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ENHANCEMENT OF CULTURAL LANDSCAPE BY GEOMORPHOLOGY. A STUDY OF GRANITE PARKLANDS IN THE WEST SUDETES, SW POLAND

ABSTRACT: MIGOŃ P. & LATOCHA A., *Enhancement of cultural landscape by geomorphology. A study of granite parklands in the West Sudetes, SW Poland.* (IT ISSN 0391-9838, 2008).

The intermontane basin of Jelenia Góra in the West Sudetes is renowned for its numerous noble residences and landscape parks, established in the 19th century. Collectively, the parks form a unique cultural heritage, which is now being promoted as one of the most valuable assets of the region and a target for tourists. One of the reasons why parklands may have been set up with such a success is local geomorphology. Deep selective weathering of granite followed by stripping of the regolith has revealed a multi-concave (multi-basin) granite topography, with isolated conical and domed hills, enclosed elementary basins, tors, clefts, scattered boulders, overhangs and caves, and minor surface features such as weathering pits and flutes. They have been skilfully incorporated into the planned landscapes around the residences, adding to their scenic appeal. In the past few decades the granite parklands of the Jelenia Góra Basin were largely neglected and suffered deterioration, but since the early 1990s projects to restore the parklands to their original glory are under way. This provides an excellent opportunity to promote geomorphology alongside the more recognized cultural heritage.

KEY WORDS: Geoheritage, Granite landforms, Cultural landscapes, Sudetes, Poland.

INTRODUCTION

In contemporary Europe the vast majority of landscapes is «cultural» in the sense that they owe their present-day appearance to various human activities, the material evidence of which is superimposed onto landscape facets shaped by natural processes. In cultural landscapes

both major groups of components, natural and human-related, are of equal importance and the relationships between them are bi-directional. Among them, and of particular interest to geomorphology are landscapes, where topography (relief, drainage) dictates specific land use patterns, architectural designs and land resource exploitation. One type of terrain where the relationships between geomorphology and cultural heritage are particularly strong, is multi-convex and multi-concave granite landscape. A range of examples from different cultural and historical contexts has been given elsewhere (Migoń, 2006). In this paper, we aim to examine a very specific case of granite «parklands» located in the West Sudetes, SW Poland. This area, historically belonging in the 19th century to the Prussian Empire, became famous for its numerous noble residences and elaborate romantic gardens and parks. We will argue that geomorphology had been a crucial factor in designing layouts of the parklands, but it is also a neglected factor in the current attempts to re-vitalize and promote the area as a touristic destination.

STUDY AREA

The basin of Jelenia Góra is one of many intramontane basins in the Sudetes, a mountain range along the north-eastern boundary of the Bohemian Massif (Jahn, 1980). It has a roughly rhomboidal shape and occupies ca. 270 km². The elevation of its floor is 350-450 m a.s.l., but individual hills within the basin rise to 500-650 m a.s.l. and the surrounding mountain massifs peak at 945-1603 m a.s.l. (fig. 1). This elevation difference of over 1000 m counts as one of the highest in the Sudetes.

The Sudetes constitute an old orogenic terrain of Palaeozoic age, ultimately consolidated during the Variscan tectonic movements, in the Devonian/Carboniferous. Sub-

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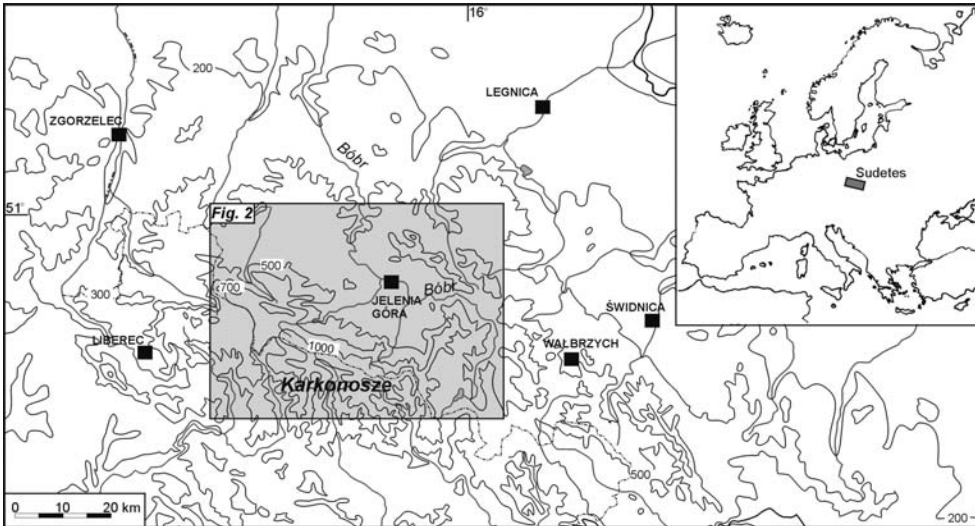


FIG. 1 - Study area. The rectangle indicates the position of fig. 2.

sequent history involved alternating phases of prevailing deposition and denudation, and the majority of the Cainozoic was characterized by deep weathering and stripping of the weathering mantle, leading towards an etch-type topography (Migoń, 1999). Normal faulting in the Neogene has resulted in differential uplift and subsidence, with the amplitude locally exceeding 1000 m. The present-day topography consists of superimposed landforms of tectonic, denudational and erosional origin, accounting for the much varied geomorphological landscape of the Sudetes and the presence of fault-bounded elevated massifs, dissected highlands, uplands, piedmonts, and intramontane basins.

