information collected in the field and related to each specified criterion (Table 1). The second step was a score-based assessment, which can facilitate further comparisons of the proposed geomorphosites with one another and with the earlier-established geosites. The approach was explained in detail [30,47], and these explanations are not duplicated in this paper. The scoring system (grades of all criteria and the related scores) is clarified below (together with the results). The principle of scoring is that the highest scores are given to the rank (see Table 1 for definition), but the other properties are also scored and can influence the total value of a given geo(morpho)site. As explained above, this approach is preferred because it was applied to the other geosites of the study area [30], and thus, its employment in the present study makes the assessment of geoheritage of Mountainous Adygeya consistent. Importantly, this approach can be used only to measure the value of proposed geo(morpho)sites, not to check whether a particular feature is a geo(morpho)site or not. The use of this approach for the proposed geomorphosites is reasonable because they should be characterized similarly to the other geosites of the area, and this assessment allows us to describe them using several criteria via scoring. Third, cultural interpretations of the proposed geomorphosites were given. Attention was given to their names and the related popular stories and legends told locally and utilized in tourism. The related information circulates in the local cultural environment, and online, tourism-focused media facilitate its dissemination. It appears important to check these media to
specify some sources of this information and to consider the relevance of their content to the purposes of this study. It should be stressed that the analysis of the information about the cultural meanings of the mountains is objective because it is based on what actually exists. It is related to the existing names of the considered mountains and the local cultural environment.

Table 1. Criteria for assessment of geomorphosites; based on the approach [38, 47]. For better clarity and to avoid repetition, scores are indicated separately, together with the results (see below).

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Explanation</th>
<th>Notes</th>
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<tbody>
<tr>
<td>Rank</td>
<td>Relative uniqueness (rarity) of a site, which depends on the abundance on analogue sites in a given territory</td>
<td>Can be global (world-scale), national (federal), regional (provincial), and local</td>
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<tr>
<td>Number of geoheritage types</td>
<td>Geoheritage type reflects attribution of a given feature to a particular class of phenomena</td>
<td>For geomorphosites, the geomorphological type always exists and often dominates; however, it may co-exist with some other type(s) such as mineralogical, palaeontological, sedimentary, or other types (see nomenclature of types in [30]).</td>
</tr>
<tr>
<td>Accessibility</td>
<td>How easy is to reach a site</td>
<td>Depends on physical remoteness from roads and settlements, transport infrastructure, wilderness, etc.</td>
</tr>
<tr>
<td>Vulnerability</td>
<td>How easy can a site loose (partly or fully) its value due to natural or anthropogenic influences</td>
<td>Depends on activity (actual or potential) of processes (natural or anthropogenic) affecting a site</td>
</tr>
<tr>
<td>Need for interpretation</td>
<td>How easy to realize essence of a site</td>
<td>Depends on degree of professional background required for the proper understanding of a site</td>
</tr>
<tr>
<td>Scientific importance</td>
<td>Utility for geoscience (also geomorphological) research</td>
<td>Research/education/tourism initiatives can be either locally or internationally important</td>
</tr>
<tr>
<td>Educational importance</td>
<td>Utility for geoscience (also geomorphological) learning by university students and schoolchildren</td>
<td></td>
</tr>
<tr>
<td>Touristic importance</td>
<td>Utility for geotourism</td>
<td></td>
</tr>
<tr>
<td>Aesthetic importance</td>
<td>Presence of features or properties that associate with the common criteria of people’s judgments of beauty</td>
<td>For geomorphosites, the most evident aesthetic properties are size and shape; nonetheless, many other aesthetic properties should not be ignored</td>
</tr>
</tbody>
</table>

