



**WSPÓŁCZESNE PROBLEMY
ARCHITEKTURY KRAJOBRAZU**

III

Anna Podolska

**SANDSTONE IN THE LANDSCAPE
AND BUILDINGS
OF SELECTED DISTRICTS
IN THE LAND OF KŁODZKO**

Wrocław 2010



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Wrocław 2010

ISSN 1898-1151
ISBN 978-83-7717-035-9

WYDAWNICTWO UNIwersYTETU PRZYRODnicZEGO WE WROCLAWIU

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ul. Sopocka 23, 50-344 Wrocław, tel. 71 328-12-77
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Nakład 100 + 16 egz. Ark. wyd. 5,5. Ark. druk. 5,25
Druk i oprawa: F.P.H. „ELMA”

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1. INTRODUCTION

In numerous studies conducted on defining natural circumstances of human development always a lot of space is devoted to the development of the biotic realm of the natural environment. Elements of the abiotic environment are often skipped or pushed into the background or considered in relation to changes in the biotic environment. If ever, this topic is usually narrowed to climatic or hydrographic conditions, and only to a much lesser extent the interest includes eg. soil relations, and even less attention is paid to the lithological diversity of substrates, or the rocks themselves.

Researchers of the abiotic components of the natural environment pay too little attention to the rock and raw material considerations of the development of civilization, and yet in the history of mankind these mineral resources are the main element of economic development. The issue of mineral resources, also rock resources, includes exploration, estimation of quantity, extraction, processing and utilization. The methods and scope of these tasks varied at different stages of civilization development. Also nowadays the mineral resources are necessary for production of approximately 70% of industrial products. However, in the environmental studies and material culture of the human race little attention is devoted to the abiotic components. There are few studies devoted to the complexity of the geological structure of an inhabited area, mainly concerning the relationship between geological structure and ways of satisfying the basic human needs. Even more rarely are taken into account the results of such studies in a comprehensive understanding of the natural environment and human culture.

The area of Sudety and the Sudety Foothills, as reported by E. Trocka-Leszczczyńska¹, is an interesting field of research. This is due on the one hand to varied natural conditions and development factors that influenced, among others, the emergence of similar characteristics of rural development, and on the other hand to breaking with the tradition of building that was mainly caused by the total rural population exchange after 1945. Initially, the most intensively and most comprehensively developed area of Poland, in the postwar period it had been declining increasingly. There was an inhibiting economic development, and a lack of funding has led to an avalanche of devastation and the aging of the spatial structure of the countryside. An improvement resulted only in the 1970s, when an interest arose in the rural buildings of the area. But an uncontrolled and unplanned upgrades of rural complexes cannot be allowed. For a proper recovery and prevention of spatial chaos and decline of the local characteristics of the regional architecture is required knowledge of local tradition. In order to sustain it, research is necessary on the characteristics of rural settlements, housing and communities.

¹ Trocka-Leszczczyńska E., 1995: Wiejska zabudowa mieszkaniowa w regionie sudeckim, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław, s. 5.

1.1. The object and purpose of research

The studied issue is the effect of the indigenous rock – sandstone on the landscape and environment of the Land of Kłodzko, with particular emphasis on certain components of rural households. The main aim of the study was to determine the participation of local sandstone in the overall rural settlements development in relation to the use of other materials, and to determine its impact on the formation of regionalism in the area.

The author's research shows how broad and frequent has been the use of the native rock material on the studied area and how much it has contributed to the creation of regionalism on these lands that distinguishes those villages in relation to other parts of the country.

The end result of the study will include the determination of a color palette for the region that refers to the colors of local materials, and the guidelines for shaping rural areas in accordance with the maintenance of harmony and special order.

This work is devised to be of cognitive character. In essence, the current state of the countryside has been examined, therefore some statements and ideas can be used in country development planning.

1.2. Research Area

The specific research area is situated in the south-western part of Poland, in Lower Silesia, and embraces a large part of the Land of Kłodzko (Fig. 1)². Three districts have been investigated:

- Nowa Ruda,
- Radków,
- Szczytna.

The research was conducted in the years 2006–2008. For the test was taken the modern The contemporary network of settlements was taken for the study. The data collected relate to the present state, with elements preserved from the last century.

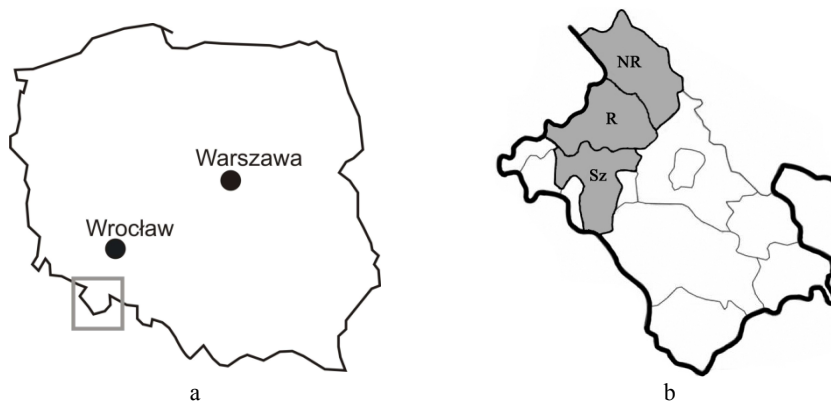


Fig. 1. Research area: a) location on the Polish map; b) studied municipality in the background of the Kłodzko district, where: NR – Nowa Ruda, R – Radków, Sz – Szczytna (own elaboration)

² Own elaboration.

1.3. The methods and scope of research

The studies are of analytical character, and have been made on the basis of direct and indirect inventory. All the work is carried out stage by stage, moving from basic research to specifics.

The studies on the historical transitions of rural settlements were conducted based on the methods used for historical research. They consisted, among others, in finding and selecting sources, comparing them and making inferences. These studies allowed us to provide the observed phenomena with a variety of cultural influences. A reference to these studies were field studies conducted by the author in selected villages of the Kłodzko Valley area. Direct field work, observations of both the whole settlement systems, as well as individual buildings made it possible to precisely analyze the materials used for construction and spatial solutions, which allowed us to define the characteristics of the existing settlements and buildings in rural areas. These studies, supported by photographic and drawing inventories of entire localities, individual homesteads or buildings, together with archival studies enabled us to represent the older and contemporary solutions to rural building.

The study was conducted by means of the settlement network, using the representative random sampling. Unit grouping is a unit of administrative division – the district.

The research is entered in three main parts that differ in thematic scope and detail.

Preliminary studies were conducted on three municipalities belonging to the districts: Kłodzko, Nowa Ruda, Radków and Szczytno, which together covered 40 localities (3 district towns and 37 villages). Then, 13 villages were studied in detail, which included:

- photographic documentation of 40 villages,
- inventory of approximately 270 rural households, for which catalog cards were made,
- petrographic, microscopic studies of 13 localities (including two preparations for the village of Wambierzyce – a sample from the kalwary and another one from the locality itself),
- soil studies of 13 villages.

Analysis of the impact of the native rock on the landscape of the Land of Kłodzko was made on the basis of own observations gathered during field visits and data available from literature. Rock fragments and soil samples gathered by the author during field works have been subjected to geological and soil science analysis. Petrographic studies involving microscopic observation, and then description of the preparations were carried out using a polarization microscope MIN-8. The preparations examined were made at the Institute of Geological Sciences PAN (Polish Academy of Sciences) in Wrocław. The aim of this research was to examine whether such a commonly used material is indeed a sandstone rock from the investigation area.

Soil science research was meant to show the dominant color in the open landscape and its modification dependent on the degree of moisture or desiccation. For this purpose, soil samples were taken using Kopecky cylinders, which then were subjected to observation, in the laboratory of the Institute of Soil Science of Wrocław University of Environmental and Life Sciences. The net result of this research was to compare the colors of the soil samples with those on the Munsell scale, which enabled to determine the dominant natural color.