The most evident legacy of neotectonic faulting, which occurred in the Neogene, is the occurrence of prominent, straight mountain fronts extending for tens of kilometres, and stepped morphology of individual massifs. One such mountain front marks the southern boundary of the Jelenia Góra Basin and is followed by an intermediate topographic step, behind which the mountain massif of the Karkonosze rises to 1400-1603 m a.s.l. (fig. 2). The imposing north face of the Karkonosze provides a majestic backdrop to the hilly relief of the basin itself and is clearly seen from almost everywhere in the basin. Another mountain front, although much lower in height and less steep, bounds the basin to the north. The eastern boundary is

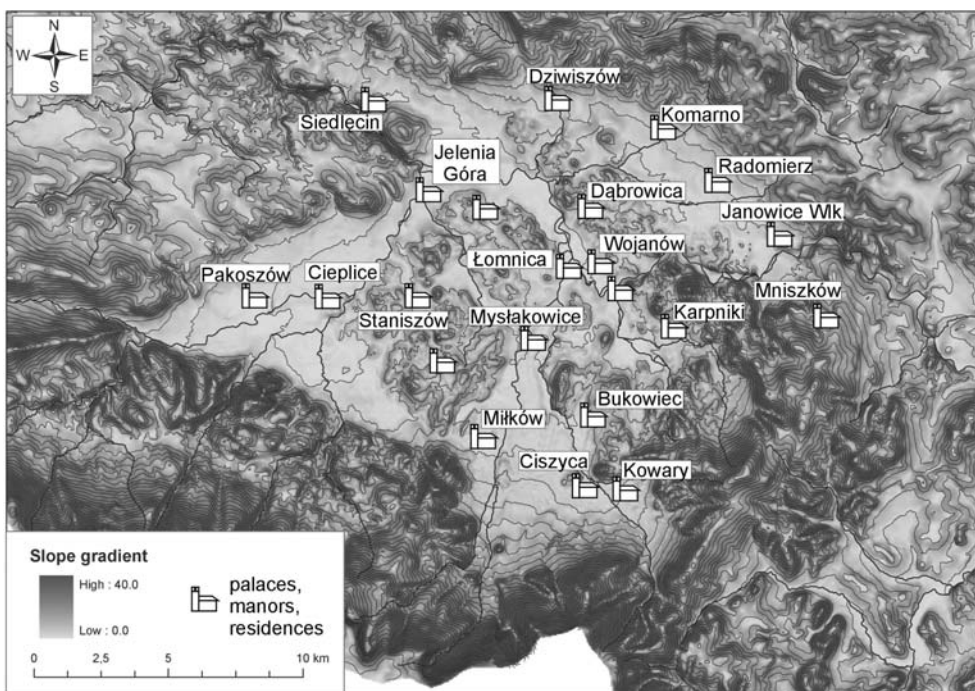


FIG. 2 - Relief of the Jelenia Góra Basin and the surrounding terrain shown as a slope gradient map. Location of major palaces, residences and manors is indicated.

less distinctive and of different character. Here, the terrain rises stepwise towards the summits of the Rudawy Janowickie range, over ca. 500 m of elevation. To the north-west, a low sinuous escarpment separates the basin from an undulating upland terrain.

Geology of the Jelenia Góra Basin is relatively simple. The basin is carved out of granite of Carboniferous age (Cloos, 1925; Borkowska, 1966), which occurs in a few major petrological variants. Coarse grained, locally porphyritic granite is most widespread, but stock-like bodies of much finer granite are common. In addition, the main granite mass is cut by numerous veins of different extension and composition, from aplitic to lamprophyric (Borkowska, 1966). In the context of granite geomorphology of the Jelenia Góra Basin fracture patterns are important and these are present in a range of geometries, from a regular orthogonal jointing (Cloos, 1925) to massive dome-like structures affected mainly by steeply dipping pressure release joints (Migoń, 1996).

The origin of the basin has long been a matter of debate, and is not yet satisfactorily explained. Most likely, the basin is a composite product of selective rock-controlled denudation and uplift of basin surroundings. The evidence for the significant role of deep weathering and stripping comes mainly from the basin itself, whereas some of its topographic boundaries follow fault lines and are fault-generated escarpments of different height.

CULTURAL HERITAGE AND ITS HISTORICAL BACKGROUND

Most of the villages in the Jelenia Góra Basin were first mentioned in the archival documents in the 13-14th century, but there is also archaeological evidence for earlier human occupancy. The typical pattern of a medieval mountain village, elongated ribbon-like along a stream or river, can still be recognised in the present-day general layout of many settlements. Although the main settlement in the region, Jelenia Góra, was a sizeable town already in the 15th century, there was rather little to distinguish the surrounding area from other parts of the Sudetes. However, it was the 19th century when the substantial socio-economical changes affected the region, contributing to the development of highly diverse and wealthy cultural heritage (Staffa & alii, 1999).