4. Results
4.1. Description of Mountains
4.1.1. Cossack Mountain

The Cossack (Kazachya) Mountain is one of the highest points of the Engineering (Inzhenerny) Range, which is the lower-level mountain range stretching in the southern half of the study area from the Lagonaki Highland in the northwest to the Belaya River valley in the southeast (Figure 1B). The mountain marks the eastern edge of the range. Its absolute height is 1428 m, and the relative height is ~800 m (relative to its toes along the Belaya River); the landform takes an area of ~15 km². The mountain has a triangle shape, and its summit resembles a small pyramid separated from the other part of the range by a saddle (Figure 4A). An elongated southern edge of the mountain resembles a sharp ledge (Figure 4B). The slopes of the mountain are moderately steep: their angles exceed 30° on the eastern side, but they are gentler on the other sides. They are covered by dense, mixed forests, although bare slopes with rock exposures also exist. The dynamics of this landform is related to erosion by numerous streams and occasional local rockfalls (Figure 4C).
Figure 4. Cossack Mountain with its characteristic, pyramid-like summit (indicated by arrows): views from west (A) and south (B); rockfalls on southern slopes with clasts consisting of Jurassic sandstones (C).
The geological setting of the Cossack Mountain is complex. A major fault zone separates an uplifted block with Lower–Middle Permian molassic red beds from another block representing Lower–Middle Jurassic siliciclastics (Figure 5A). This fault zone stretches along southwestern slopes of the landform. Softer Jurassic siltstones and shales are eroded easily, as a result of which the southwestern part of the mountain has gentler slopes. In contrast, Permian sandstones are hard and more resistive to erosion, which determines the existence of steeper slopes in the other parts. It appears that this mountain was not denuded completely and retains its individual shape due to the resistivity of Permian sandstones, as well as Jurassic massive sandstones occurring locally. Interestingly, Lower–Middle Jurassic fine siliciclastics are deformed (folded and faulted) more intensively than Permian coarse siliciclastics. The Cossack Mountain has been shaped by the Zholobnaya River and its multiple small left tributaries in the south, as well as by the Belaya River and its small left tributaries in the east and the north. A rapid incision of the valleys of small rivers and streams determined by a deeper incision of the main rivers and the lowered local base level has shaped the landform.

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**Figure 5.** Geological cross-sections of the mountains considered in the present study: the Cossack Mountain (A), the Monk Mountain (B), and the Three Teeth Mountain (C). See Figure 3 for location of these cross-sections.
4.1.2. Monk Mountain

The Monk (Monakh) Mountain is a large, lower-level, individual landform which is situated in the center of the study area between the Azish-Tau cuesta-type range in the west and the Belaya River valley in the east (Figure 1B). This huge mountain has two elevated points: the first of them is found on the southeastern edge (1063 m), and the second point is found on the northeastern edge (1124 m). Despite the difference in height, the first point is considered as the mountain’s main summit. The relative height of the landform is ~550 m (relative to its toes along the Belaya River), and it takes an area of ~20 km$^2$. The mountain has a tetragonal shape, and its summits correspond to its southeastern and northeastern edges ("angles"). The southern slope resembles a steep wall, where the angles exceed 50$^\circ$ (Figure 6A). The eastern slope is similarly steep, but it is carved by deep and narrow valleys of small streams (Figure 6B). Its northeastern slope is also steep but drained by the multiple right tributaries of the Sibirka River and carved by their valleys. The northwestern slope does not exist in a strict sense because the mountain is “attached” directly to the Azish-Tau Range. The general shape of the landform can be described as table-like. The table surface is almost flat and inclined slightly to the west where it joins the middle part of the slope of the Azish-Tau Range (Figure 6C). The mountain is covered by dense, deciduous, and mixed forests; meadows are available on the table surface. Bare slopes with rock exposures are common on the southern and eastern sides of the mountain. The landform is dynamic along its southern edge where rockfalls and even significant slope collapses are common (particularly, these can be triggered by microseismicity).