1.4. Research Status

Rural settlement bodies are a vital element of the settlement network of the entire region, and entire country. Therefore, issues connected with them are the subject of numerous studies. There are also many studies of both general and specific character related to rural building and settlement in the Sudety region. Most of them, however, focus mainly on the types of rural development, construction solutions, etc. The present study differs from other approaches to the topic in that it addresses not only the influence of indigenous materials on the shape and character of development but also their relationship to the open landscape

Nowadays, there is a risk to natural values in the human environment, which results in Poland not from a lack of knowledge or experience on proper organization of cultural systems, but from the lack of legal power and principles in this country that would enable a consistent implementation of systemic solutions and insure security for cultural values³.

1.4.1. Discussion of literature

The pioneers among researchers of regional rural architecture were, in the first half of the twentieth century, G. Ciolek⁴ and, after the Second World War, I. Tłoczek⁵. They distinguished architectural regions, characterized by the use of local building materials, homogeneous color and ornamentation of the interior layout and a good, solid shape of the building and construction. Each region has its individual style, is easily recognizable and original, and the use of local materials contributes to the overall spatial order.

Research on rural building in the area of Sudety had already been conducted in the nineteenth century, both general and specific. The scope of those studies included among others identification of the types of rural developments and their location on the areas belonging then to Germany⁶, as well as describing the development of buildings of particular places, and its construction solutions⁷. The successive, post-war, German elaborations included descriptions of the construction and building materials⁸, while the Polish ones were very concise and did not treat the whole issue of rural building in the Sudety region⁹. A more detailed research on rural housing the Sudety region was conducted in the postwar period in the Department of Rural Building Design of the Institute

³ Novák Z., 1997: Planowanie regionalne i udział w nim architekta. Wyd. III. Wydaw. Politach. Krakowskiej, Kraków, s. 31.

⁴ Ciolek G., 1981: Regionalizm w budownictwie wiejskim w Polsce, Monografia 24, Politechnika Krakowska, Kraków.

⁵ Tłoczek I., 1985: Dom mieszkalny na polskiej wsi, Państwowe Wydawnictwo Naukowe, Warszawa.

⁶ Inter alia: Meitzen A., 1882: Das deutsche Haus In seinem Volksthümlichen Formen, Berlin, Verhandlungen des 1. Deutschen Geographentages, Dietrich Reiner; Meitzen A., 1863: Urkunden schlesischer Dörfer, w: Codex Dipl. Silesiae, t. 4, Breslau, Josef Max & Komp.

⁷ Inter alia: Heinke A., 1941: Die Grafschaft Glatz, Breslau, Ostdeutsche Verlagsanstalt.

⁸ Inter alia: Löwe L., 1969: Schlesische Holzbauten, Düsseldorf, Werner.

⁹ Inter alia: Bachmiński J., 1979: Drewniane budownictwo ludowe na ziemi Śląskiej, rozprawa doktorska (maszynopis), Raport Inst. Hist. Arch. Szt. i Tech. PWR, nr P-43/80, Wrocław; Lew S., 1964: Rozplanowanie wnętrza chałupy chłopskiej na obszarze Dolnego Śląska, Prace i materiały etnograficzne, t. 23, Wrocław.

of Architecture and Urban Planning, Wrocław¹⁰ University of Technology,. This work involved an analysis of regional characteristics of rural building with regard to construction, material and architecture; and also determination of proper conduct of repair work and modernization, and charting future directions in designing of new buildings. Similar problems were also dealt with by other scientific institutions, among others the Institute of Agricultural Construction, Agricultural University in Wrocław¹¹.

The former publications were mainly concerned with the construction aspects of building. Though the focus was on regional traits of rural building, they were mostly structural and architectural elements. No notice was taken of the impact of local colors, imparted by the use of indigenous building materials that created the regional character.

The issue of colors was dealt with in the 20s and 30s of the 20th century, mainly by the colorist painters. In the 1960s a Polish atlas of colors started to develop. However, due to the difficult political and economic situation the color issue was removed for a long time into the background. Therefore, there were but a few Polish studies on color in the architecture.

A completely different approach than that in Poland to the color issue can be noticed in other countries. J. Tarajko¹² reported that in many countries there are strict legal rules to ensure visual harmony between the surrounding landscape and architecture, both designed and erected. Such a law exists, e.g. in Austria, Germany and Switzerland, where the rules allow some differentiation in proportions of the materials used but within the same basic principle (eg, wood should constitute at least 30% of the material in the white facade of a wall). Individuality in the selection of color detail is permitted, but visually they must match the whole complex.

E. Bendin¹³, B. Lamprecht¹⁴ and C. Pohl¹⁵ with the team, and also K. Gatz¹⁶, in their publications show the western approach to the use of colors. In the world the use of color in architecture is strictly controlled, and each offense subjected to legal prosecution. Not only the color palettes are determined but also color bases. In addition, color coordinating activities are also conducted to counteract the unmatched use of building materials and, where necessary, to systematize the selected colors.

¹⁰ Inter alia: Biesiekierski T., Bocheński S., Trocka E., Wiatrzyk S., 1985: Architektura regionalna wsi Dolnośląskiego Pasma Sudetów, [w:] Architektura nr 3, s. 38–40; Biesiekierski T., Bocheński S., Trocka E., Wiatrzyk S., Będkowski S., Weber E., 1982: Elementy i detale architektoniczne budowli regionu Dolnośląskiego Pasma Sudetów. (maszynopis), raport Inst. Arch. i Urb. PWr, Wrocław.

¹¹ Inter alia: Staffa M., Janczak J., Mazurski K., Zając C., Czerwiński J., 1992: Słownik geografii turystycznej Sudetów, nr 13, Wydawnictwo PTTK Kraj, Warszawa – Kraków; Staffa M., Janczak J., Mazurski K., Zając C., Czerwiński J., 1994. Słownik geografii turystycznej Sudetów, nr 15. Wyd. I-BIS, Wrocław.

¹² Tarajko-Kowalska J., Kowalski P.: Kształtowanie harmonii wizualnej między krajobrazem a architekturą w oparciu o kolor, [w:] Czasopismo Techniczne Architektura, Z. 10, z. 5-A/2007, Wydaw. Politechnika Krakowska, s. 99–101.

¹³ Bendin E., Mehnert A., Mehnert F.: Sächsisches Land-Farbenbuch, Freistaat Sachsen.

¹⁴ Lamprecht B., Manske K., 2004: Bauen im ländlichen Raum. Besser Aufklären als Verbieten. Region Ostthüringen. Zentrum für Thüringer Landeskultur e.V.

¹⁵ Pohl C. and the team, 1998: Bauliches Gestalten und Wohnen im Erzgebirge. Das Wohnhaus im ländlichen Raum. Dorfentwicklungsverein Steinbach e.V.

¹⁶ Gatz K., 1961: Color in architecture, Reinhold Publishing Corporation, N.Y.

In Poland also publications appeared on color in the rural architecture, those by G. Balińska¹⁷, E. Trocka-Leszczynska¹⁸ i S. Wróblewski¹⁹. But they are only short articles in the journal Architectus. These publications relate mainly to the impact of regional materials and building traditions on the color and texture of the development of Polish rural areas, but most cases it is the color of the obligation and applies to historical buildings. Only S. Wroblewski raises the problem of the use of native rock material and its impact on the color of local buildings in the Polish Jura.

¹⁷ Balińska G.: Wpływ materiału regionalnego i tradycji budowlanych na kolor i fakturę zabudowy wsi polskiej, [w:] Architectus, nr 1 (7) 2000, s. 133–136.

¹⁸ Trocka-Leszczynska E.: Kolor w architekturze wiejskiej obszaru Sudetów, [in:] Architectus, nr 1 (7) 2000, s. 143–161.

¹⁹ Wróblewski S.: Kolor i faktura w budownictwie wiejskim regionu Jury Krakowsko-Częstochowskiej, [w:] Architectus, nr 1 (7) 2000, s. 137–141.

2. LANDSCAPE

The concept of landscape one intuitively associates with the complex but perceived as a separate-entirety image, which in addition to the terrain features, nature, traces of human existence consists of the items perceived by the senses, that altogether affect the overall landscape impression (Phot. 1).