In the early 19th century extensive land parcels within the Jelenia Góra Basin were bought or inherited by members of the royal Prussian family and turned into their summer (Karpniki, Myslakowice) or permanent residences (Wojanów). The establishment of royal residences in the basin initiated the movement among the Prussian aristocracy to buy land in this region. Soon it became fashionable to have a residence near the royal one and to be involved in the activity of the court. Furthermore, some estates were granted to high-rank officers and court officials as rewards for their merits to the Prussian empire (Łuczynski, 2000). The erection or rebuilding of the residences was often conducted by the best Prussian architects, such as Carl

Langhans, Carl Gottfried Geissler, Karl Friedrich Schinkel, and Friedrich August Stüler, who followed new trends in architecture and employed various historic styles such as classicism, neo-Gothic and neo-Renaissance (Zabytki sztuki w Polsce. Śląsk, 2006). The inner parts of the residences were often masterpieces of architecture, containing also valuable art collections. Similarly, the spatial compositions of gardens and parklands were created by the most known Prussian gardeners, including Pierre Lenné, Hans Karl Walther, and Friedrich Teichert (Zabytki sztuki w Polsce. Śląsk, 2006). The result of these developments was an unusually high concentration of palaces, manors and associated parklands over a relatively small area (fig. 2).

However, the vicinity of the royal court was not the only reason for buying land and developing residences in the Jelenia Góra region. A new philosophical trend, romanticism, developed in the early 19th century. It was based on the idea of «return to nature», glorifying countryside life and encouraging search for personal contact with wild nature. Romantic ideology not only favoured a new attitude to life and nature, but was also reflected in art and architecture. The Jelenia Góra Basin was a perfect place for development of such ideas, as it has varied landscape itself on one hand, and borders with the then highest mountain range in the entire Prussian empire, the Karkonosze (Germ. *Riesengebirge* = Giant Mountains), on the other hand. A parallel development in the 19th century was mass tourism, accessible to ever wider social circles, and the Jelenia Góra region, together with the Karkonosze Mountains, became one of the most attractive tourist regions in the country (Staffa & alii, 1999). Additionally, rapid expansion of the railway network since the middle of the 19th century highly increased its accessibility from most big Prussian cities, including the capital, Berlin. All these interlinked factors resulted in an increase of population of the Jelenia Góra region in the 19th century and caused substantial changes in the landscape, among which the creation of extensive parklands was perhaps the most significant development.

LANDFORM DIVERSITY

Granite landscape of the Jelenia Góra Basin shows remarkable diversity, observed at various spatial scales, from major to minor. It is this diversity that enhances the wealth of cultural assets and values, accounting for the unique blend of nature and culture. In fact, no other intramontane depression in the Sudetes rivals the Jelenia Góra Basin in this respect, as their floors are almost invariably subdued, largely depositional, and lacking hilly relief.

The actual extent of geomorphological diversity of the basin is revealed in the assemblages of medium-size and minor landforms. The most remarkable individual geomorphic features in the basin are residual hills (inselbergs), which dot its floor, particularly in the central and south-eastern part (Migoń, 1996, 1997). There are more than 100 hills of variable height, from a mere 15-25 m to more than 100 m. The twin inselbergs of the Sokole Góry («Falcon Hills») rise by 200-250 m above the flattish surrounding

terrain. The shape and ground plan of the hills are much controlled by the underlying geology. The most prominent hills are built of stocks of fine grained granite or of very massive compartments of coarse grained granite, and these are typically circular to oval in plan. By contrast, long linear ridges supported by vein rocks may extend for >5 km. In between the residual hills there occur second- and third-order flat-floored basins and elongated depressions, apparently adjusted to master fractures. Together, they form a mosaic of hilly terrain and low, often marshy ground, particularly in the eastern part of the basin.

Many residual hills are characterized by the abundance of rock outcrops. These occur in different shapes: as angular tors, ruiniform relief (apparently chaotic clusters of bedrock outcrops of variable shape), boulder piles, exposed rock faces, often curved convex-upward, and scattered boulders (fig. 3), the majority of them associated with coarse grained variants of granite. Minor facets of rock relief include roofless and roofed joint-aligned clefts (Szmytkie, 2005), rock platforms, basal overhangs, and boulder talus on footslope surfaces.

The rock surfaces of individual outcrops may be also highly diversified, hosting a range of microforms produced by weathering (Czerwiński & Migoń, 1993), common for granite surfaces around the world but fairly rare in other lithologies. Among these smallest features weathering pits (gnammas) are most abundant, attaining typical dimensions to 1 m in diameter and 20-30 cm deep. Besides, examples of rillenkarren, tafoni-like openings, basal hollows, and polygonal fracture patterns have been recorded. Interestingly, these minor landforms tend to cluster at particular localities, indicating specific susceptibility of rock to selective weathering.