Figure 6. Monk Mountain: panoramic views from southeast (A), northeast (B), and southwest (C). Note the steep southeast and east slopes (A,B) and almost flat west slopes that join to the Azish-Tau Range in its middle part (C). Images (B) and (C) were published in grayscale [33].
Geologically, the Monk Mountain corresponds to a vast field of distribution of Lower-Middle Jurassic siliciclastics (Figure 5B). Although these are chiefly shales and siltstones, this sedimentary package includes locally massive sandstones dipping to the west. These rocks are rather hard and resistive to erosion, as a result of which the landform retains its shape. The noted table surface corresponds to the layering surface, and thus, the mountain’s development resembles a typical evolution of cuestas [35]. At its northeastern edge, the mountain is bounded geologically by a major fault zone, where the Sashkova River and the tributaries of the Sibirka River developed their valleys. Abundant precipitation on the landform’s table surface and the impossibility of water discharge to the west due to the “blockage” by the higher-level Azish-Tau Range determine the existence of streams that flow across the southern, eastern, and northeastern edges of the mountain and feed the Kutanka, Sashkova, Sibirka, and Belaya rivers.

The Monk Mountain possesses some other minor but notable features. Slope collapses (probably triggered by earthquakes) led to a wide distribution of huge boulders and megaclasts (Figure 7A). Slope steepness and the existence of layers of hard rocks (sandstones) determine the existence of waterfalls and their cascades (Figure 7B). Finally, spectacular wind erosion of vertically exposed surfaces of sandstone took place locally (Figure 7C). Although more investigations are required, it can be hypothesized that this wind erosion intensified in the Pleistocene on bare slopes of the mountain and formed “cells” and even caves. All these features are related to the past and present dynamics of the local geological environment.

Figure 7. Peculiarities of the Monk Mountain: megaclast (indicated by an arrow) with a tree on its top (A), cascading waterfalls (indicated by arrows) on the Kutanka River formed where the river crosses layers of relatively hard Middle Jurassic sandstones (B), “cells” formed by wind erosion in Middle Jurassic sandstones (C). A.V.M. stays for scale on all images.
4.1.3. Three Teeth Mountain

The Three Teeth (Tri Zuba) Mountain is the most peculiar, although not the highest point of the Windfall (Burelom) Range, which is a lower-level mountain range stretching in the northern half of the study area from the Azish-Tau Range to the southeast and then to the east (Figure 1B). This range is curvilinear, and it is cut into three principal segments by the deep valleys of the Belaya River and its right tributary, namely the Syuk River. The mountain marks the northwestern edge of the central segment (Figures 1B and 8A) and has three peaks which resemble teeth (Figure 8B). The highest is the eastern peak (1049 m), and two other peaks are lower by a few dozens of meters. The relative height is ~550 m (relative to the bottom of the Granite Gorge); the landform takes an area of ~3 km², and it is the smallest from the proposed geomorphosites. The mountain has irregular shape, and it is sculptured by streams flowing to the Belaya River (these streams end commonly with waterfalls, i.e., hanging mouths). The slopes are steep everywhere, with angles up to 70°. From the northern and western sides, the mountain is bounded by the deep and narrow Granite Gorge (Figure 8C) with almost vertical walls. This gorge is a separate geosite [30]. The slopes are covered by dense, deciduous forests (some with pines), and bare slopes with rock exposures are common. The dynamics of this landform are linked to erosion by numerous streams and rockfalls.

![Figure 8. Three Teeth Mountain (indicated by arrows): distant (A) and close (B) views; a view from the northern (C) and southern (D) entrances to the Granite Gorge. All images represent views from the north. Image (B) was published in grayscale [33].](image)

The geological setting of the Three Teeth Mountain is simple because it corresponds to the “core” of the Dakh Crystalline Massif where carboniferous granitoids (granodiorites and granites) crop out in an uplifted tectonic block (Figure 5C). These are hard rocks resistive to erosion although weakened by weathering and numerous joints and small faults. Hypothetically, weak zones determine the position of the valleys of small streams that erode granitoids actively (significant annual rainfall should be noted). The valleys are relatively long, and some of them reach the very summit and sculptured granitoids, as a result of which the three-teethed shape has developed. A network of weak zones in granitoids determined the unusual shape of the landform, which seems to be an element of the typical granite landscape (sensu [11]). Active weathering of granitoids has also contributed to the landform’s development.
4.2. Heritage Dimensions