Phot. 1. Rural landscape (photo author)

The concept of landscape, depending on the kind of science, is variously defined. In the biological and geographical sciences the landscape is treated as a concept of nature, whereas in town and country planning it is a set of external, visual characteristics. In general, landscape can be defined as the external manifestation of the environment²⁰. According to Borcz and Z. Pogodziński²¹, landscape can be described as the physiognomy of a naturally limited area of the earth and a perceived synthesis of natural elements and human activity. The landscape is not only the unrestricted whole but also individual views, small interior spaces forming special entities that reflect the sense of space, of form and color, and express understanding of nature through spiritual contents. When analyzing landscape, all the above mentioned elements should be included.

²⁰ Borcz Z., 1999: Krajobraz nizinnych wsi dolnośląskich, Wydaw. Akademii Rolniczej we Wrocławiu, s. 9.

²¹ Borcz Z., Pogodziński Z., 1994: Woda w krajobrazie wiejskim. Zagrożenia i ochrona. Zeszyty Naukowe Akademii Rolniczej we Wrocławiu, Monografie IV, s. 7.

In Germany the term *landschaft* has been in use at least since the tenth century. *Landschaft* in German – landscape, image, that represents both the literal view of nature as well as its ideal images, meant to trigger definite feelings or behavior. Initially, the term was used in the sense of an area and later to determine also its content²². A new meaning of the word, as the view presented by painters emerged in the heyday of the Flemish art at the turn of the fifteenth / sixteenth century. In the seventeenth century, the term landscape (English: the image of the earth) became widespread in Britain. It was used in a broader sense: including physiognomy, or the appearance of the earth's surface, both in terms of the visible environment and in the territorial sense. To the Polish language the word landscape was brought by Joachim Lelewel in the nineteenth century. He described twelve different landscapes as twelve different images of the country²³.

Richling and Solon²⁴ distinguished the following features of the landscape:

- Landscape – a section of space, which can be represented on a map;
- It is characterized by a definite physiognomy, which can be represented by a photograph or drawing;
- It is a dynamic system, dependent on the choice of its components, the links between them and the type of dominant processes;
- It has its own story, and is evolving in time;
- Man as an element of the landscape is changing it continuously. Even, where there is a sporadic anthropogenic influence, it is visible in the landscape.

Four types of landscapes can be distinguished, depending on the changes made by man:

- virgin landscape,
- natural landscape,
- cultured landscape,
- devastated landscape (degraded).

Virgin landscape has the ability for self-regulation, it is characterized by biological equilibrium that has not yet been affected by human activity. Nowadays, this type of landscape is almost nonexistent.

Natural landscape, also retains the characteristics of self-regulation, and occurs in areas of human activity, though human interference is negligible there.

Cultured landscape has a shaken ability for self-regulation and hence it requires protection. This type of landscape is under the influence of intensive human economic activity. Cultured landscape, due to the retention of a certificate of the activity of its former residents, is somehow the sign of identity of a region. That type of landscape was created as a result of centuries of population impact on nature and transforming it in harmony with environmental conditions. Cultured landscape is subject to constant change. The passage of time, the natural processes occurring in nature and the economic activity heavily impact all of its components.

The type of landscape in which the degree of human interference is not so aggressive and natural elements appear its components is called the natural cultured landscape.

²² Szymski A., Dawidowski R., 2006: *Architektura krajobrazu. Tom 1. Podstawy kompozycji*, Wydaw. Walkowska, Szczecin, s. 7.

²³ Kopczyński K., Skoczyła J., 2008: *Krajobraz przyrodniczy i kulturowy. Próba ujęcia interdyscyplinarnego*. Wyd. Nauk. UAM, Poznań, s. 9–10.

²⁴ Richling A., Solon J., 1994: *Ekologia krajobrazu*. PWN, Warszawa.

Human activity in this type of landscape should most of all move in the direction of conservation and exposing its natural elements in the existing forms and harmoniously integrating them with the newly created objects.

Devastated landscape occurs in areas of increased intensity of urbanization and industry. Due to a significant destruction of the natural system, it requires complex rehabilitation work.

Rural landscape (Phot. 2), according to *The countryside development planning*²⁵, is an area whose external features were shaped by the indigenous land use (which is still dominating), expressed in the forms of settlement, agrarian structure, land and plant cultivation. The establishment of rural settlement is inextricably associated with running a sedentary lifestyle, which allows agricultural production. Rural settlement was established in the course of centuries as a result of complex social, political and economic processes. According to M. Wiśniewska²⁶, the natural factors were the main force modeling the spatial layouts of settlements, such as terrain relief, climate, soil and water relations, and forestation.



Phot. 2. Village Bożków in municipality Nowa Ruda (photo author)

The rural landscape is an important component of material culture. Unfortunately, the traditional rural landscape in its original form almost no longer exists.

The term agricultural landscape comes from the German *Landwirtschaftslandschaft*. In the geography of agriculture has developed a separate landscape direction of geography and agricultural research, which aims to study agriculture as a whole, including different types of landscape²⁷. The advantage of the Polish countryside is its high degree of integration with nature, but in the face of the advancing too fast urbanization and uncontrolled activities the green areas are becoming rare. Therefore, the still preserved natural potential should be absolutely protected.

²⁵ Zaniwska H., Pawła-Zawczykraj A., Gloza-Musiał H., 2000: Zagospodarowanie przestrzenne i zabudowa wsi, SGGW, Warszawa, s. 92.

²⁶ Wiśniewska M., 1999: Osadnictwo wiejskie, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa, s. 5.

²⁷ Jaszczak A., 2006: Ochrona przyrodniczych i kulturowych wartości krajobrazu rolniczego. Krajobraz kształtowany przez kulturę rolną, pod red. Młynarczyka K., Olsztyn, s. 33.

The top place in the anthropogenic system has the man as a creator of his environment. The factors associated with its existence, i.e., politics, religion, economics, affect the internal relations of the system and its surroundings is the constantly transforming natural environment.

The problem of degradation of the open areas and rural areas has long been recognized. This is apparent, among others, in the existing legislation²⁸. It is necessary, however, as noted by E. Trzaskowska and K. Sobczak²⁹, to introduce protection for specific panoramas and views for specific districts of nationwide importance, or to emphasize the local advantages, since it is the beautiful view that constitutes the heritage and cultural benefit.

Every system of rural landscape through the general panoramic and partial views will have its characteristic face that makes it unique. It. Because it is the well-designed landscape interiors are the basic units of aesthetic experiences in the rural environment. As noted by M. Kadelska³⁰, we can perceive landscape just like a work of art. Thanks to the beautiful composition, both the values may have high aesthetic value. Man, apart from the archetypes of space, feels a strong need for a sense of beauty and harmony. Therefore, it is important to care for preservation of aesthetic elements that shape the space. W. Osikowska and J. Przetacznik³¹ on the basis of surveys point out that among planners, architects and landscape architects there is a feeling that it is precisely those social groups that fulfill their duty towards the public by maintaining the order and spatial harmony.

Since the dawn of sedentary life humanity was characterized by a great feeling of the surrounding space. Through numerous observations of environmental features the man acquired the ability to use space, becoming a factor in its intentional planning.

To emphasize the relation between man, the buildings and space in which he operates, in the 1960s arose the architectural psychology. It forms part of a broader discipline the environmental psychology and deals with the organized and created by man architectural environment, ranging from a small to a large-scale³². An important concept in the psychology of architecture is the *genius loci* – the spirit of the place. According to Lenartowicz,³³ *"it is a set of properties that endow a specific part of the human environment the place-with individual and unique quality. Genius loci is a living ecological relationship between the observer and the environment, person and place. In other words : the identity attribute of identity of a place that includes the topography, appearance, economic functions, social activities and the particular importance derived from past events and the current situation. Genius loci may survive despite the profound*

²⁸ Ustawa Prawo Ochrony Środowiska, Ustawa o ochronie dóbr kultury i o muzeach, Ustawa o planowaniu i zagospodarowaniu przestrzennym.