The diversity of granite landforms in the Jelenia Góra Basin becomes also evident if Kaplan's (1975) concept of perceived landscape diversity is applied (see also Hamann, 1994). The granite landscape of the basin is both complex, in the sense that it consists of a number of minor landforms, and legible, as it shows a certain structure, of which the principal components are isolated hills, ridges, and elementary basins. However, the great variety of forms shown by many granite hills, and the concealment of some landscape facets by higher hills or particularly imposing rock outcrops in the front, add to the feeling of «mystery» which is an important added value to the scenic quality of a landscape (Hamann, 1994). These attributes of the granite landscape of the Jelenia Góra Basin provided the 19th century masters of gardening an excellent framework to be exploited.

GEOMORPHOLOGY AND LANDSCAPING

In the 19th century, an integral part of planning a noble residence was designing the immediate surrounding of the building, according to the principles of romanticism and the expectations of the owners. Most gardens and parklands were formed according to the rule of an English garden style, meaning that they imitated wild nature and

traces of their maintenance should have been largely invisible (Kapałczyński & Napierała, 2005). The size of an area under planning was primarily dependent on the size of the estate and the wealth of the owners. The largest parkland around the residence in Bukowiec stretched for 23 ha and connected with neighbouring estates in Karpniki, Wojanów, and Mysłakowice.

Another important factor to influence the design of parklands, however, was the existing topography and the various geomorphological features present in the Jelenia Góra Basin itself and in its vicinity. Their role may be seen at different spatial scales. At the large scale, the towering Karkonosze mountain range was the most important landmark. Therefore, many residences, viewing points or resting areas along tourist trails were located in places which offered spectacular views towards the abruptly rising mountain massif (e.g., Bukowiec, Łomnica).

However, the geomorphic diversity at medium scale, within the Basin itself, was of no minor importance. The spatial layout of residences and manor-parkland compositions was planned even in minor details and adjusted to the terrain in order to expose the best values of the natural landscape. According to the architectural rules of the time, natural landforms had to enhance the artistic expression of residential and garden buildings, and vice versa, the buildings were incorporated into the natural landscape as an integral part. Following these principles, granite inselbergs were perfect places for location of many parkland buildings, such as viewing towers, romantic ruins of pseudo-medieval castles, open-air theatres, belvederes, tea-rooms and summer pavilions. The location on the hill tops ensured both spectacular views and privacy for personal contact with nature. Some inselbergs became places of worship, with chapels or crosses erected on their tops, whereas others were used to commemorate people rendering great service to the country, e.g., Bismarck monument on the Witosza hill in Staniszków (Łuczynski, 2000).

The flat-floored basins and depressions, separating residual hills and ranges, were often turned into water bodies. The topography of the Jelenia Góra Basin suited the establishment of fishing ponds already in medieval times (Bukowiec, Staniszków, Karpniki, Cieplice). In the 19th century the existing ponds were incorporated into the new garden compositions, whilst many new artificial lakes were created, using natural topographic lows (Mysłakowice, Wojanów), thereby further increasing landscape diversity.

Bare granite outcrops, diverse in form and widely present within all major landscape facets, were important elements of landscape compositions and became popular tourist attractions. The most spectacular tors and boulder groups had their own names, some of which have persisted until today. Special attention in the process of landscaping was paid to rock outcrops and residual boulders standing in isolation from similar features. Their solitary position caused a sense of uniqueness and enhanced their landscape value. Such places were often left forested and, according to romantic beliefs in supernatural forces derived from old pagan worshipping nature, were turned into «magical stone rings» or «Druid circles». Some of