There are numerous mountains in Mountainous Adygeya, and a few of them were already attributed to its geoheritage [30,32]. The Cossack, Monk, and Three Teeth Mountains differ from many other mountains due to their dominance in local landscapes and somewhat unusual, characteristic shapes. The three considered landforms can be proposed as geomorphosites because of three reasons. First, these landforms dominate (also visually) the landscapes of Mountainous Adygeya and attract the attention of its visitors. In other words, these are “ordinary” mountains neither in the local landscapes nor in people’s perceptions. In this sense, they are analogous to the Oshten and Gud mountains, which have already been recognized as geoheritages [30,32]. Second, their shapes and origins, as well as the geological setting, demonstrate some peculiarities (see descriptions given above). Third, these landforms represent such geomorphological phenomena as cuesta development and granite sculpturing, which are relatively uncommon and attractive in an international research perspective [11,35]. Principally, the selection of these mountains as geomorphosites is based on their distinction from many “ordinary” mountains of the study area.

Importantly, the considered mountains are well-shaped, and thus, the proposed geomorphosites can easily be delimited to avoid mixing with the other geosites proposed earlier [30]. Essentially, these are geomorphological features, and thus, these are almost pure geomorphosites (some of their geological characteristics (see above) are also interesting). The usage of the preferred approach [30,47] for the semi-quantitative assessment indicates certain differences among the proposed geomorphosites (Table 2). Below, the proposed geomorphosites are described by all employed criteria. These descriptions are objective because they are based on field observations, and they allow for the understanding of why the particular scores were given to each geomorphosites in Table 2 (in other words, the text below serves to comment Table 2).

Table 2. General assessment of the proposed geomorphosites. Criteria are explained in Table 1. Template and scoring system are adapted from [30,47,49].

<table>
<thead>
<tr>
<th>Criteria and Scores (Scores Are Indicated for Each Grade)</th>
<th>Geomorphosites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rank: global (+500), national (+250), regional (+100), local (+50)</td>
<td>+50</td>
</tr>
<tr>
<td>Number of geoheritage types: &gt;10 (+50), 4–10 (+25), 2–3 (+10), 1 (0)</td>
<td>+10</td>
</tr>
<tr>
<td>Accessibility: easy in populated area (+25), easy in remote area (0), difficult (−25)</td>
<td>−25</td>
</tr>
<tr>
<td>Vulnerability: no danger (+25), potential danger (0), partly damaged (−25), fully destroyed (−50)</td>
<td>+25</td>
</tr>
<tr>
<td>Need for interpretation: absent (+25), basic geological knowledge required (0), professional geological knowledge required (−10), scientific analysis required (−25)</td>
<td>+25</td>
</tr>
<tr>
<td>Scientific importance: international (+25), local (0)</td>
<td>0</td>
</tr>
<tr>
<td>Educational importance: international (+25), local (0)</td>
<td>0</td>
</tr>
<tr>
<td>Touristic importance: international (+25), local (0)</td>
<td>0</td>
</tr>
<tr>
<td>Aesthetic importance: high (+50), medium (+25), low (0)</td>
<td>0</td>
</tr>
<tr>
<td>TOTAL SCORES</td>
<td>85</td>
</tr>
</tbody>
</table>

The rank of the proposed geomorphosites is local in all cases: on one hand, these are very distinctive landforms (see above); on the other hand, they can be judged notable and are representative only locally, i.e., within Mountainous Adygeya. This does not indicate an absence of the heritage value and only implies that this value is not substantial. In addition to the geomorphological features, some other “purely” geological features
should be noted. These include unusual Jurassic sandstone outcrops and rockfalls on the slopes of the Cossack and Monk mountains (sedimentary and engineering geoheritage types, respectively) and granitoid outcrops on the slopes of the Three Teeth Mountains (igneous geoheritage type). Active water erosion and presence of abundant waterfalls (Figure 7B) implies the existence of the hydro(geo)logical geoheritage type in the Monk Mountain. Therefore, the proposed geomorphosites represent 2–3 or even more geoheritage types, including geomorphological types which are the most valuable and essential for the proposal of geomorphosites (Table 2).