²⁹ Trzaskowska E. i Sobczak K., 2006: O konieczności ochrony panoram i widoków na przykładzie gminy Wólka. Krajobraz kształtowany przez kulturę rolną, pod red. Młynarczyka K., Olsztyn, s. 152.

³⁰ Kadelska M., 2006: Odbiór i prawidłowe formowanie krajobrazu. Krajobraz kształtowany przez kulturę rolną, pod red. Młynarczyka K., Olsztyn, s. 179.

³¹ Osikowska W., Przetacznik J., 2007: Problemy percepcji i oceny wartości krajobrazowych, [w:] Czasopismo Techniczne Architektura, Z. 10, z. 5-A/2007, Wydaw. Politechnika Krakowska, s.155.

³² Gądecki J., 2005: Architektura i tożsamość. Rzecz o antropologii architektury, Wydaw. Rolwski, Nowa Wieś, s. 18–32.

³³ Lenartowicz J. K., 2005: Słownik psychologii architektury, Wydaw. Politach. Krakowskiej, Kraków, s. 31–32.

changes in the basic ingredients of the place identity". As noted by A. Mitkowska³⁴, the place tradition gives us the possibility of creating landscapes in a wide range of their original and at the same time regional forms. A. Górka³⁵ defines tradition as a kind of heritage, "...because it is tended to be associated with the places where important events took place, it is a permanent existence in the past and present". A way of building which is close to the nature of space and nature itself allows creating works of timeless beauty. E. Cisek³⁶ compares a harmonious architectural form to an open book, since it is just the characteristic features inherent in your environment that make the place becomes visible and original.

An important concept is also the visual durability of landscape, which is its ability to integrate new elements or changes without detriment to its values and integrity³⁷. For the first time the visual durability of landscape appeared in the literature about 30 years ago in an article by P. Jacobs and D. Way³⁸. Its usefulness is noticeable, e.g., in town and country planning and implementation of impact assessments for new investments on the environment. The activities of an architect, planner or urban planner formerly boiled down to two interrelated trends: striving for balance and creation of links between a community³⁹. Today, this phenomenon is quite rare and is increasingly disappearing. Nowadays, the individualism is sought, which is due to economic, cultural and psychological conditions, this often resulting in the building development being not integrated with the environment. Yet, as rightly observed by A. Mitkowska⁴⁰, to preserve the tradition of the place, buildings must maintain its regional character as components of the local composed landscape. An important feature of the spatial order is thus giving common features to objects adjacent to each other. As noted by M. Petelenz⁴¹, the main tool for integrating a development with the environment is the building material and the color it has. A help in its enforcement may be the law on country management and planning⁴², which requires "*the formation of spatial structure in accordance with the principles of spatial order, (...) and the used materials should be of high technical and aesthetic level*".

Man from the dawn of history was the driving force in landscape modeling, so that the landscape in its current form is the result of long-term development. However, the character of a landscape is only its momentary shape and does not constitute the final

³⁴ Mitkowska A., 2007: Tradycja miejsca i jej regionalizm w nauczaniu krajobrazowym, [w:] Czasopismo Techniczne Architektura, Z. 10, z. 5-A/2007, Wyd. Politechnika Krakowska, s. 229.

³⁵ Górka A., 2007: Powrót na wieś? Tradycja, nowoczesność, odnowiona tradycja, [w:] Czasopismo Techniczne Architektura, Z. 10, z. 5-A/2007, Wyd. Politechnika Krakowska, s. 135.

³⁶ Cisek E.: Równowaga i harmonia jako piękno współczesnej architektury Norwegii, [w:] Czasopismo Techniczne Architektura Z. 13, z. 6-A, Politechnika Krakowska, s. 198.

³⁷ Rygiel P., 2007: Odporność wizualna krajobrazu – zastosowanie w planowaniu przestrzennym, [w:] Czasopismo Techniczne Architektura, Z. 10, z. 5-A/2007, Wyd. Politechnika Krakowska, s. 257.

³⁸ Jacobs J., Way D., 1969: How much development can landscape absorb?, Landscape Architecture No. 58, p. 70–72.

³⁹ Kwiatkowski K.: Pomiedzy indywidualizmem a imperatywem życia we wspólnocie. Dylematy społeczne współczesnej architektury, [w:] Czasopismo Techniczne Architektura, z. 2-A/2007, Wyd. Politechnika Krakowska, s. 149-152.

⁴⁰ Mitkowska A., 2007: Typowe materiały i technologie budowlane w kreowaniu autentyczności formy tradycyjnego prowincjonalnego domu (na przykładzie Lanckorony), [w:] Czasopismo Techniczne Architektura, z. 4-A/2007, Wyd. Politechnika Krakowska, s. 231.

⁴¹ Petelenz M.: Integracja przestrzenna zespołów zabudowy – działania formalne i praktyka, [w:] Czasopismo Techniczne Architektura, z. 1-A/2007, Politechnika Krakowska, s. 140.

⁴² Ustawa z dnia 27.03.2003, Dz.U. 03.80.717.

image, which is subject to change and in subsequent periods receives new forms. Man, ever more conscious, had ever more different way of perceiving the world and different hierarchy of values. With the passage of time also changed its behavior in relation to nature. As noted by U. Myga-Piątek⁴³ after other researchers, three stages of landscape transformations that were influenced by man are distinguished, the stage of pre-agrarian society, the stage of agrarian society and the stage of industrial society. These milestones have helped to transform the natural landscape in the cultured landscape.

In the geographical studies there were many definitions of cultured landscape. For the first time this concept has been defined in Germany at the turn of the nineteenth and twentieth century. The landscape was then treated as a sector of the anthropogenic and material environment. As a new field the cultured landscape has become a trend in which the main idea was to investigate the development of landscape, where nature was the starting backdrop for human activity.

In the 1920s in Germany a further definition arose that characterized the cultured landscape and represented its physiognomical expression of culture, since it was thought that the spiritual contents create the landscape as a whole. Finally, research on the landscape led to its symbolism. In subsequent periods appeared concepts which treat the landscape as a result of processes. A revival of landscape studies was the work by C. Sauer, which referring to German practice of the turn of the 19th and 20th century treated the landscape as a visual creation with the characteristic relationships between the natural and cultural elements. An innovative approach to this type of landscape had de la Blache who believed that the cultured landscape was the result of the relationship between man and environment. The landscape contains information about how different groups interpret, evaluate and exploit their environment⁴⁴.

Research on the cultured landscape was conducted by various schools from around the world. According to the American school of landscape, which alluded to the wording of the German school, the landscape was compared to the region in which on one level interacted with each other natural and cultural elements, which testified to the long-term human presence on earth. Researchers announced that landscape is the result of complex interactions between the human community of certain values and opportunities and definite environmental conditions. In every historical period the mankind makes a mark of its existence, leaving in the landscape a picture of his time, which reflects its adaptation to the environment. According to the French school, represented by Paul Vidal de la Blache, landscape was the result of culture and history, which determines how people lived and what was their relationship with nature. The Polish school of landscape continued the idea of la Blache. It was represented among others by: M. Dobrowolska, L. Krzywicki, K. Potkański. Maria Dobrowolska (*fide* J. Plit⁴⁵) has elaborated a group of factors shaping the cultured landscape. These include:

⁴³ Myga-Piątek U., 2005: Krajobraz kulturowy w badaniach geograficznych. Krajobraz kulturowy. Aspekty teoretyczne i metodologiczne. Prace Komisji Krajobrazu Kulturowego PTG, 4, Sosnowiec, s. 42.

⁴⁴ Rembowska K., 2002: Kultura w tradycji i we współczesnych nurtach badań geograficznych. Wyd. Uniwersytetu Łódzkiego, Łódź, s. 85–87.

⁴⁵ Plit J., 2005: Wciąż aktualne spostrzeżenia Marii Dobrowolskiej na temat krajobrazu kulturowego i jego przemian, [w:] U. Myga-Piątek (red.), Krajobraz kulturowy. Aspekty teoretyczne i metodologiczne, Prace Komisji Krajobrazu Kulturowego PTG, 4, s. 32–39.

