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Ancient Deep Sea Bottom in Modern Mountains: New Aspects of Geoheritage from Guzeripl in Southwestern Russia

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Abstract: Geoheritage studies have different perspectives, among which treatment of geological features in relation to particular areas and settlements seems to be promising for better local planning and tourism organization. The small town of Guzeripl in the Western Caucasus (southwestern Russia) experiences tourism-triggered development. Five localities, which are parts of two earlier established geosites, are found directly in this settlement and in its vicinity. They show representative siliciclastic deposits dominated by shales, which accumulated on the deep bottom of the Caucasian Sea in the Early Middle Jurassic. New field investigations allowed for the collection of information regarding the improvement of the geological knowledge of this study area and the reconsideration of its geoheritage in relation to the settlement's needs. Particularly, the tentative approach for the functional assessment of the localities was proposed and applied. It is established that the localities represent not only deep-marine siliciclastic deposits, trace fossils, and specific palaeoenvironment, but also the structural elements (anticline, syncline, and fault) of the complex deformed domain. They differ by functional value, with two of the most valuable localities directly in Guzeripl, and all of them can be employed for the settlements' needs. Geoscientists, guided student groups, and geotourists can choose Guzeripl to collect new data, train, and for new impressions. Importantly, geotourism based on the considered localities can diversify the experience of visitors, and it can be combined with and facilitated by ecotourist activities already offered by the Caucasus State Nature Biosphere Reserve, which is famous for its natural heritage. The study area focuses on the spatial distribution of geoheritage relatively to the touristic patterns.

Keywords: Caucasian Sea; geotourism; Jurassic; natural heritage; tectonics

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1. Introduction

Geoheritage inventory, assessment, and interpretation remain urgent tasks for many territories, and the outcomes of these studies facilitate geoconservation (conservation and sustainable management of geoheritage) and geotourism (exploitation of geoheritage for the purposes of tourism and recreation). The related concepts and procedures were explained in the well-known, synthetic monographs by Dowling and Newsome [1], Prosser et al. [2], and Reynard and Brilha [3]. This knowledge grows rapidly [4] and, particularly, the "fresh" investigations by Carrión-Mero et al. [5], Coratza et al. [6], Diniz and de Araújo [7], El Hassi and Muftah [8], Guerra and Lazzari [9], Hernández et al. [10], Kubalíková and Balková [11], Matshusa and Leonard [12], Neto and Henriques [13], and Zafeiropoulos and Drinia [14] refine the understanding of multiple geoheritage aspects, needs, and perspectives. It has already been realized that general characteristics of geosites, including those based on application of scoring-based approaches, should be accompanied by some more specific studies revealing their particular aspects or focusing on their utility in the given natural, socio-economical, or organizational context.

The Western Caucasus and, particularly, Mountainous Adygeya as its geodiversity hotspot, has become a kind of test territory for Russian geoheritage studies [15]. The latter have resulted in not only rather comprehensive characteristics of its numerous geosites, some of which are of international importance, but also conceptual, methodological, and practical developments. Nonetheless, this territory is large and geologically rich, and, thus, many aspects of its geoheritage are yet to be investigated. For instance, an area in the south of Mountainous Adygeya, which corresponds to the so-called Guzeripl Depression, boasts spectacular outcrops of the Lower-Middle Jurassic deep-marine deposits of the former Caucasian Sea, and it also experiences steady touristic development with huge potential for geotourism. Although geosites have been established there [15] and one of them was partly considered in regard to the geoconservation needs [16], it appears evident that the geoheritage of this area needs reconsideration in regard to its integrality and relation to the demand of the local tourism industry. Moreover, the geosites and their particular fragments (points and localities) should be justified better against the local geological framework, which remains poorly understood. New field geological and geoheritage investigations undertaken in the Guzeripl Depression coupled with the earlier observations permit us to fill the above-mentioned gaps in the knowledge

The present contribution aims at characterizing the localities representing the deep bottom of the Early Middle Jurassic Caucasian Sea as geoheritage specific to Guzeripl and its vicinity. Novel descriptions of these localities are offered. They are assessed functionally, i.e., in regard to what they mean to the settlement's development. The related approach and interpretations are also new. Theoretically, this work contributes to the multi-dimensional understanding of geoheritage, which should not be restricted to only geosite identification and "standardized" assessment. Practically, the analysis of functionality sheds light on the opportunities of effective geoheritage exploitation in the popular tourist destination.

The outcomes of earlier studies [15,16] are taken into account, but not replicated. New data collected in the field are employed. Special attention is paid to the improvement of the local geological knowledge and the establishment of geoheritage links to the local touristic environment. This work is not a "standard" geoheritage assessment, but a specialized study devoted to the particular area where portions of geoheritage can be exploited. In other words, it is not geosite-focused but settlement-focused, which seems to be interesting both conceptually and practically. The principal research problem, which is addressed by this study, is the relation of geoheritage to the local planning needs. Apparently, dealing with this problem contributes to the better understanding of how geoheritage can be put into the geographical and socio-economical contexts, which is essential for its effective exploitation.

After the introductory remarks, a description of the study area is given. Then, the original methodological explanations are provided. Various outcomes of the study are reported in a special section, which is followed by another section with their interpretations and conclusive remarks.