The accessibility of the geomorphosites is ambivalent. All of them are located along the high-class paved road that connects Maykop city and the Guzeripl settlement (Figure 1B). Moreover, Mountainous Adygeya is a popular tourist destination where a small number of residents are recompensed by crowds of visitors and workers of the local tourism and recreation industry. However, steep slopes of the considered mountains and neighboring landforms (e.g., the Windfall and Engineering ranges), dense vegetation cover (deciduous and mixed forests), and abundant wildlife (bears, wild pigs, and wolves, among other animals) make direct access to the geomorphosites very difficult (Table 2). Climbing these mountains is only possible for well-trained and experienced persons with some good knowledge of the local topography. Trails and climbing routes are available, but they are too ephemeral, not maintained, and used infrequently; knowledge of them is restricted.

The proposed geomorphosites differ in their vulnerability (Table 2). Apparently, the Cossack Mountain does not experience any negative influences, and thus, no danger to this geomorphosite exists. In contrast, slope processes modify the shape and the visible features of the Monk Mountain. A large slope collapse that happened in the 2000s changed the view of the southern-most picturesque slope of the mountain, as a result of which the features essential for its naming (see below) were partly destroyed. As for the Three Teeth Mountain, the potential danger exists because erosion, weathering, and microseismicity can provoke slope collapses on its summit, and thus, one of its “teeth” can be damaged. The traffic along the noted roads is already hectic. However, the local administrations make efforts to minimize the anthropogenic influences on the natural environment. The regular public transportation between Guzeripl and Maykop, i.e., along the principal road, makes it possible to travel without owning cars. Moreover, the roads do not cross the proposed geomorphosites.

The need for interpretation is minimal (Table 2). Any specific knowledge is not required to comprehend the Cossack and Monk mountains, but some basic geological knowledge about igneous rocks will facilitate the better understanding of the Three Teeth Mountain. The geomorphosites can be useful for geoscience research, education, and tourism, although only local-scale projects are anticipated (Table 2). For instance, geomorphologists can document better geological controls of the mountains’ shapes, and engineering geologists can see potential in studies of the local rockfall mechanisms. The mountains can be used for the explanation of some basic geomorphological ideas to university students in geology and geography. It should be stressed that Mountainous Adygeya has already been used actively as a place for the summer field educational practices for students organized by the leading Russian universities such as the Southern Federal University and the Voronezh State University [30]. Tourists can admire the local landscapes dominated by the considered mountains, which are well visible from many observation points (Figures 4, 6 and 8). These landforms seem to be excellently suitable for adventure and climbing tourism, and the related services have already been offered by local tourism organizations. Finally, one should note the aesthetic properties of the geomorphosites (Table 2). The Cossack Mountain boasts its slightly unusual, geometrically “regular” form (Figure 4A). The Monk Mountain is very huge in size (this seems to be one of the largest mountains of Mountainous Adygeya), and it boasts features resembling a person’s face (see below) and unusually flat table surface on the top (Figure 6B). The Three Teeth has a very unusual, three-summit shape (Figure 8). These characteristics are linked to common criteria for people’s judgments of beauty [50,51]. Moreover, the bare slopes of the Monk and Three Teeth mountains demonstrate yellow and
pink-to-red colors, respectively. It is known that these colors (especially red) are associated with people’s emotions [52].

Scoring the three geomorphosites by their properties implies that their total values are comparable despite some differences mentioned above (Table 2). The Monk Mountain is a bit less valuable, which is explained by its damage due to the slope collapse (see above).

4.3. Cultural Meanings

The three proposed geomorphosites have certain cultural meanings which are linked, first of all, to the actual names of the related landforms. The Cossack Mountain was named after Cossacks, who were free settlers of the Russian South for many centuries [53,54]. Although it is unclear whether an original Cossack presence in the area or their removal to the region in the first third of the 20th century (Table 3) is associated with this mountain’s name, it is evident that the latter echoes the wide presence of the Cossacks in the Russian South and their remaining culture and traditions.

Table 3. Cultural interpretations of the proposed geomorphosites available in online, tourism-focused media.