- geographical conditions, which determine the location of cultures,
- biological and psychological factors – adaptability of social groups to environment,
- economic and cultural factors,
- political factor.

The cultured landscape is shaped under the influence of interaction of processes and phenomena occurring in the two environments: anthropogenic and natural. The anthropogenic factor is necessary because it is since its appearance in the original landscape that one can talk about creating a cultured landscape. This factor includes the effect of activities of different cultural groups and the overlap of cultural elements of different centuries. The anthropization of landscape depends on the strength of the interaction. It can be weakly or strongly transformed, depending on the human activity, and should reflect the principles of sustainable and balanced development and achievement of spatial order. Not always, however, human activity is thoughtful. Sometimes human interference in the environment is random and can lead to a chaotic development that leads to disruption of the entire system.

The cultured landscape is a comprehensive reflection of natural phenomena and processes associated with human activities. It was formed during the development of civilization by the ever more new creations of human hands, which when saturated with spiritual contents acquired specific characteristics that gave separateness and uniqueness to a site. It is the visual form of a place changing in time that gives us a complex knowledge of the genesis and evolution of the space that surrounds us. This natural – cultural structure provides us with a comprehensive knowledge of the genesis and evolution of the surrounding area. It is an image of a space that undergoes continuous evolution and of human activity in a geographical environment. Starting from the initial integration of the human being with the environment, through his identification with nature, till the introduction of conscious products of his thought.

2.1. Factors affecting the landscape

The location of Poland has a very strategic importance, which is reflected in many areas. It is the site of important boundaries, e.g. ethnic, anthropogenic, climatic; the boundaries of occurrence of certain plants and animals, and the Tornquist-Teisseyre line (the name comes from the names of two geologists who discovered and described it) which is a ridge that separates the European from the Asian landmass. According to Wikipedia⁴⁶ this is a tectonic zone of a width of approximately 100 km consisting of a series of parallel ridges and deep splits separating three large European structural units. It stretches from the Jutland Peninsula to the Black Sea coast, on the Polish territory it extends from Kołobrzeg to Przemyśl.

The effect of the Polish location is reflected, among others, in the settlement and construction developments, and manifests itself in different types of structures, materials, plans and layouts of buildings in different areas of the country. There are also some areas where their ranges are mutually intertwined, thus creating mixed zones.

⁴⁶ Encyclopedia Wikipedia: http://pl.wikipedia.org/wiki/Strefa_T-T.

The landscape is affected by all the natural factors: relief, soils, waters, vegetation and man-made elements: buildings and technical installations. As a result of human activity, the landscape is constantly changing, areas with natural character are converted, urbanized and industrialized.

The changing landscape also affects the external image of the village. This is reflected in the choice of material and construction of buildings and their incorporation into the landscape.

To build their homes, people above all use local material, the most available and widespread in the neighborhood, including: wood, clay and stone. "*Building material is the element which very strongly impresses in the landscape and it is one of the basic materials of regional differences*"⁴⁷. The use of appropriate building materials depends on the geographical distribution of forests, clay and stone deposits.

A secondary factor that decides to use a particular material is also the cultural and economic possibilities of man: the degree of wealth, means of transportation and mentality prevailing in the area of the country, i.e. tradition and custom.

Natural materials used in construction:

- The regions where the main material is wood are characterized by a high percentage of wooden buildings. The prevalence in this area of definite construction remains in simple proportion to the forest area. The main feature here is the dependence of a specific type of building to the material present in the region. It is possible, however, a modification of the used construction material caused by agents of civilization. It was proved, however, that the rural population that makes a living from agriculture often uses traditional materials and old forms used for centuries for building⁴⁸. Analyzing the old building of the Polish countryside, wood construction shows a huge advantage, that had increased significantly in the mid-nineteenth century.
- The use of clay in rural construction was generally twofold:
 - direct, with the construction of skeletal walls,
 - indirect, as a raw material for making bricks.

Import of wood is characteristic for these areas, and the presence of large quantities of natural deposits of clay. Clay as a building material usually occurs in treeless areas or without proper building wood materials.

- Brick is a building material made of burnt clay. The increase in its popularity and use in rural building was associated with greater affluence and easy transportation links with brickyards. On a larger scale the development of the brick building dates to the second half of the twentieth century, This was associated with an increase in living standards, the impact of re-emigrants and politics of the state.
- The universality of stone buildings depends mainly on the presence of this material in nature and on its technical value. This material is located mainly in the upland (indigenous fossil stone) and in the lowlands – boulders rocks, glacial.

⁴⁷ Ciołek. G., 1984: Regionalizm w budownictwie wiejskim w Polsce, Kraków, s. 110.

⁴⁸ Gorzuchowski S., Osiedla miejskie w Polsce i ich materiał budowlany w zależności od czynników przyrody. Warszawa 1936, s. 42.

In the Polish construction the use of stone as a homogenous material is not a common phenomenon. This is due mainly to the climatic conditions and the characteristic lack of insulation property against moisture and cold and the difficulty of treatment. The most common building material is limestone, sandstone and granite.

2.1.1. Stone as an architectural, construction and decorative material

A stone, PWN Encyclopedia⁴⁹, is a block or piece of rock or, as reported in a petrographic dictionary⁵⁰, a generic name of rock. In the geographical dictionary of the Polish Kingdom⁵¹ a stone refers to boulders, blocks and fragments of rock scattered abundantly over the whole surface of the Polish land. A rock is however a natural combination of minerals that arose in the geological or cosmological process. Rock and mineral in the geological sciences are the fundamental building blocks in the earth's crust. In everyday language the term stone is often used. An important difference is that the rock may be loose but the stone solid and hard⁵². And although the term rock is generally accepted by geologists, the name stone in combination with a qualifying adjective, is present in the terminology of many sciences: for example, in construction, or jewelry, in such designations as: building, decorative, or noble stone⁵³. In this paper the focus is mainly on building stones or rocks which are used in various fields of construction, architecture and sculpture, mainly in the form of blocks or cladding panels.

Stone is one of the basic and simultaneously the oldest of the mineral materials. Thanks to its properties, i.e. hardness, tensile strength and resistance, as well as ornamental advantages it was willingly used in construction and sculpture. From times immemorial stone buildings have undergone different stages of evolution, and with the development of civilization stone enjoyed a growing interest.

Rock material was the main construction material for construction of architectural objects – starting from the shelters of primitive man, through defensive structures and buildings, to tombs, temples and decorative and sculptural elements.

The stone has been used by mankind for centuries. Due to the difficulty of its treatment it often evoked awe, curiosity, or discouragement resulting from complications associated with the execution of the work. This material was considered very durable, almost indestructible⁵⁴. It became, by petroglyphs, the means to record important events for humanity, and also, by religion – the laws derived from God. However, some factors and processes, which originally led to emergence of the rocks, are also the cause of their destruction.

Natural stones are used in construction in the form of boulders or of rock fragments, which are obtained by manual or mechanical disjoining of rock massifs. They are subjected to treatment in order to impart the appropriate shapes. Depending on the technical characteristics of the stone material it is used in cubature, road and water building.

⁴⁹ Wielka encyklopedia powszechna 1965, PWN, Warszawa, s. 407.

⁵⁰ Ryka W., Maliszewska A., 1991: Słownik petrograficzny, Wydaw. Geologiczne, Warszawa, s. 160.

⁵¹ Słownik geograficzny Królestwa Polskiego, 1882, t. 3, s. 731.

⁵² Skoczylas J., 1999: Wstęp do geologii, Wydaw. Nauk UAM, Poznań, s. 131–135.

⁵³ Mizerski W., Sylwestrzak H., 2002, Słownik geologiczny. Wydaw. Nauk. PWN, Warszawa, s. 88.

⁵⁴ Kopczyński K., Skoczylas J., 2006: Kamień w religii, kulturze i sztuce, Wydaw. Naukowe UAM, Poznań, s. 132.