2. Study Area

The study area represents the elevated domain in the western segment of the Greater Caucasus (Figure 1A). It corresponds to the southern part of Mountainous Adygeya, which is a nature-rich territory and a very popular tourist destination of the Russian South. Guzeripl and its vicinity constitute the area where geoheritage coexists with the world-class natural heritage, facilitating the ongoing influx of tourism and recreation.

The geographical setting of Mountainous Adygeya, including the study area, was characterized comprehensively by Bedanokov et al. [17], Lozovoy [18], and Nazarenko et al. [19]. Several short mountain ranges with heights of up to 1500 m above sea level and rather steep slopes exist there; they are crossed by the valley of the Belaya River (Figure 1B). In the central part of the area, the small elongated Guzeripl Depression exists. Its bottom lies at ~700 m above sea level. The noted valley is relatively wide, and river terraces occur in this depression. The climate is temperate, with cold and snowy winters and rather hot, long summers. The annual rainfall exceeds 1000 mm. The study area is crossed by

the Belaya River (Figure 2A), which is a big left tributary of the Kuban River (Figure 1A). Two small tributaries of the former are the Molchepa and Zholobnaya rivers (Figure 1B). The landscapes are dominated by mixed forests (Figure 2B) with rich wildlife. They cover slopes of mountain ranges. Meadows occur on the bottom of the depression. Guzeripl is a small settlement with a population of only ~100 residents and a rapidly growing tourism industry (Figures 1B and 2C–E). Taking into account temporary workers of hospitality enterprises and long-stay visitors, the actual population may be several times higher. The town hosts dozens of hotels and lodges, and it is overwhelmed by visitors in summer, as well as on winter and spring holidays. It is connected by a high-class, paved road with Maykop (the administrative center of Adygeya), and another road leads to the Partisan and Yavorova glades (very popular tourist attractions) in the west (Figure 1B). Guzeripl was established in the first half of the 20th century, and it remained a remote village for decades. Although it has been modernized and has become easily accessible and looking as a true town in the past two past decades, it still functions as a kind of "civilization border" marking an informal division between the "outer", populated and "inner", "wild" domains of the Western Caucasus.

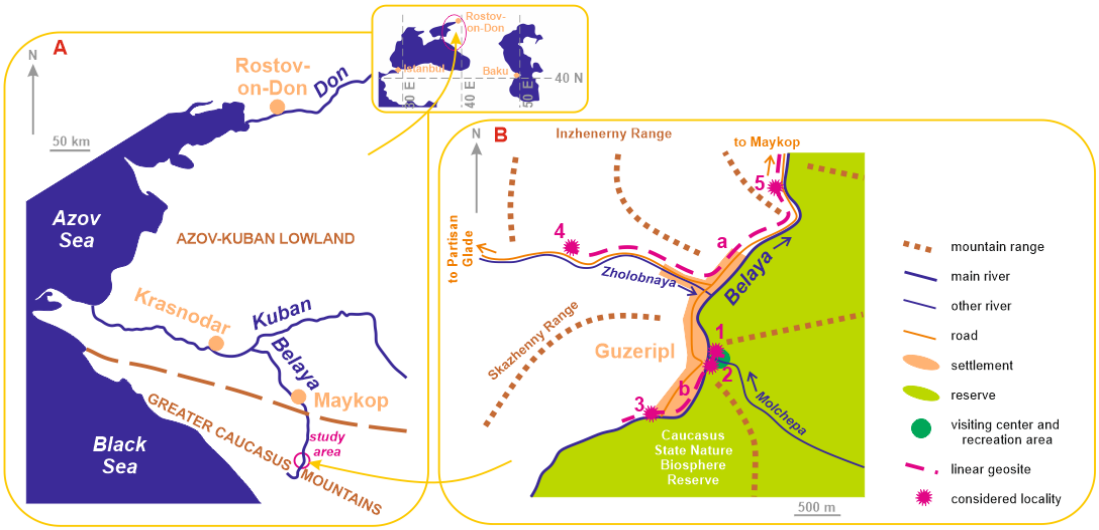

Figure 1. General location (**A**) and geographical outline of the study area (**B**).

Geologically, the study area belongs to the major orogen uplifted during the Late Cenozoic between the Black Sea in the west and the Caspian Sea in the east [20–24]. This orogen followed the development of the Mesozoic–Early Cenozoic active zone on the northern periphery of the Neo-Tethys, where island arcs and back-arc basins evolved [25–29]. Principally, there used to be the Greater Caucasus Basin, which was covered by the Caucasian Sea [30,31]. The study area is dominated by the Lower-Middle Jurassic siliciclastic deposits (chiefly shales with a subordinate amount of sandstone and siltstone beds) [32–34] (Figure 3). Locally abundant assemblages of trace fossils were found [16,35]. The exact age of these deposits is yet to be established due to the almost lacking fossils and the strongly deformed and fragmented outcrops. Most probably, it is Pliensbachian–Toarcian [32,33,35], although the local presence of the Aalenian cannot be excluded because Toarcian–Aalenian strata constitute a single sedimentary complex in Mountainous Adygeya [33]. These deposits accumulated in the deep parts of the semi-enclosed Caucasian Sea with oxygen depletion, to where sedimentary material was delivered from nearby islands (deep-sea fans were also registered) [31,35]. The mid-Mesozoic (Cimmerian) and the Late Cenozoic (Alpine) pulses of the tectonic activity led to the folding of the relatively soft shales (Figure 3). One should also note that the Lower-Middle Permian molassic deposits (red siliciclastics) crop out in the northeastern part of the area (Figure 3). They formed together with the growth of the Hercynian orogen, which preceded the development of the Greater Caucasus Basin. A major fault separates the Permian and Jurassic sedimentary complexes

(marine deposits accumulated in the Triassic, but they were eroded locally). It should be noted that rock exposures are found generally along the rivers (on their banks and in valley slopes) and in road cuttings. Outcrops on mountain slopes seem to be very rare and almost inaccessible due to the dense vegetation cover. This situation challenged previous studies on the local geology, which has remained poorly understood. Nowadays, tourism facilitates the infrastructural development of the study area and, thus, rock exposures become more numerous and more accessible.