<table>
<thead>
<tr>
<th>Geomorphosite</th>
<th>Cultural Interpretation</th>
<th>Sources (All Are in Russian and All Were Accessed on 15 May 2024)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three Teeth</td>
<td>Direct: similarity of three summits of the mountain to three teeth and Neptune’s trident; sometimes, not three, but five “teeth” are mentioned</td>
<td><a href="http://vetert.ru/rossiya/adygeya/sights/253-gora-trezubec.php">http://vetert.ru/rossiya/adygeya/sights/253-gora-trezubec.php</a>, <a href="https://lagonaki.ru/dostoprimechatelnosti/gora-trezubecz-v-adygee/">https://lagonaki.ru/dostoprimechatelnosti/gora-trezubecz-v-adygee/</a></td>
</tr>
</tbody>
</table>

The Monk Mountain is named so because its first visitors and/or local residents noted that rock exposures on the southern slope resemble a monk’s face. The related explanations, stories, and even full-scale legends circulate actively and are offered to tourists (Table 3). Although the features essential for the above-mentioned attribution were damaged due to the slope collapse, the cultural meaning was not lost. A large monastery has grown in the northeast of Mountainous Adygea since the beginning of the 21st century, and it has become a very important attraction for pilgrims and tourists. Its presence facilitates the association of the Monk Mountain to the local cultural environment. The presence of the ancient (1st millennium AD) cave monastery in the study area, which is open to visitors, also matters. In other words, the presence of a mountain named after a monk can be “natural” to visitors.

The Three Teeth Mountain is called so due to its characteristic shape. This is a cultural treatment of the natural landform which seems to be especially far-reaching when Neptune’s trident is considered in the popular stories told to tourists (Table 3). In contrast to the two other cases, this cultural meaning is not local and appeals to a very general cultural knowledge of classical mythology.

The available cultural meanings of the considered landforms differ essentially (Table 3), but they all are very important and contribute to the identity of geomorphosites and attract tourists. These meanings are objective because they are related to the existing mountains’ names and the cultural patterns. Their presence allows for the incorporation of the three mountains into a local tourismscapes (this term is used after [55,56]). It is known from the tourism research that historical tales, legends, and myths attract tourists and contribute to the value of sites [57–59]. The popular stories and legends related to the Monk and Three Teeth Mountains are common in the tourism-focused webpages (Table 3). Generally, the cultural interpretations of geomorphosites seem to be important enough to sustain a demand for them.
5. Discussion

5.1. Inferences and Practical Implications

The analysis of the proposed geomorphosites makes it possible to judge their relationship to the other, very rich and highly valuable geoheritage of Mountainous Adygeya [30]. Several inferences are possible. First, this geoheritage includes some other geomorphological features, including isolated mountains, but these differ essentially from those reported in the present paper. Moreover, the Cossack, Monk, and Three Teeth mountains are the only “pure” geomorphosites of the study area, i.e., localities fully dominated by geomorphological elements. The earlier reported geosites include significant portions of geological features and are often dominated by the latter. Second, the values of the majority of geosites established with the same approach [30] are chiefly higher than those of the proposed geomorphosites (Table 2), but the consideration of the latter contributes to the Mountainous Adygeya’s geoheritage diversity and density (new geomorphosites fill some “blank” spaces between the other geosites). Third, some other geosites have also received cultural interpretations, but these are not as sharp, clear, and popular, as in the case of the three proposed geomorphosites, the cultural meanings of which are very strong. Generally, it is evident that the present analysis of the Cossack, Monk, and Three Teeth mountains supplies a portion of the novel information, which extends the vision of the entire geoheritage resource of Mountainous Adygeya.

The names of all proposed geomorphosites reflect their cultural meanings, and the physical views of two geomorphosites (Monk and Three Teeth mountains) correspond well to their names and common cultural interpretations. This situation is very helpful for their touristic exploitation. The rapid development of tourism and, particularly, geotourism in Mountainous Adygeya increases the demand for local products and souvenirs, which are sold in many places, including the toes of the Cossack, Monk, and Three Teeth mountains. The ideas of geoproducts and geofood (local goods branded with recognizable geoheritage elements or produced with any geological resources) [60–64] raise a question of the proper branding of local goods sold to tourists. A brief examination of the already available brands suggests that mountain symbols are often preferred. If so, why not use the idealized views of the three considered mountains as such symbols? The Three Teeth Mountain is especially suitable due to its unusual and easy-to-identify shape that is reflected by its name. This approach would facilitate the association of local goods with the local environment and would strengthen the identity of these goods.