In the rural construction the largest application have found granites, hard sandstone and limestone, used mainly for the foundations of buildings. However, light sandstone and limestone and porphyry tuffs are used to erect the walls of buildings, in civil engineering the construction stones are used to erect bridge abutments, retaining walls, etc.⁵⁵ Stones were also used in construction of external elements of representative buildings and interior finishing. From the earliest times, in low rural buildings were used natural building materials, i.e., wood, natural stones, and also clay where the seamless walls were erected. Nowadays, there is an increasing popularity of ceramic products, which gradually are being replaced by concrete products.

Launched at the end of the eighteenth century, the industrial revolution in England only apparently weakened the role of stone in architecture. Although production halls and factories were erected in great numbers with less expensive materials, but also appeared new stone buildings of banks and stock exchange buildings.

Stone and buildings made from it still fascinate us, and although in our country prevails brick construction, in the general feeling the stone is more precious than the brick.

2.1.2. Types of stone material used in architecture and sculpture

Rock material has always been a valuable raw material for construction of various architectural objects. With the development of masonry it has become an indispensable element of decoration. This was reflected in religious and secular buildings, which played an important role in shaping the style and form in architecture.

The increase in demand for ever more attractive rock raw materials caused a bloom of masonry. Stone began to be used, not only as a construction but also decorative element. Of it were made, among others, portals, attics, columns, bas-reliefs and sculptures. The fashion to create architectural details of stone material demanded more and more exploration of raw rock materials with appropriate technical parameters that would give the planned facilities the desired elegance and durability.

The effects of lithological development are visual and aesthetic characteristics of stones. Depending on the period of origin and the method of manufacture they differ in texture, structure, color, mineral composition and physical properties which allow attainment of proper stone texture⁵⁶.

The most popular material for stone architecture and decoration are sandstones and limestones which represent the sedimentary rocks, granites, porphyries, basalts of magmatic origin and marbles and gneisses belonging to the metamorphic rocks.

2.1.2.1. Igneous rocks

These rocks belong to the least susceptible to destruction due to their low water absorption and compact structure. They undergo slow destruction due to weathering and rapid temperature changes and only in the surface region. This results in loosening the rock integrity, leading ultimately to granular disintegration. Resistance of these rocks, like all the others, depends on the mineral composition. Due to durable adoption of

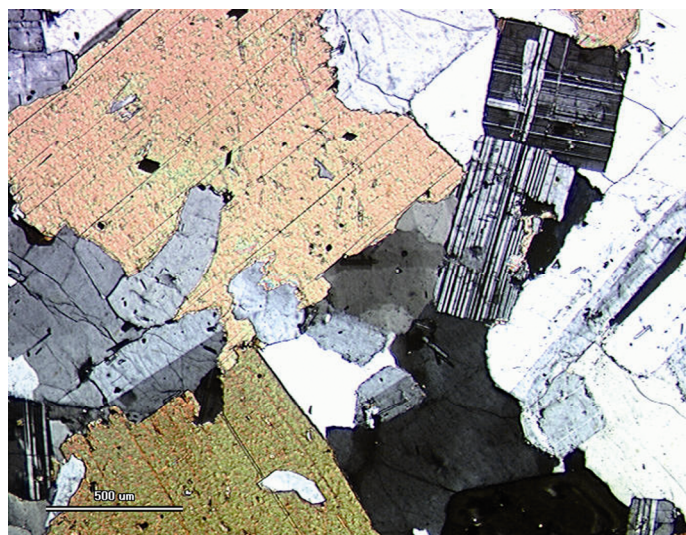
⁵⁵ Lenart J., 1993: *Budownictwo wiejskie*, SGGW, Warszawa, s. 122.

⁵⁶ Smoleńska A., Welc K.: *Walory dekoracyjne wybranych kamieni budowlanych*, Kamień architektoniczny i dekoracyjny. Materiały Konferencji Naukowej, Kraków AGH, 23–24 września 2003 r., s. 182.

polish, they also show resilience and a long-term resistance to external factors. The rocks are characterized by high decorative values, resulting from the differential tint of individual components, as well as texture and structure.

Granites

This is a group of rocks (Phot. 3)⁵⁷ that best satisfies the conditions imposed on the stone utilitarian and decorative materials. Owing to a homogeneous internal structure various techniques can be used in their cutting. Granites are mainly used in civil engineering, for production of cobblestones and curbs. They are also used as flooring, cladding, windowsills, and also for making monuments and gravestones.



Phot. 3. Microscopic picture of granite (photo M. Lorenc)

In Poland the granites are mined on an industrial scale. Particularly rich in this respect is the Lower Silesia region, where the rough stone is operated primarily from the foreland of Sudety and from the Sydety mountains.. Granite mining areas of major importance as a raw material is the massif Strzegom-Sobótka, areas around Strzelin and Niemcza and Szklarska Poręba.

2.1.2.2. Metamorphic rocks

They arise from the transformation of other older sedimentary, igneous and metamorphic rocks and the type of parent rock has an impact on their subsequent mechanical properties. Of the igneous rocks is forming the variety of ortho-, for example: orthogneisses, ortho-amphibolites, and of the sedimentary rocks, such as a variety of parafor example paragneisses. Metamorphic rocks are classified depending on the temperature and pressure ranges in which they arise.

⁵⁷ Lorenc M.W., 2004: Kamień – naturalny materiał budowlany i dekoracyjny. Acta Scientiarum Polonorum Architectura 3 (2), s. 55–68.

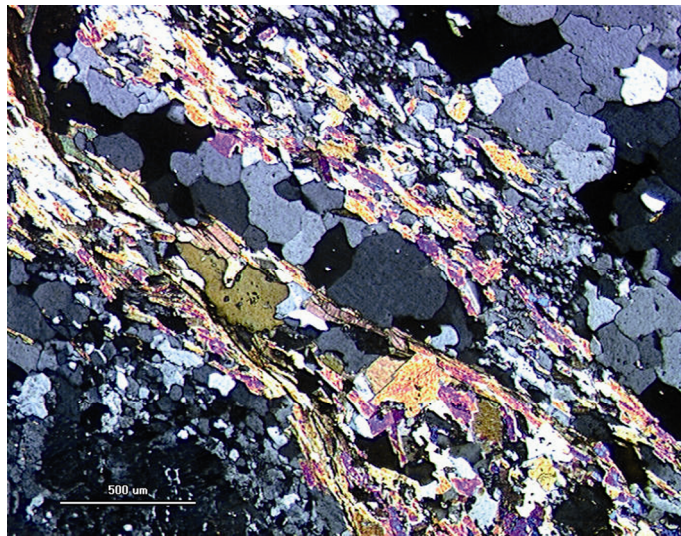
The most widely used stone material among the metamorphosed rocks, applicable for the needs of architecture, art and construction, are marbles and gneisses (Phot. 4, 5)⁵⁸.

Gneisses

They are the rocks of a specific, well – visible crystalline structure and more or less explicit ordering of mineral components, distinguished by their gneissic texture, which is conditioned by a singular arrangement of mineral grains or their aggregates⁵⁹.

The most magnificent gneiss deposits in Poland are located in Lower Silesia; however, despite the enormous resources their use is negligible. The stone is mined in many places but only for local construction needs. On a larger scale it is obtained only in two places: in the region of Doboszowice and by Lubań Śląski, as a byproduct of basalt mining.

The gneisses from the region Doboszowice are characterized by a clear directional texture and light gray color with a shade of pink. The good technical properties of this material make it suitable for the production of cobblestones, curbs, broken stone and crushed stone for underpinning⁶⁰.



Phot. 4. Microscopic picture of gneiss (photo M. Lorenc)

Marbles

Marbles, originally limestone or dolomitic rocks, which under the influence of pressure and temperature during crystallization process changed their mineral, structural and textural characteristics, and thus also the technological characteristics such as density,

⁵⁸ Lorenc M. W., 2004: Kamień – naturalny materiał budowlany i dekoracyjny. *Acta Scientiarum Polonorum Architectura* 3 (2), s. 55–68.