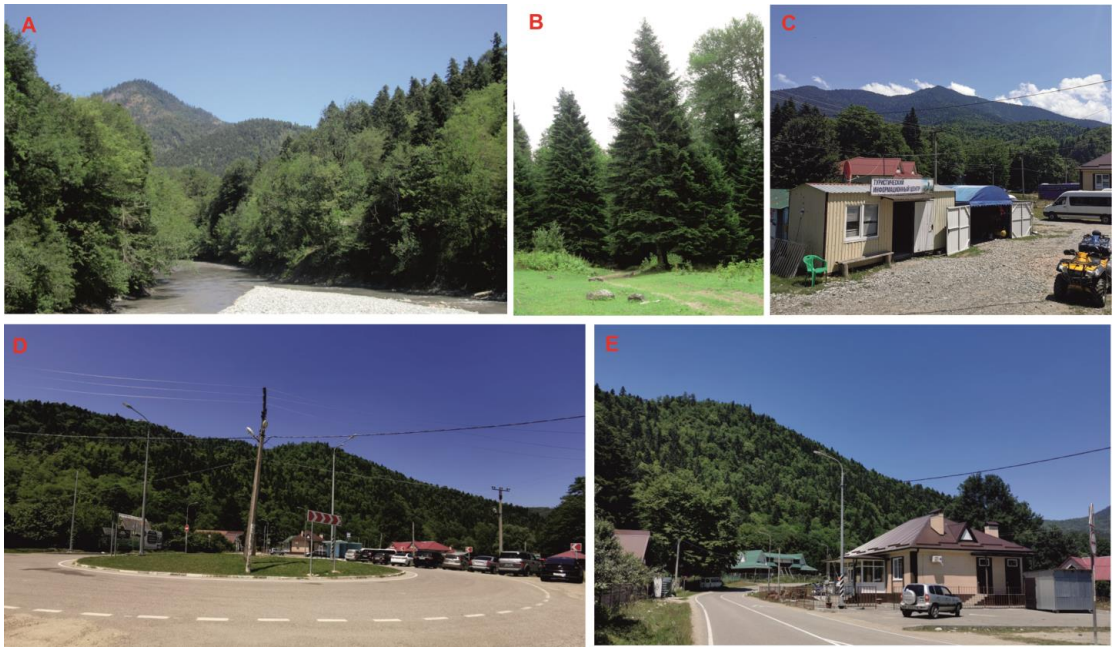

Figure 2. Landscape elements of the study area: (**A**) The Belaya River valley; (**B**) A typical mixed forest; (**C**) Local tourist information center; (**D**) Central part of Guzeripl; (**E**) Central street of Guzeripl with Skazhenny Range behind the settlement.

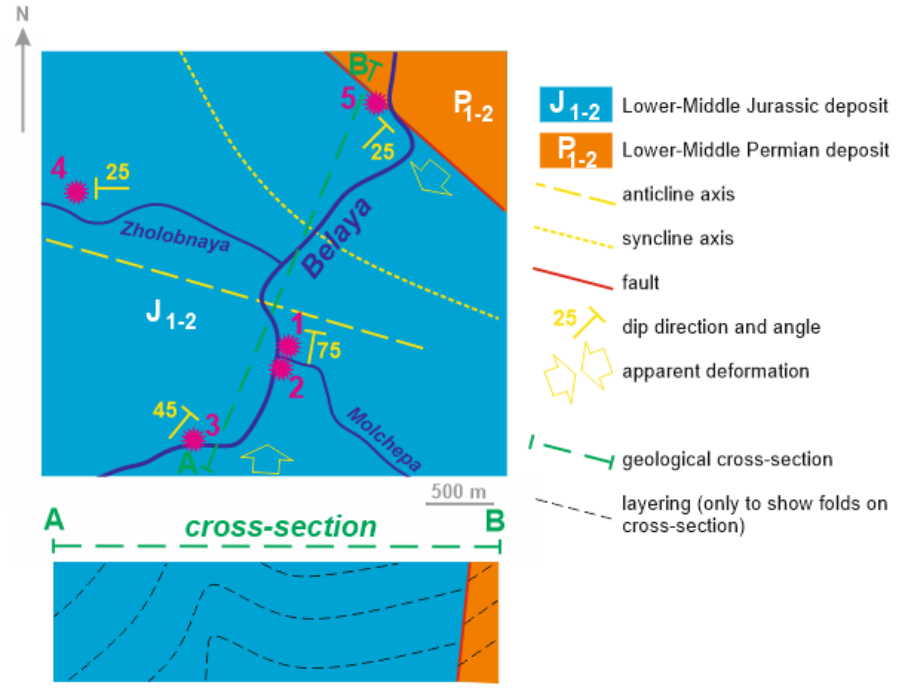

Figure 3. Geological scheme of the study area.