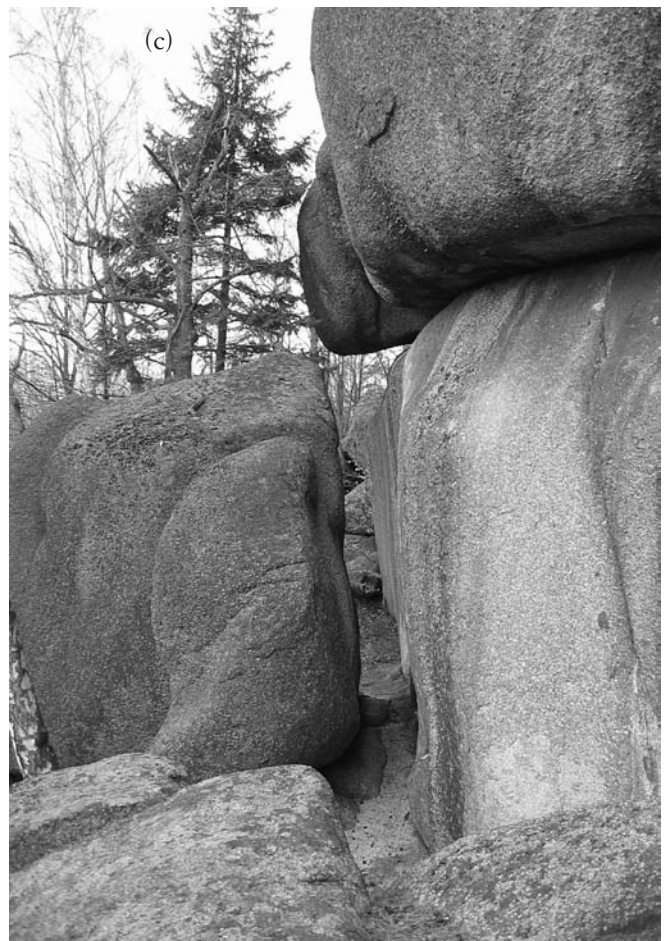
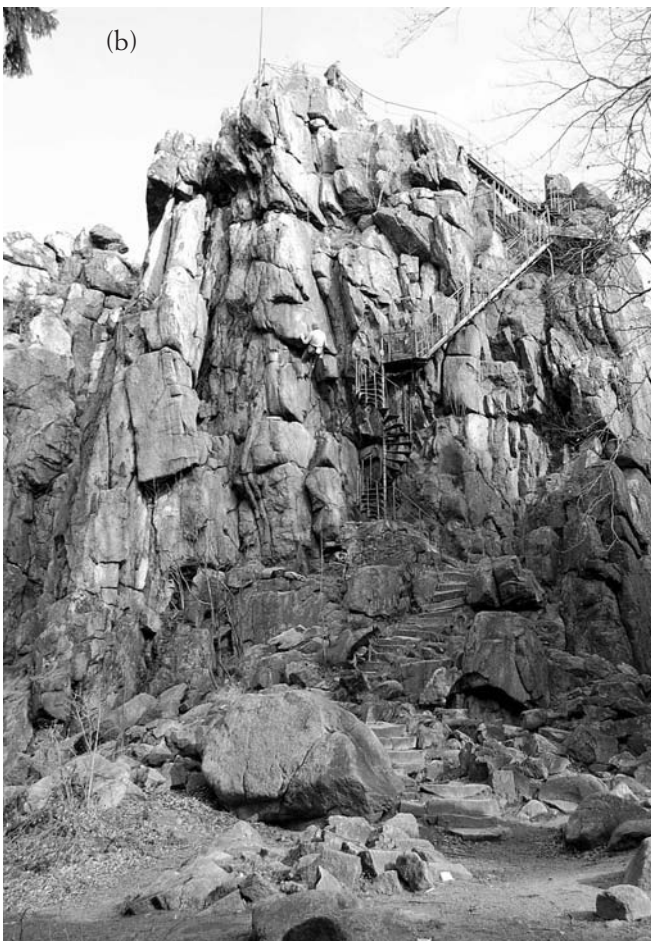


FIG. 3 - Geomorphological diversity of the Jelenia Góra Basin. (a) residual ridge supported by resistant microgranite veins. Along the ridge romantic buildings of the Bukowiec estate have been built; (b) granite tor, with stairs leading to the viewing platform on the top; (c) rock clefts due to joint opening.

them can still be recognised in the terrain, for example in Bukowiec and Staniszów.

Minor granite landforms, such as clefts, ravines and natural tunnels were incorporated into tourist walking trails, ensuring aesthetic and emotional experience while wandering among exposed rock faces. The best example of a dense network of such walking routes, using the natural variety of minor granite landforms, can be found on the Witosza hill (fig. 4). This domed inselberg was locally significant as early as in the 17th century, because of a local prophet living in one of the granite fissure caves which developed within the rock slopes. Therefore, to enhance the aura of mystery, natural granite caves in other places were also said to be ancient hermitages and hide-outs, fitting well the symbolic, romantic landscape. Likewise, other minor granite features, for example bowl-shaped weathering pits (Germ. *Opferkessel*), were important part of the landscape, having been interpreted as old pagan places of worship and sacrifice.

The best example of the romantic philosophy, which attributed various symbolic meanings to the blend of natural and cultural objects, can be found in the large Bukowiec estate (fig. 5). Here, numerous buildings and romantic sites spread over the entire parkland, reflecting consecutive stages of cultural development of humankind.

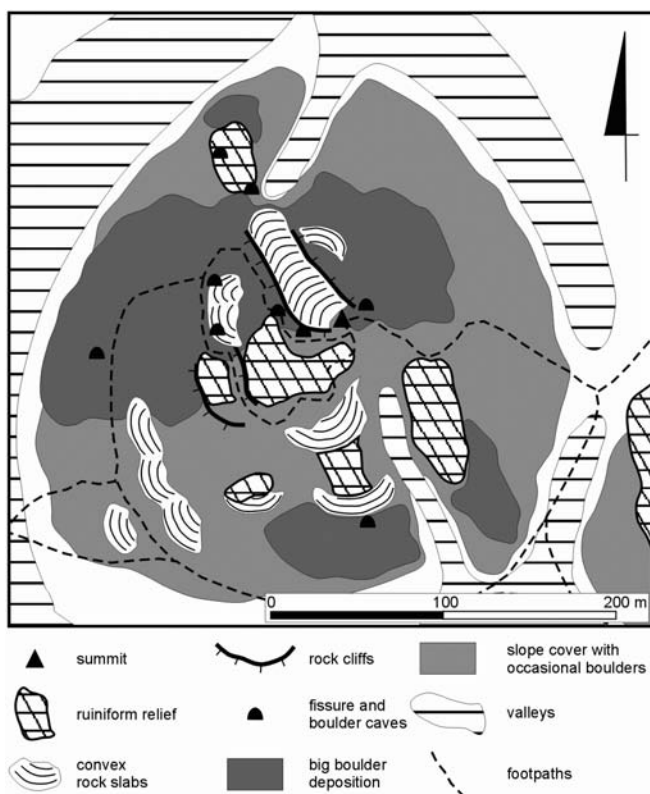


FIG. 4 - Geomorphology of Witosza residual hills. Note that walking trails leading to the summit pass all the main geomorphological features of the hill.