The rise of the local tourism and recreation industry poses a question about the principle of the touristic exploitation of the proposed geomorphosites. Indeed, these can be attractive by their names and physical views, but the limited internal accessibility (see above and Table 2) does not allow for organized regular excursions on their slopes. Nonetheless, the two-level organization of the local geomorphology and the dominance of the landforms in the local landscapes make them well visible (Figures 4, 6 and 8) from many plots which are perfectly accessible from roads and settlements (Figure 9). Importantly, each landform is visible from two or more places. Georoutes (itineraries) are very useful for organizing educational (for students) and touristic excursions [65–69]. In Mountainous Adygeya, it is possible to offer a georoute connecting all plots suitable for the distant observation of the proposed geosites (Figure 9). It seems to be logical and very comfortable because these plots are accessible from paved roads (the principal Maykop–Guzeripl road and its branch leading to the Lagonaki highland). There is enough space on each plot to stop a car or bus and to accommodate dozens of visitors. This georoute (Figure 9) can be demanded by university lecturers guiding student groups during their field practices and tourists (not necessarily geotourists) interested in new experiences and knowledge. The additional importance of this georoute is its potential contribution to the dispersal of the knowledge of sustainable development because it is established that mountains well visible in the local landscapes facilitate perceptions of ecosystem services [70]. All observation plots to be included in the georoute can be equipped with interpretive panels indicating and naming the mountains and explaining their morphology and origins. The previous advice
on the content of such panels [71,72] can be followed. The georoute should be promoted by local tourism organizations and on webpages focused on regional tourism. The cultural interpretation of the proposed geomorphosites facilitates making this georoute thematically consistent and attractive, and it can be labeled as “The Legendary Mountains of Adygeya”.

Mountainous Adygeya is an important tourist destination of the Russian South, and regional and local administrations and tourism enterprises make significant efforts toward its further development. In such a situation, implementation and funding of the above-mentioned actions and initiatives are feasible. A managerial challenge is finding the proper materials for interpretive panels and other infrastructural objects to make them resistive to wet climate, slope movements, and quick vegetation growth. This technical task can be solved by specialists from the universities of the Republic of Adygeya and other Russian regions.

5.2. Policy Implications

Various perspectives of geoheritage policy were considered [73–77]. Indeed, this policy comprising several mechanisms (administrative, collaborative, financial, legal, social) should focus on conservation and rational exploitation of geo(morpho)sites. Of special concern are their specific content, total value, and vulnerability. The outcomes of the present study demonstrates another perspective of geoheritage resource policy regarding...
the cultural meanings of the considered mountains. These meanings imply the existence of non-geomorphological heritage values, the potentially higher demand by tourists, and the direct cohesion to the local cultural environment. These are premises to outline several policy implications.

First of all, geoheritage policy can be integrated with a cultural heritage policy. This is not only helpful for more comprehensive conservation and exploitation of geomorphosites, but it can improve the geoheritage policy via its attachment to the already existing and well-understood mechanisms of heritage treatment in the study area. Second, the priorities in the exploitation of geoheritage of Mountainous Adygeya should shift from the most valuable geosites [30] to those less valuable (Table 2) but potentially more demanded by tourists. On one hand, this is necessary to facilitate geotourism development in the study area. The involvement of the considered geomorphosites in touristic initiatives can become the first step toward enhanced geotouristic exploitation of the entire geoheritage resources of the study area. On the other hand, the geomorphosites with cultural meanings may be more vulnerable in the future due to the higher tourist flows, and thus, the conservation issues will need systematic actions. Third, the cultural meanings of the geomorphosites should be fixed adequately. This means that the related information distributed on tourism-related webpages has to be correct and well-articulated. In an ideal case, such information should be communicated in Russian and some other languages (e.g., Chinese, English, Hindi). In other words, these cultural meanings require adequate expression and preservation. Moreover, they need additional development for better relations to local culture, history, and traditions. Fourth, the present study implies that the comprehension of the considered geomorphosites depends on their visibility from distant plots (Figure 9). If so, it is very reasonable that the geoheritage resource policy should address such plots and enable their maintenance and conservation. Fifth, this policy should pay attention to the naming of geo(morpho)sites. If a name of the given landform is related to its cultural meaning, this is very helpful in its exploitation, and thus, the names are important attributes of geoheritage that determine the demand for this resource.