The study area possesses very rich natural heritage [17]. First of all, its eastern half belongs to the Caucasus State Nature Reserve (Figure 1B), with its long history and international status due to its outstanding biodiversity [17,36–39]. The entrance to this reserve, which offers various educational and recreational opportunities, is located directly in the center of Guzeripl (Figure 1B). The visiting center includes a museum, mini-zoo, archaeological site, short trails, and some recreational facilities near the mouth of the Molchepa River. This is one of the most important attractions of the entire tourist destination of Mountainous Adygeya and the trigger of the local tourism growth, although the latter is also facilitated by adventure, hiking, sport, and other kinds of tourism, as well as outdoor recreation in Guzeripl and its vicinity. The history of ecotourism in the study area goes back to the 1940s. Geoheritage is also available there in significant amounts. According to the previous comprehensive assessment [15], there are two linear geosites (Figure 1B). The first of them is the Khamyshki section. This nationally ranked geosite stretches for ~20 km along the Belaya River from Guzeripl in the south to Khamyshki in the north, and only its southern edge is represented in the study area. Although this geosite displays chiefly Permian molassic deposits, some parts (including that near Guzeripl) show Juirassic siliciclastics. The Molchepa section is the second, also linear geosite ranked regionally, which consists of several outcrops along the Belaya River (the most principal of them is found near the mouth of the Molchepa River). It represents Jurassic siliciclastics and boasts important trace fossil localities [16,35]. Taking into account the overall touristic significance of Guzeripl, these geosites can be employed for the purposes of geotourism.

3. Materials and Methods

Field investigations have been conducted regularly in the Guzeripl Depression for more than a decade. Two geosites are available in the study area (Figure 1B). Each of them consists of localities corresponding to individual outcrops (they can also be termed as geoheritage points or geotourist attractions). A total of five localities are established (Table 1). They were visited specially for the purposes of the present study (the initial inventory was undertaken in 2021, and it was repeated in 2022). General geological and geoheritage observations, measurements of dip direction and angle were made, and photographs were taken there.

Table 1. General information about the considered localities.

ID (as on Figure 1B)	Location	Geological Features	Geosite (According to [15])			Image
			Affinity to Geosite	Rank of Geosite	Part of Geosite	
1	Near the mouth of Molchepa River	Lower-Middle Jurassic shales and siltstones, trace fossils, oxygen depletion in palaeosea, tectonic distortion	Molchepa section (this geosite is fully represented in the study area)	Regional	Northern edge, principal fragment	Figure 4A,B
2	Beach of Belaya River near entrance to nature reserve	Lower-Middle Jurassic shales and siltstones, oxygen depletion in palaeosea, tectonic distortion			Central part, supplementary locality	Figure 4C
3	Left bank of Belaya River at town's edge	Lower-Middle Jurassic shales, siltstones, and sandstones, oxygen depletion in palaeosea, trace fossils, tectonic distortion			Southern edge, important fragment	Figure 4D

Table 1. *Cont.*

ID (as on Figure 1B)	Location	Geological Features	Geosite (According to [15])			Image
			Affinity to Geosite	Rank of Geosite	Part of Geosite	
4	Cutting of paved road to Partisan Glade	Lower-Middle Jurassic shales and sandstones, oxygen depletion in palaeosea, tectonic distortion	Khamyshki section (the only southern fragments of this geosite are represented in the study area)	National	Southwestern edge, supplementary locality	Figure 4E
5	Cutting of road to Maykop, Belaya River gorge	Lower-Middle Permian red molassic rocks, Lower-Middle Jurassic shales and sandstones, oxygen depletion in palaeosea, tectonic distortion, major fault			Southern part, important fragment	Figure 4F,G

Figure 4. Views of the considered localities (IDs as on Figure 1B): (**A**) Locality 1 (lower part); (**B**) Locality 1 (upper part); (**C**) Locality 2; (**D**) Locality 3; (**E**) Locality 4; (**F**) Locality 5 (Jurassic rocks); (**G**) Locality 5 (fault).

The methodology of the geoheritage study is diverse and well-developed [2,3,7,11,15,40–45]. However, many approaches serve the purpose of identification and evaluation of geosites as principal constituents of territorial geoheritage. In the case of the study area, two geosites have already been established, and their formal characteristics and outcomes regarding the semi-quantitative assessment have been published [15]. The present study has a different goal, namely putting the available geoheritage into the general context of Guzeripl as a particular settlement and center of touristic activities. This is why attention is paid to the five localities (potential geotourist attractions), not geosites. For the same reason, a specific methodology, which does not pretend to be universal, but serves the particular goal of this study, is proposed and employed. It should be stressed that this is not a geosite inventory and, thus, does not replace the "standardized" assessment approaches noted above and already used in Mountainous Adygeya [15]. The tentatively proposed methodology pays

attention to some new aspects of the geoheritage representing the deep bottom of the Early Middle Jurassic Caucasian Sea.