One can find a dwelling of primeval people (in fact, a granite fissure cave), the Druid circle which is a cluster of residual granite boulders, Roman-style open-air theatre, classical-style tea-room called Athen's Temple, neo-Romanesque Abbey acting as a sepulchral chapel of the estate's owners, and artificial ruins of a medieval castle. All these buildings were located either on granite inselbergs or along the residual granite ridges. Several fishing ponds and landscape scenic axes oriented to the places mentioned above and also towards the Karkonosze mountains, especially to the highest peak of Śnieżka, linked all elements of the parkland composition and complemented the landscape variety of the estate (Korzeń, 2006).

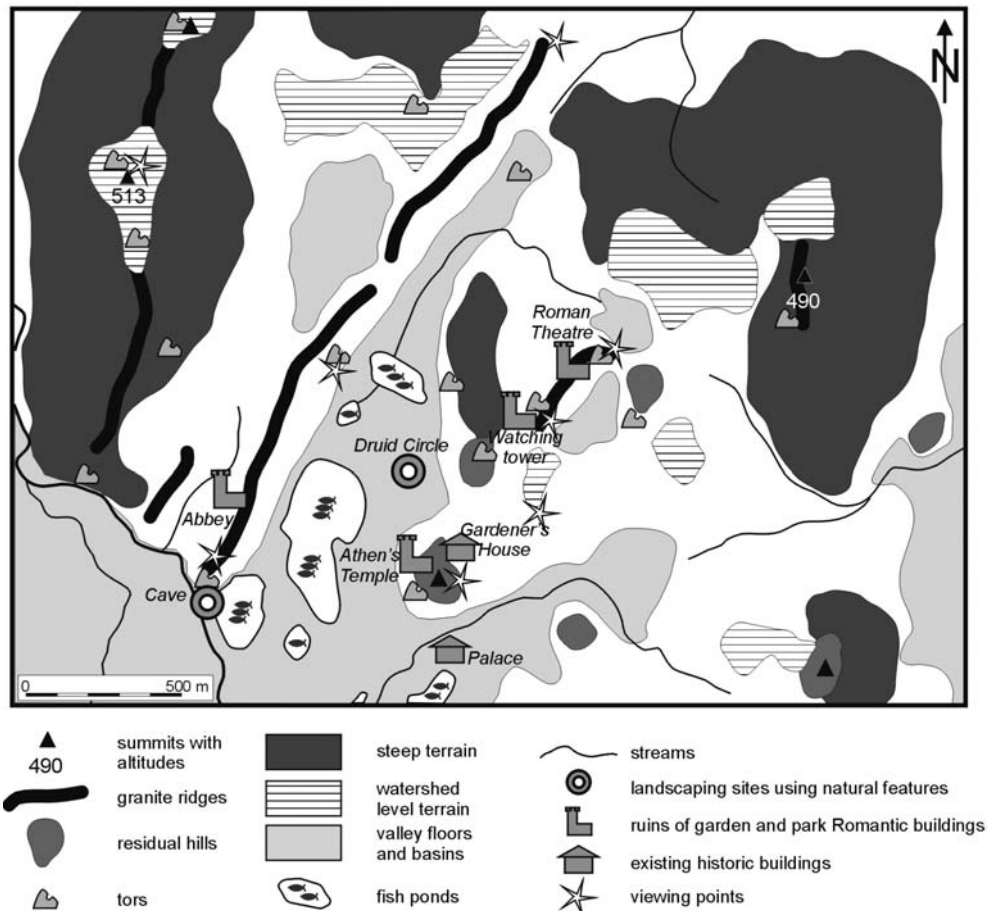
PAST, PRESENT AND FUTURE OF GRANITE PARKLANDS

The period of glory for the granite parklands of the Jelenia Góra Basin was connected with the time of the military and economic prosperity of the Prussian empire and lasted until the World War II, suffering little from the World War I. The nobility and royal family members could afford investing money in the development and maintenance of their estates according to the newest trends. Local tourist organizations, primarily the Riesengebirgsverein established in 1880, the first of its kind in the Prussian empire and one of the first in Europe, considered the parklands as a considerable regional asset and a tourist attraction. At the turn of the 20th century many new roads and paths, often signposted, were built to make the scenic points easily accessible. Individual hills became professionally maintained viewing points, equipped with flights of steps, protecting barriers, benches, pavilions, and viewing towers. Especially, places allowing admiration of the majestic panorama of the Karkonosze mountains were favourite destinations for both tourists and artists (Staffa & alii, 1999).