⁵⁹ Drozd J., Licznar M., Licznar S., Weber J., 1998: *Gleboznawstwo z elementami mineralogii i petrografii*. Wrocław: Wydawnictwo Akademii Rolniczej we Wrocławiu, s. 52.

⁶⁰ Lorenc M.W., Mazurek S., 2007: *Wykorzystać kamień*. JASA, Wrocław, s. 64.

hardness, resistance to weathering, susceptibility to polishing and sculpting, and color. With respect to the rock of which they were formed they can be classified as calcite and dolomitic marbles⁶¹.

Polish marbles are mined at two locations in Lower Silesia: in the Kłodzko Valley in the vicinity of Stronie Śląskie and in Eastern Sudety in the vicinity of Ślawnowice⁶².



Phot. 5. Microscopic picture of marble (photo M. Lorenc)

2.1.2.3. Sedimentary rocks

Sedimentary rocks are formed as a result of several successive processes, that have a significant impact on their type; namely, weathering, erosion, transport, sedimentation and diagenesis. Weathering processes take place in the subsurface of the earth's crust or on its surface and consist in grinding, transformation and dissolution of minerals and rocks. Two types of weathering can be distinguished: physical (mechanical) and chemical weathering. The first one leads to a weakening of the cohesion of rocks and minerals, causing cracking and crushing, without changing their chemical nature. The chemical weathering, however, causes significant changes in the composition of rocks and minerals. Numerous factors may cause the changes, such as water, atmospheric oxygen, carbon dioxide and chemical compounds produced by plants and animals.

The material released as a result of weathering, transported with the forces of nature in a convenient place, and then undergoes collection and deposition/ sedimentation due to gravity. The resulting sediment passes through the lengthy process of diagenesis, namely a transformation under the influence of various factors into a compact, hard rock. The process consists mainly in cementing the rock fragments by chemical substances which serve as binders or in sediment compaction caused of the pressure of the overlain sediments.

⁶¹ Dziedzic K., Kozłowski S., Bajerowicz A., Sawicki L., 1979: Surowce Mineralne Dolnego Śląska, Wrocław, PAN, s. 299.

⁶² Lorenc M. W., Mazurek S., 2007: Wykorzystać kamień. JASA, Wrocław, s. 66.

Among sedimentary rocks, with regard to their origin, mineral composition and structural features, there are three basic groups:

- clastic rocks. This is the most common type of sedimentary rocks, resulting from the accumulation of products of weathering of older rocks. They can be loose or compact, the latter cemented with a mineral substance called binder. Regardless of this division, clastic rocks are divided according to the structure, i.e. the dominant particle size. A group of clastic sedimentary rocks highly prevalent in construction engineering are sandstones.
- clay rocks. Clay rocks are a diverse group of sedimentary rocks. They consist of grains with a diameter of less than 0.01 mm. Their composition includes mostly the clay minerals, which include, among others, kaolinite, illite and montmorillonite. The most frequently encountered clay rocks are numerous variations of loams and clays, and shales.
- rocks of organic and chemical origin. To the rocks of chemical origin belong compositions resulting from the precipitation of various substances from solutions, while the organogenic rocks are formed due to accumulation of organic debris. Classification of many of these rocks, as purely organic or purely chemical rocks is very difficult, because they may contain organic substances and minerals, precipitated in the chemical way. These include for example, carbonate rocks, namely limestones and dolomites.

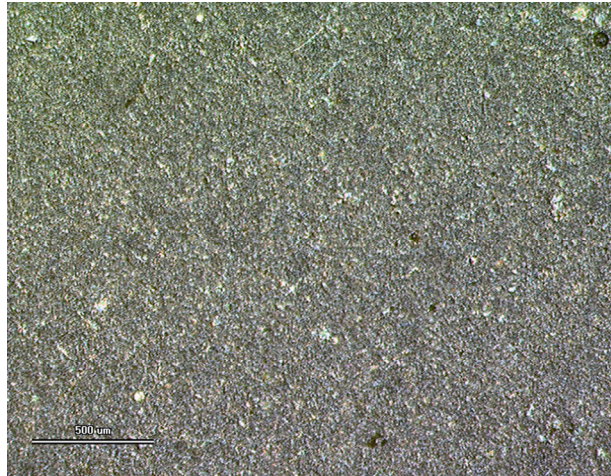
The main representatives of sedimentary rocks used most frequently in construction and sculpture are the limestones and sandstones. Their properties depend on the mineral composition and the structure and texture.

Limestones

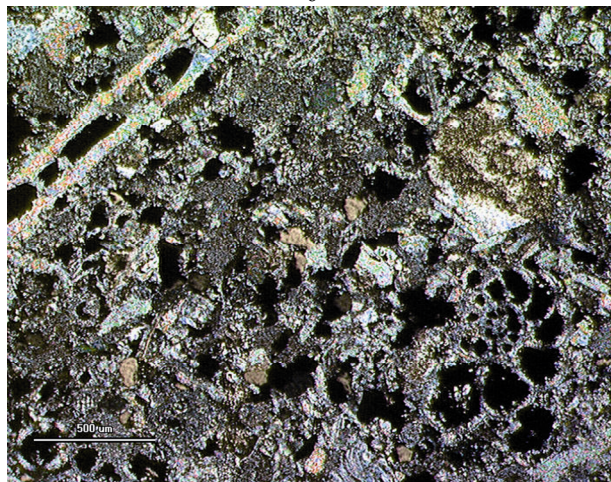
Limestones, like sandstones, belong to the sedimentary rocks which are the material of many historic buildings in Poland, mainly in eastern and southern Poland. The characteristic diversity of their structure is mainly due to: mostly remnants of animal organisms they contain, and also chemical, physical and geological processes causing their lithification and diagenesis.

Limestones are particularly vulnerable to water attack, and the harmful agents in the polluted atmosphere. Depending on the mineral composition, texture and structure, the resistance of limestones to these factors undergoes considerable changes. The most resistant to destruction are compact limestones, characterized by low porosity compact structure. High resistance is also characteristic for rock limestones that possess high hardness and low water absorption. The least resistant to the damaging factors are light limestones with high porosity and water absorption. The process of destruction of these rocks reveals itself as the occurrence of the surface layers or dulling. There may also appear small cracks, flaking, and then the stone material begins to gradually stratify and pour off, and as a result of changes of volume in the surface layers, bulge and strains are formed. Another characteristic symptom of the destruction of limestone is the so-called saccharification of the subsurface layers of a rock, and cracking into irregular fragments⁶³.

⁶³ Liber-Maziarz E., Teisseyre B., 2002: Mineralogia i petrografia, Oficyna Wydaw. Politechniki Wrocławskiej, s. 152–159.



6



7

Phot. 6, 7. Microscopic picture of limestone (from left: the chemical and organic origin)
(photo M. Lorenc)

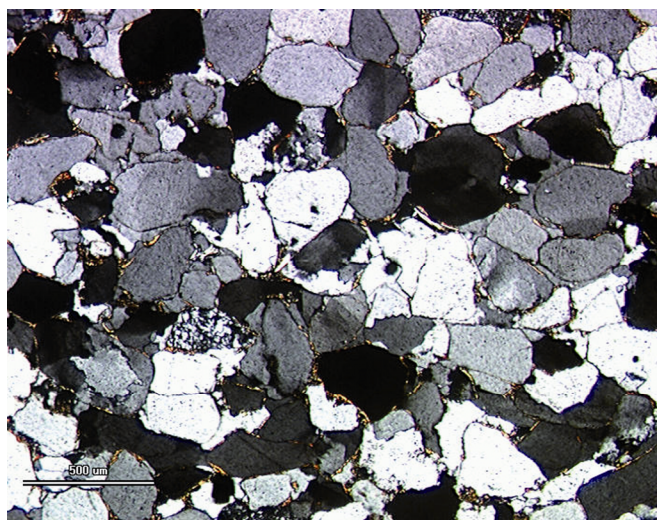
In trade, certain varieties of limestones are often mistakenly called "marbles", although with true marbles they do not have much in common. Real limestones in contrast to marbles are sedimentary rocks, of organic or chemical origin (Phot. 6, 7)⁶⁴ and are made of calcium carbonate. They do not have the crystal structure, as marbles have, and differ from them in appearance and physical properties. A common feature however is the chemical composition, since both the marbles and limestones are carbonate rocks, where calcite (CaCO_3) or dolomite ($\text{Ca}_4\text{Mg}(\text{CO}_3)_2$) are the dominant minerals.