The analysis includes three simple approaches arranged specially for the present study. First, the geological knowledge is updated for a better understanding of the geoheritage setting. Special attention is paid to the structural elements constituting the local tectonic framework. Second, the five geoheritage localities are described generally, i.e., in regard to their view, represented features, and position relatively to the settlement and its touristic infrastructure. Third, the localities are assessed on the basis of several criteria (Table 2). This assessment can be called functional because it explores the potential usability of the geoheritage localities in Guzeripl. Although these criteria are selected rather tentatively and intuitively, their importance can be argued on the basis of what is already known from the literature as follows. Geoheritage attracts various visitors (target audience), which include scientists, students, and tourists (also fossil/mineral amateurs and "lay public") [46–50]. Although their interests differ essentially, it is evident that a geological object that is interesting to tourists also has educational value. Accessibility is another important property, which is essential for geoheritage utility [51–55]. Indeed, this is a very relational characteristic; for instance, some can find even 150 m of hiking difficult, whereas others can easily hike for 15 km; the national context also matters (countries may differ by the development and the cost of public transport, as well as by the number of people with a driving license). Geoheritage can be tied to natural [56–58] and cultural heritage [59–61]. Expectedly, their co-occurrence makes a given locality more attractive, also in regard to the diversity of visitors' activities and experiences. Aesthetics depend strongly on the people's idea of beauty, and it can differ substantially between visitors [62]. However, there are more or less definite criteria of the potentially attractive features and properties [63] and, thus, their presence in geosites is an indication of their aesthetics. The importance of the latter in geoheritage management seems to be outstanding [63–67]. It appears to be important in realizing whether natural beauty is restricted to only geological features or their landscape context. Position in relation to settlements may seem to be a "marginal" aspect. However, the focus of the present study stresses the urgency of its consideration. In fact, spatial links between geological localities and urban areas are essential for geotourism integration in urban activities [10,68,69]. Importantly, comprehension of geoheritage in the context of a given settlement requires also its proper visibility. It is known that visual connections are important in natural heritage management in urban areas [70]. Finally, the spectrum of activities related to geoheritage should be considered [59,71–74]. Evidently, such activities as observation, examination, and "hunting" for fossils/minerals are essential for geoheritage exploitation (the latter must not lead to damage and overcollection). Indeed, some activities can be allowed and others can be prohibited and, thus, this aspect is also related to the degree of freedom permitted to visitors.

Table 2. Criteria and scoring system for the functional assessment of the considered localities (tentative development for the purposes of this study).

Criteria	Grades	Scores
Target audience (main types of visitors)	Only scientists	10
	Only guided student groups	15
	Scientists and guided student groups	20
	Guided student groups and tourists	35
	Scientists, guided student groups, and tourists	50
Accessibility (from settlement)	Hiking (difficult)	5
	Car/bus	15
	Public transport	25

Table 2. *Cont.*

Criteria	Grades	Scores
	Hiking (easy)	35
Heritage diversity	Only geoheritage	10
	Geoheritage and other natural heritage	20
	Geoheritage and cultural heritage	25
	Geoheritage, other natural heritage, and cultural heritage	35
Aesthetics	None	0
	Only landscape	15
	Only geological features	25
	Geological features and landscape	35
Position (relative)	Outside of settlement	10
	Settlement's periphery	20
	Settlement's center	35
Visibility (relative)	Limited to locality	10
	Distant, outside of settlement	25
	Distant from settlement	35
Use (activities)	Only general observation	10
	General observation and close examination	25
	Active exploration (for instance, "hunting" for fossils or minerals—if permitted and not dangerous to geoheritage)	35
	Combination with non-geological activities adds 15 scores to each grade	
Total value	Relatively low	<100
	Moderate	100–200
	Relatively high	>200

The scoring system has been developed so as to reflect the relative difference of grades established by each criterion, as well as to make a distinction between the criteria by their relative importance (Table 2). For instance, it is clear that the locality accessible by public transport is more functional than that accessible only by owned/rented cars; similarly, the locality where one can dig for fossils (indeed, if permitted and without negative consequences to geoheritage) is more functional than that suitable for only general observation. The total sum of scores allows judgments about the value of the localities (importantly, this is a very specific value and not the general value established by the "standardized" approaches [3,15,40]). It should be stressed that this approach and its scoring system are designed for the purposes of only this study (first of all, for strengthening the descriptions with some numerical values). Nonetheless, the scores can be assigned on a rather objective basis because the grades can be established without serious doubts in all cases.

4. Results

The five examined localities (Table 1) are essential for the understanding of the geological setting of Guzeripl and its vicinity. It should be stressed that the Guzeripl Depression is a topographic element developed in the late Quaternary by river erosion (not by subsidence). All localities represent Lower-Middle Jurassic dark-colored shales with interbeds of sandstones and siltstones (Figure 3). However, the local geology is not monotonous because these rocks are strongly deformed in a complex way, and dip direction and angle differ significantly. Their accurate measurements have allowed to outline anticline and syncline

folds striking from the northwest to the southeast (Figure 3). Their shapes demonstrate some irregularities. The distance between their axes does not remain constant, which can be explained by the specific deformation field. In the northeast of the study area, a major fault separates the Lower-Middle Jurassic shales (hanging wall) from the Early Middle Permian molassic deposits (foot wall). Notably, these sedimentary complexes demonstrate almost the same dip direction, although the angles differ. The fault is a normal, high-angle (up to 80°) fault. This geological description is more or less consistent with the regional geological scheme outlined earlier by Latysheva and Kirmasov [32], although the former explore the knowledge of structural elements in detail.