Perhaps the most important feature of the granite parklands of the pre-World War II period was that particular properties were not planned as separate and isolated objects. The adjacent estates were often composed at a regional scale, with vast parklands seen as their linking corridors. Therefore, large areas within the Jelenia Góra Basin formed a harmonic and integrated architectonic-landscape composition, as for example the royal estates of Wojanów, Karpniki and Mysłakowice.

The post-World War II period had seen an unfortunate reversal of fortune for the granite parklands. Although no military campaigns were carried out in the Jelenia Góra Basin, in winter and early spring 1945 the owners decided to leave their residences and to flee to the western part of Germany. In the following years the unsupervised estates, treated as «war trophies», met variable fate. Only a few of them were taken over by the new Polish administration and kept, at least initially, in a reasonable state. They were used as schools, office buildings, or army cantinas. Some manors were converted into communal houses, but the sense of ownership was largely missing among the in-

FIG. 5 - Geomorphology and cultural landscape of the northern part of the Bukowiec estate.



habitants and the buildings suffered from rapid deterioration. However, other residences, including the spectacular palace in Wojanów, were plundered, burned and left standing in ruins. A few were subsequently demolished. In the late 1980s the vast majority of former noble residences was ruined or abandoned, and there was little realization of their potential as a tourist attraction (Kapałczyński & Napierała, 2005).

The surrounding parklands suffered similarly and lost much of their former appeal. Their deterioration had two faces. First, the majority of small garden architecture ceased to exist, whereas larger buildings such as viewing towers or belvederes were devastated and did not play their role any longer. Second, long-term neglect in gardening resulted in uncontrolled vegetation growth, so that many paths disappeared, popular tourist places fell into obscurity, and vantage points got lost in the forest. Numerous granite landforms, previously advertised as local attractions and frequently visited, were now hidden in dense bush and become virtually inaccessible. Popular guidebooks paid little attention to the landscape and history of the Jelenia Góra Basin, focusing on the adjacent Karkonosze massif instead.

However, in the early 1990s political and economic developments in Poland have created a new situation,

within which granite parklands of the Jelenia Góra Basin have been given the second chance. Some estates went into private hands, of individuals or national and international foundations, and the process of their restoration has been initiated. The effects are variable, but a few manor houses have already regained their former splendour and serve as upmarket hotels and conference centres. The multicultural heritage of the region and its potential as a tourist product is now well realized and advertised within the regional strategy of tourism promotion, in clear contrast to the politically-motivated neglect of the German legacy during the 1945-1989 period. In addition, several non-governmental organizations have been established in the region, focusing their activity on nature conservation, cultural heritage preservation, and local development. A good example of NGO's activity is a complex project, which has been recently completed in Bukowiec. It was organised as students' training and focused on (1) the preservation of monuments and cultural landscape, (2) practise of conservation works, (3) realization of economic potential of monument and nature conservation in the region (Korzeń, 2006). One of the outputs of the project is the detailed inventory of natural and anthropogenic features, including maps, and the assessment of scenic values of the landscape.

At the same time, a research programme focused on granite geomorphology of the basin was launched, resulting in both the detailed inventory of granite landforms and the elucidation of many aspects of the geomorphic history (Czerwiński & Migoń, 1993; Migoń, 1993, 1996; Migoń & Dach, 1995). It has become evident that the geomorphological diversity of the Jelenia Góra Basin is considerable, comparable with many famous granite landscapes elsewhere, and that many locations with relatively easy access are not simply scenic points but may serve as educational geomorphological sites as well.

Nearing the end of the first decade of the 21st century, re-vitalization is largely restricted to the palace buildings themselves and their immediate surroundings, apparently because of huge costs involved and the intention to turn the residences into profitable establishments (hotels, restaurants etc.). The Jelenia Góra Basin is advertised as a «Land of Residences», or even, with a controversial dose of exaggeration, as the Silesian «Val de Loire», with little focus on the complementary natural values.

Nevertheless, there are independent efforts under way to promote and increase the visibility of natural, chiefly geomorphological phenomena. In 2005 an educational trail was opened in the central part of the Jelenia Góra Basin, near the village of Staniszów. The path first climbs the granite dome of Witosza, where special panels explain the origin of the dome, its adjustment to geological structure, and the factors behind the origin of caves and clefts on hillslopes (fig. 6a). The second part of the trail winds through the manor park, rich in monumental trees belonging to both local and exotic species such as *Quercus robur*, *Quercus rubra*, *Acer palmatum*, *Tsuga canadensis*, and *Pinus cembra* (Pielech & Zajac, 2005). At the same time, the unique, early 20th century geological cross-section of the West Sudetes in Jelenia Góra was restored (fig. 6b), although because of vegetation growth in the meantime it is no longer possible to have an unobstructed view of the

granite landscape of the Basin. In addition, brief descriptions of selected geomorphic phenomena such as granite tors, boulder clusters and cave-like features have appeared in tourist magazines.

On the downside, however, unforeseen threats to the integrity of the granite parklands have recently emerged. Development of private housing creates demand for open space, with easy access and good view over the countryside. Many gentle slope terrain units between residual granite hills have been divided into individual parcels, sold and subsequently built-up without respect to local architectural style. One of the side-effects of land division and building activity has been restricted access to geomorphologically interesting spots. A few parks have been partially closed to public. Defacing of rock outcrops, littering and vandalism are other emerging problems.