Generally, the presence of the considered geomorphosites in the study area requires certain modifications of the conventional vision of the geoheritage policy and also allows it to strengthen the latter. Indeed, some priorities will change: for instance, the presence of cultural meanings makes the importance of geo(morpho)sites less dependent on their geoheritage values. The development and the implementation of the geoheritage resource policy can be conducted by regional and local administrations in cooperation with university experts and representatives of the tourism and recreation industry.

6. Conclusions

The present study of the geomorphological heritage of Mountainous Adygeya permits making five general conclusions, which are related to geomorphological and geological descriptions of the considered mountains, assessment of their geoheritage properties, and interpretations of their cultural meanings:

(1) The Cossack, Monk, and Three Teeth mountains dominate the local landscapes and are interesting in regard to their morphology and geological setting that are reported descriptively (for instance, one can note the pyramid-like summit of the Cossack Mountain, table-like shape of the Monk Mountain, and three-peaked summit of the Three Teeth Mountain that were shaped by erosion in different geological settings);

(2) As established by the “standardized”, semi-quantitative analysis of the basic geoheritage properties such as rank, number of geoheritage types, accessibility, vulnerability, need for interpretation, scientific, educational, touristic, and aesthetic importance, the proposed geomorphosites are more or less equal by their total heritage value, and they can be ranked locally, i.e., they are unique to Mountainous Adygeya;

(3) The cultural meanings are reflected by the existing names of the analyzed geomorphosites (the related information also circulates via tourism-focused media) and related (in two cases) to their physical views, which can facilitate their touristic ex-
ploitation (importantly, the links between the names and the cultural environment can be traced easily);

(4) The considered landforms constitute a resource that can be exploited for the purposes of education and tourism via a georoute connecting all plots for their distant observation;

(5) The presence of geomorphosites with cultural meanings requires various modifications of the geoheritage policy.

Generally, this study implies that the presence of well-popularized cultural meanings, which are objective and reflected by the mountains’ names, can increase the utility of even locally ranked geo(morpho)sites. Particularly, the latter can work as “anchors” for the development of education and tourism. Therefore, the actual importance of geo(morpho)sites with cultural meanings can be even more significant than that of some higher-ranked geo(morpho)sites. For instance, the unusual shapes of the locally ranked Three Teeth Mountain can attract attention of visitors easier than some other, higher-ranked geosites [30] lacking spectacular physical views and interesting to only visitors with more or less advanced geological knowledge. Theoretically, this study contributes to the concept of geocultural heritage [5], which needs discussion regarding different geographical and geological domains.

The main limitation of this study is its focus on the proposed geomorphosites themselves. The opinions of tourists, workers of the local tourism industry, and residents would also be important, but their examination requires a different research project. The other limitation is linked to the impossibility of detailed geological studies of some parts of the geomorphosites due to the dense vegetation cover of mountain slopes. This difficulty is unavoidable and typical to the entire study area and the Western Caucasus.

The entire Greater Caucasus and the Western Caucasus are rich in geomorphological phenomena (mountains, canyons and gorges, karst fields, glacier-related features, wind erosion forms), and they also boast a very rich cultural history. The past and present interactions between natural and cultural heritages (for instance, cultural peculiarities and historical events reflected by the landforms’ names) can be interesting conceptually and demanded by rapidly growing tourism. This analysis demonstrates the importance of the ongoing and future geomorphological and geocultural heritage inventories in the Greater Caucasus. The research potential is linked to geo(morpho)sites identification and examination in Mountainous Adygeya and beyond. The development of some advanced tools for examination of cultural meanings of geomorphosites is another task for future studies.

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