The locations look similar to a certain degree (Figure 4), but each of them demonstrates peculiarities. Although some of them look like "ordinary" outcrops, they should be treated in the terms of geoheritage because of three reasons. First, they are fragments of the already established geosites with well-proven value [15]. Second, they demonstrate some geoheritage value, such as in the case of ichnological localities [16,35]. Third, taken together, these localities reflect the mid-Mesozoic presence of the deep bottom of the Caucasian Sea in what is now a mountainous domain [30,31,35]. The information about the localities is summarized in Table 1. Some additional characteristics are provided below.

The first locality is found near the mouth of the Molchepa River (ID 1 in Figure 1B). Its size is small, but this does not limit its importance. One can observe typical Lower-Middle Jurassic deposits, with dominated shales and a subordinate amount of siltstones (Table 1). The distinctive feature is the presence of abundant trace fossils, and this has become the key locality for the local ichnological research [16,35]. Apparently, it is close to the hinge zone of the anticline (Figure 3). The locality consists of two parts. One part is an outcrop in the cutting of the local, unpaved road, which leads to the entrance to the Caucasus State Nature Biosphere Reserve through the recreational area (Figure 4A). The other part is found right above this outcrop, where rocks are exposed directly along the wide trail (Figure 4B). Better to say, building this trail decades ago exposed the rocks. Such a geometry of the locality makes its examination, collection of trace fossils, and structural measurements very comfortable. Importantly, this locality is associated with the most visited tourist attraction in Guzeripl, namely the recreational area of the noted reserve.

The second locality corresponds to the natural outcrops near the Belaya River, where a kind of beach exists close to the entrance to the Caucasus State Nature Biosphere Reserve (ID 2 in Figure 1B). This locality is rather simple in regard to the represented features (Table 1), namely distorted siliciclastic deposits (Figure 4C). However, one should note its structural importance. The dip angle is smaller by a few degrees than in Locality 1, which indicates the decrease in the angle of the southwestern limb of the anticline together with the increase in the distance from its axis. Moreover, the scenic properties of the landscape are high (Figures 2A and 4C). Earlier, this river beach was used for recreational purposes (swimming and sunbathing) by both locals and visitors, but these activities are prohibited now. Despite this, it remains a part of the recreational area of the reserve.

The third locality stretches for several hundred meters along the left bank of the Belaya River (ID 3 in Figure 1B). It represents Lower-Middle Jurassic shales, with interbeds of siltstones and sandstones (Figure 4D), and some trace fossils were found there [35]. The deposits are tectonically distorted and form the southwestern limb of the anticline (Figure 3). However, the dip angle becomes smaller than in the Localities 1 and 2, and, thus, the idea of its decrease together with the increase in the distance from the anticline's axis is proven. This locality is located at the very edge of the settlement. A paved road ends a few dozen meters near the river. After walking down the stone stairs, one can reach a well-established trail along the river upstream. Deposits crop out almost continuously along this trail, which makes their close examination comfortable as well as their sampling, if necessary,. There are also small beaches (Figure 4D) used for outdoor recreation by locals and visitors. The landscape is very picturesque, with rather diverse views along the trail. However, it remains poorly visited because it is "shadowed" by the main Guzeripl's

attraction (recreational area of the reserve). The other challenge is that the trail does not lead to any other attraction and stops abruptly.

The fourth locality is situated northwest of the settlement (ID 4 in Figure 1B). It represents the same shales with sandstone beds (Table 1), and it is distinguished from the other localities by significant tectonic distortion (minor folding and faulting) (Figure 4E). The general direction of dip suggests that this is the southwestern limb of the syncline, which differs from the nearby anticline by the much smaller angles of the limbs (Figure 3). This locality is a cutting of the road leading to the Partisan and Yavorova glades, which is one of the most actively used touristic routes. Commonly, tourists prefer cars and buses to long-distance hiking, and, thus, the locality itself is poorly visited. Nonetheless, it is situated not so far from the settlement, various infrastructural facilities (such as camp sites), and souvenir vendor points are very close.

The fifth locality is a part of the rather large outcrop, which shares features of road cutting and natural rock exposure in the steep river valley's slope; it is situated north of Guzeripl, on the left bank of the Belaya River (Figure 1B). There, one can observe Lower-Middle Permian red molassic rocks, which dominate this outcrop, Lower-Middle Jurassic shales and sandstones represented near its southern edge (Figure 4F), and the major fault dividing them (Figure 4G). This locality corresponds to the northeastern limb of the syncline, which dips at the same angle as the opposite limb (Figure 3). The locality occurs along the road connecting Guzeripl with Maykop, and this is the main route for tourists going to the former and the Partisan and Yavorova glades. The landscape scenery may attract visitors to stop and take photographs. Notably, this locality is very close to Guzeripl, but it is not associated with it either infrastructurally or even visually.