CONCLUSIONS

Our survey of parklands surrounding the noble estates in the intramontane basin of Jelenia Góra allows us to offer the following conclusions and recommendations.

1. The outstanding value of the group of the 19th century residences in the Jelenia Góra Basin derives from both their architectural and cultural significance, as well as from the values of the terrain, among which geomorphological diversity is the most important factor.
2. Weathering and long-term denudation of granite created a range of medium- and small-scale landforms, co-existing with each other over relatively compact areas, which has enabled the implementation of the concept of a Romantic parkland to its full extent.
3. The current challenge is to restore the parklands wherever possible and to preserve the cultural landscape of the area which suffers from poorly planned development.



FIG. 6 - Examples of geotourism promotion in the Jelenia Góra Basin. (a) educational trail on the Witosza inselberg, with a panel explaining the origin of rock caves; (b) recently renovated geological cross-section of the West Sudetes in Jelenia Góra.

4. An opportunity to use the granite parklands for educational purposes in Earth Science is worth further exploration, in addition to the initiatives already implemented.

Any further action towards the wider recognition of the heritage of the Jelenia Góra Basin would benefit from the inclusion of geomorphological assessment.

REFERENCES

- BORKOWSKA M. (1966) - *Petrografia masywu Karkonoszy*. Geologia Sude-tica, 2, 7-119.
- CLOOS H. (1925) - *Einführung in die tektonische Behandlung magmati-scher Erscheinungen (Granittekonik)*. I. Teil. Das Riesengebirge in Schlesien. Gebrüder Borntraeger, Berlin, 194 pp.
- CZERWIŃSKI J. & MIGOŃ P. (1993) - *Mikroformy wietrzenia granitów w masywie karkonosko-izerskim*. Czasopismo Geograficzne, 64, 265-284.
- HAMANN C. (1994) - *The role of geomorphological mapping in scenery appraisal*. Proceedings of the National Science Council, Part C, 4(2), 231-245.
- JAHN A. (1980) - *Main features of the Tertiary relief of the Sudetes Moun-tains*. Geographia Polonica, 43, 5-23.
- KAPALCZYŃSKI W. & NAPIERAŁA P. (2005) - *Zamki, pałace i dwory Kotliny Jeleniogórskiej*. Fundacja Doliny Pałaców i Ogrodów Kotliny Jele-niogórskiej, Wrocław, 160 pp.
- KAPLAN S. (1975) - *An informal model for the prediction of preference*. In: E.H. Zube, R.O. Brush, J.G. Fabos (Eds.), «Landscape Assessment: Values, Perceptions and Resources». Halsted Press, Stroudsburg, 118-129.
- KORZEŃ J. (2006) - *Ochrona dziedzictwa kulturowego w Kotlinie Jelenio-górskiej. Waloryzacja założenia w Bukowcu*. Zielony Region, 2/2006/34, 12 pp.
- ŁUCZYŃSKI R.M. (2000) - *Tropami śląskiego dziedzictwa*. Atut, Wrocław, 186-191, 207-211.
- MIGOŃ P. (1993) - *Kopułowe wzgórza granitowe w Kotlinie Jeleniogór-skiej*. Czasopismo Geograficzne, 64, 3-23.
- MIGOŃ P. (1996) - *Granite landscapes of the Sudetes Mountains - some problems of interpretation: a review*. Proceedings of the Geologists' Association, 107, 25-38.
- MIGOŃ P. (1997) - *The geologic control, origin and significance of insel-bergs in the Sudetes, NE Bohemian Massif, Central Europe*. Zeitschrift für Geomorphologie N. F., 41, 45-66.
- MIGOŃ P. (1999) - *Residual weathering mantles and their bearing on long-term landscape evolution of the Sudetes*. Zeitschrift für Geomorpho-logie N. F., Supplement-Band, 119, 71-90.
- MIGOŃ P. (2006) - *Granite Landscapes of the World*. Oxford University Press, Oxford, 384 pp.
- MIGOŃ P. & DACH W. (1995) - *Rillenkarren on granite outcrops, SW Po-land, age and significance*. Geografiska Annaler, 77A, 1-9.
- PIELECH R. & ZAJĄC K. (2005) - *Ścieżka przyrodnicza «Wzgórza Łom-nickie»*. Przewodnik turystyczny. Zachodniosudeckie Towarzystwo Przyrodnicze, Jelenia Góra, 36 pp.
- STAFFA M., MAZURSKI K.R., CZERWIŃSKI J., PISARSKI G. & POTOCKI J. (1999) - *Słownik geografii turystycznej Sudetów, t. 4. Kotlina Jele-niogórska*. Wydawnictwo I-Bis, Wrocław, 519 pp.
- SZMYTKIE R. (2005) - *Jaskinie granitowe w krajobrazie wzgórz wyspowych Kotliny Jeleniogórskiej*. Przyroda Sudetów, 8, 163-176.
- ZABYTKI SZTUKI W POLSCE. ŚLĄSK (2006) - *Krajowy Ośrodek Badań i Dokumentacji Zabytków*. Warszawa, 1193 pp.

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