The tentative functional assessment of the considered localities reveals their differences (Table 3), which are explained below. Although all three of them seem to be suitable to all kinds of visitors, the target audience of the two others is more limited: scientists have nothing to study at Locality 2, whereas it is questionable whether Locality 4 can be attractive to tourists. Localities 1–3 can be accessed easily from the settlement, whereas reaching Locality 4 requires driving or far-distance hiking, and Locality 5 is principally accessible with public transport (Guzeripl has regular bus connection with Maykop). The maximum diversity of heritage is established at Locality 1 where geoheritage [15] occurs in the Caucasus State Nature Biosphere Reserve, which is high-class natural heritage by definition [17], and near an important archaelogical object (megalitic construction typical to the Western Caucasus). Localities 2, 3, and 5 are in and near the same reserve, boasting their significant natural heritage [17], and they are parts of the established geosites [15]. Finally, Locality 4 is a part of the geosite [15], and only geological features are valuable there. All considered localities are distinguished by high aesthetic properties determined by the abundance of vegetation, the presence of water objects, their color contrast, and the availability of distant views. However, in only two cases, geological features can be judged as beautiful. This occurs with the striped rocks at Locality 3 and the red color of molasse at Locality 5. As for the position, two localities (1 and 2) are found directly in the settlement's center, Locality 3 is situated on its periphery, and two other localities (4 and 5) are found in its vicinity (Figure 1B). Visibility is the only studied property, which is equal to all localities, where geological features can be viewed from only a very short distance measured by the first dozens of meters (curvature of slopes and dense vegetation cover do not make long-distance viewing possible). Finally, the localities can be used differently. All of them can be observed for a general comprehension of the distorted Lower-Middle Jurassic deposits, as well as examined closely (for instance, for seeing lithologies or structural measurements). Active exploration (trace fossil collecting) is possible at Localities 1 and 3, although one should note that Locality 1 belongs to the territory of the reserve, where collecting in a strict sense requires special permission. Regardless, one can try to find trace fossils on bedding planes and take photographs of them without their extraction. The same is recommended for Locality 3 to avoid the occasional damage of the geosite (principally, the risks of such a damage seems to be minimal). The alternative solution is looking for trace

fossils in large rock fragments in slope debris, which can be found near these localities. Non-geological activities (outdoor recreation and taking photos) are possible (and already occur) at Localities 1, 3, and 5.

Table 3. Functional assessment of the considered localities (based on criteria and scoring system explained in Table 2).

Criteria	Localities (See Figure 1 and Table 1 for IDs)				
	1	**2**	**3**	**4**	**5**
Target audience	50	35	50	20	50
Accessibility	35	35	35	15	25
Heritage diversity	35	20	20	10	20
Aesthetics	15	15	35	15	35
Position	35	35	20	10	10
Visibility	10	10	10	10	10
Use	50	25	50	25	40
Total value	230	175	220	105	190
	Relatively high	Moderate	Relatively high	Moderate	Moderate

The above-mentioned assessment by the selected criteria suggests that Localities 1 and 3 receive the highest scores, and the lowest scores are given to Locality 4 (Table 3). Regardless, all localities demonstrate either relatively high or moderate values. This means that the considered pieces of geoheritage from Guzeripl and its vicinity are suitable to be used for the settlement's needs (see discussion below).

5. Discussion and Conclusions

The contributions of geoheritage to socio-economic growth, efficient planning, and sustainable development are studied actively [75–80]. Realizing the functional value of the considered localities (Table 3) raises the question of their exploitation for the purposes of the development of Guzeripl. Research, education, and tourism are the key directions for the exploitation of geoheritage [6,15,40,46–50].

The considered localities are suitable (even essential) for achieving several research tasks, namely the development of the local lithostratigraphical framework, ichnological survey and interpretations (the study area has outstanding importance for the studies of Jurassic ichnofossils in the Western Caucasus [35]), better understanding of the tectonic setting of the southern part of Mountainous Adygeya (the proposed scheme (Figure 3) and the earlier proposals [32] require additions and justifications), sampling rocks for geochemical analyses, and collecting the evidence of oxygen depletion in the Caucasian Sea. These studies require long field campaigns, and Guzeripl, with its numerous opportunities for lodging, seems to be the ideal place for accommodation for research groups. Moreover, geoscientific workshops and pre- post-conference trips can be organized there.

The localities are also ideal for field-based education of university students in geology. It should be noted that several Russian universities with strong earth science programs use Mountainous Adygeya for their field educational campaigns (the examples are the Southern Federal University from Rostov-on-Don and the Voronezh State University from Voronezh). Two of the most evident topics of education include deposition on the bottom of deep seas in the geological past and mapping structural elements in folded and faulted domains (modern orogens). All localities can be employed for this purpose. Indeed, Guzeripl can be used for the temporal accommodation of students and lecturers and/or their visits to the outcrops can be linked to the visits of the Caucasus State Nature Biosphere Reserve fundamental for geoecological education.

Mountainous Adygeya experiences gradual growth of geotourist activities, although they are in their initial phase [15]. Presently, they are almost absent in the southern part of this territory. Nonetheless, the very idea of the existence of an ancient deep sea bottom in the modern mountains may sound potentially attractive to visitors. Moreover, geotourism can easily be facilitated by ecotourism developed actively by the Caucasus State Nature Biosphere Reserve. It should be stressed that Guzeripl has already become an important center of tourism. Many tourists go there during their summer vacations, holidays, and weekends (the statistics are absent, but the tourist flows are measured by thousands of people per month). Some of them take one-day trips, whereas others stay in hotels and lodges for 2–3 days and sometimes longer. Although there are possibilities for ecotourism, adventure and sport tourism, and outdoor recreation, the related activities usually take not more than a few hours. If so, the wider potential should be used to diversify tourists' experience, to increase their satisfaction, and to increase the length of their stay in Guzeripl (the latter task is especially demanded by local hospitality enterprises). Geotourism may contribute to achieve these tasks, although this requires infrastructural development (installation of professionally prepared signs and interpretive panels), marketing (online promotion of geotourist attractions and inclusion in the offered tours), and development of online, interactive tools facilitating individual visits to the localities.

The collected information and its interpretations presented above allow for the focus of the study area to be on the spatial links between the settlement and the localities. A total of three zones can be outlined (Figure 5). The first zone corresponds to the very "core" of Guzeripl. On the left bank of the Belaya River, there is a tourist information center (Figure 2C), small market for local souvenir vendors, parking zone, several "meadows" for outdoor recreation, and the entrance to the reserve. A bridge leads from there to the right bank with the recreational area of the reserve with various attractions. Two localities (1 and 2), one of which has relatively high functional value, are found there (Figure 5). The second zone embraces two thirds of the settlement. It is called central because it corresponds to the area where tourists concentrate in hotels, lodges, and restaurants. From this zone, Localities 1–3, two of which boast relatively high functional value, are easily accessible by hiking along paved roads that may take no more than a half of hour (Figure 5). The peripheral zone embraces the northern, newer part of the settlement. Hotels, lodges, and restaurants are also numerous there, but this seems to be a true periphery relative to the principal attraction (the reserve) and the valuable localities 1 and 3. The localities of these zone (4 and 5) can be reached by car and bus by tourists who stay there and in the central zone (Figure 5). Hiking would not be too difficult, although it would be time-consuming and require some preparation. The same is true for reaching Localities 1–3 by tourists who prefer to stay in the peripheral zone. This zonation suggests that researchers, guided student groups, and geotourists should prefer the central zone for accommodation, and that visiting all five localities requires the use of cars or buses. In other words, this zonation may help in the planning of geotourist activities in Guzeripl and its vicinity.

In conclusion, the present study implies that the deep bottom of the Early Middle Jurassic Caucasian Sea is represented in Guzeripl and its vicinity in five localities, which are fragments of two geosites. The related knowledge has been systematized for the first time. As established with the original approach, these localities differ on the basis of their functional value, and the two most important ones are found directly in the settlement. Importantly, they can serve scientists, guided student groups, and tourists, and the geoheritage links to the local touristic environment are traced.

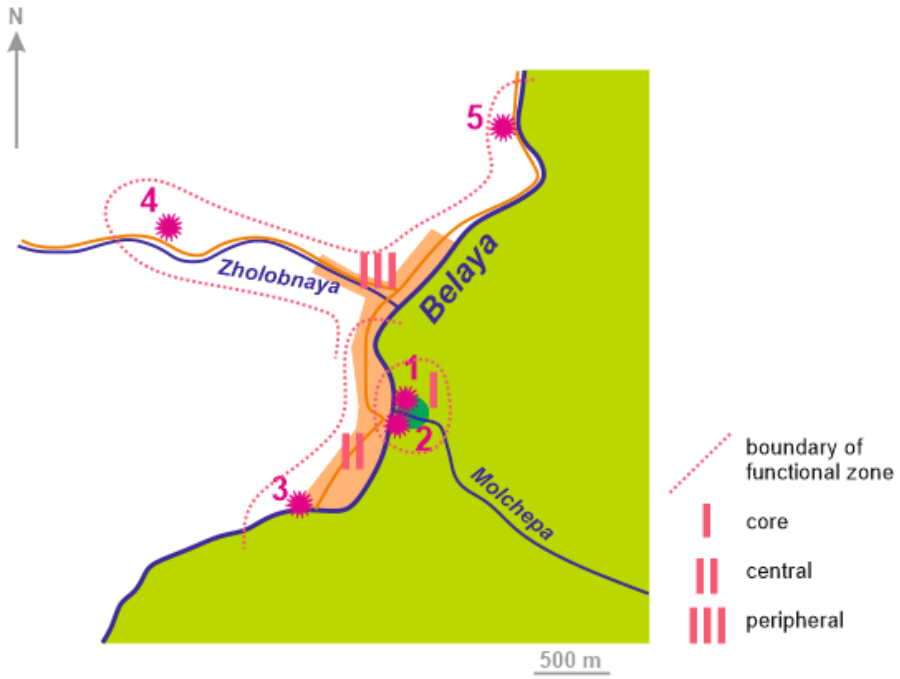

Figure 5. Proposed zonation of the study area (see text for details).

More generally, this study stresses new aspects of geoheritage, which can be assessed and also interpreted in regard to local/urban planning. This might become a major theoretical issue because contemporary research needs to extend its vision of geoheritage to demonstrate its true importance to society and policy-makers. The proposed approach is new but tentative and designed for this case study. The main limitation is the rather intuitive, case-dependent choice of criteria. In the future, the approach can be modified to consider a bigger number of criteria and refined to take into account various situations for its application. Another limitation is the focus on only geological features, whereas people's opinion of them also deserves investigation. The perception of these localities by local policy-makers, residents, and tourists is an important topic for further research. Nonetheless, it appears that analyzing the spatial distribution and value of geoheritage manifestations in a particular area/settlement may be important (both conceptually and practically) similar to "standardized" geosite assessment.

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