⁶⁴ Lorenc M.W., 2004: Kamień – naturalny materiał budowlany i dekoracyjny. Acta Scientiarum Polonorum Architectura 3 (2), s. 55–68.

In Poland, limestone used in construction occur mainly in Góry Świętokrzyskie (The Holy Cross Mountains).

Sandstones

That stone was most commonly used for the construction of Polish monuments. The main reason for this is a significant amount of deposits of these rocks located in different parts of the country. Sandstones are characterized by a wide palette of colors, easy handling and, depending on the mineral composition, different resistance to weathering. They represent a large group of sedimentary rocks formed in different epochs and geological conditions. The greatest economic importance have sandstones from: Ordovician, Carboniferous, Triassic, Jurassic, Cretaceous and Tertiary⁶⁵. They are mined in three regions: Lower Silesian, Świętokrzyskie and Carpathian.



Phot. 8. Microscopic picture of sandstone (photo M. Lorenc)

Sandstones (Phot. 8.)⁶⁶ are built from fragments of rock held together by a binder. The most important fragments of rock are quartz, less often feldspar and micas. Depending on the size of the grains sandstones are classified as coarse-, medium- and fine-grained. Adhesive binding, called the binder, or cement, is a chemically precipitated mineral substance in the free spaces between fragments during diagenesis and lithification.

Most frequently, in the stone industry are used quartz sandstones with a silica binder. They are particularly resistant to physical, chemical and mechanical destructive processes. In the quartz sandstones with random texture destruction can be seen as a surface flaking and black layers, while in highly stratified varieties it is marked with an evident stratification.

⁶⁵ Jarmontowicz A., Krzywoblocka-Laurów R., Lehmann J., 1996: Piaskowce w zabytkowej architekturze i rzeźbie, Towarzystwo Opieki nad Zabytkami, Warszawa, s. 17.

⁶⁶ Lorenc M. W., 2004: Kamień – naturalny materiał budowlany i dekoracyjny. Acta Scientiarum Polonorum Architectura 3 (2), s. 55–68.

A very common building material of historic buildings, although characterized by lower resistance to destructive factors is sandstone with a limy binder. Its destruction occurs due to the impact of temperature differences and changes in the binder, and as a result of the chemical reaction of calcium carbonate with aggressive acids contained in certain atmospheric precipitation.

To stones with the lowest resistance to the damaging effects of water and the atmosphere belong sandstones with loamy binder. The cause of the low resistance is a significant swelling of binder under the influence of water, which also contributes to the low frost resistance of these stones. For this reason, these sandstones are very rarely applied to the external facade and decorations.

In sandstones the most frequent are mixed binders. Depending on the quantitative prevalence of one of the components, the type and quantity of the elements and structure and texture a stone has different properties.

Table 1. The relationship of color and mineralogical composition

Mineralogical composition	Color
<ul style="list-style-type: none"> • Hydrated limonite • Iron compounds 	Yellowish Blue-green, Gray-blue, red
<ul style="list-style-type: none"> • Opal or chalcedony binder with traces of bitumen substances • Glaukonit 	Dark gray Green

Depending on the mineral composition, the macroscopic characteristics of sandstones are changing, usually the color, which depends on the presence of iron compounds in them. The kinds of color of sandstones are shown in Table 1⁶⁷.

The names of sandstones are based on mineral composition, the mining place, e.g. Radkow? sandstone, and on the age of emergence, e.g. Jurassic sandstones.

The most important properties of sandstones are resistance to compressive strength, abrasion, porosity, water absorption, bulk density and frost resistance.

For commercial purposes the most important are nowadays sandstones of the Cretaceous age, occurring in Lower Silesia. In terms of technical features they are the best in Europe. These sandstones are characterized by ease of cutting, high strength, hardness, resistance to weather, as well as small wastes during the extraction of stone blocks.

The Polish sandstone is extracted on an industrial scale in the three regions: Lower Silesia, the Holy Cross Mountains and the Carpathians. Their varieties and application are shown in Table 2⁶⁸.

⁶⁷ Own elaboration on the basis: Jarmontowicz A., Krzywoblocka-Laurów R., Lehmann J., 1996: Piaskowce w zabytkowej architekturze i rzeźbie, Towarzystwo Opieki nad Zabytkami, Warszawa, s. 18.

⁶⁸ Own elaboration on the basis: Jarmontowicz A., Krzywoblocka-Laurów R., Lehmann J., 1996: Piaskowce w zabytkowej architekturze i rzeźbie, Towarzystwo Opieki nad Zabytkami, Warszawa, s. 18.

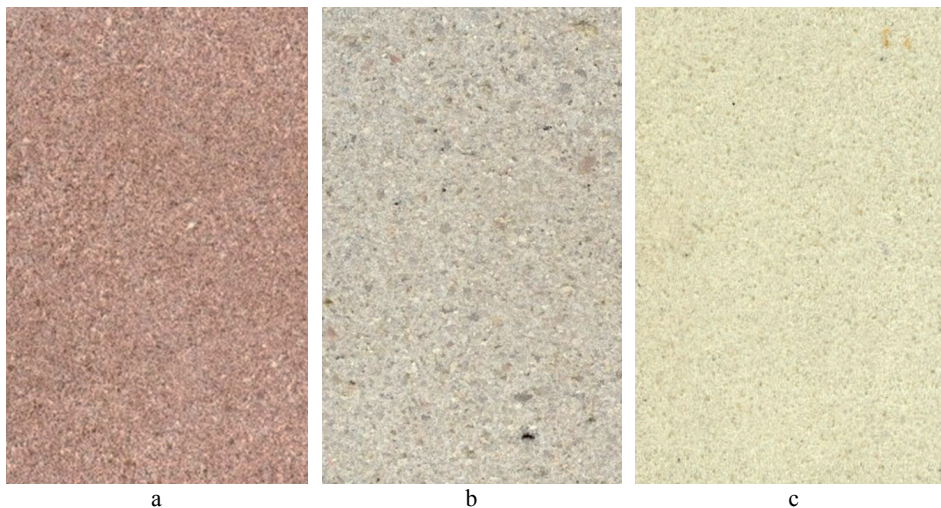
Table 2. Characteristics of sandstones of 3 main extraction regions in Poland

Region	Quarry	Common name	Color	Application	Construction
Lower Silesia	Czaple near Złotoryja	–	Light cream-colored, light gray, pale yellow. It is patinating in gray or dark gray with a shade of golden	– for sculptural work and in the construction industry – elements of small architecture – plate cladding	Medium-grained sandstones with the sub-content of varieties of fine-and coarse-grained sandstones with a silica-loam binder
	Rakowice Małe near Lwówek Śląski	–	Light gray, pale yellow, It is patinating in gray		Fine-grained sandstones with the small participation of medium-sized occasionally thick grains. Silica-loam binder
	Zbylów near Lwówek Śląski	–	Cream-colored, pale yellow with reddish yellow streaks It is patinating in gray or dark gray with a shade of yellow		Medium-grained sandstones with the sub-content of varieties of fine-and coarse-grained sandstones with a silica-loam binder
	Żerkowice near Lwówek Śląski	„Żerkowice”	Light gray, pale yellow, less often gray cream-colored and light pink. It is patinating in gray and light gray		Fine-grained sandstones involving medium-sized grains, a binder silica-clay
	Wartowice near Bolesławca	„Wartowice”	Light gray, pale yellow. It is patinating in gray brown		Fine-grained undergoing in places in medium-grained-coarse-grained sandstones with a silica-binder
	Nowa Ruda – Słupiec	„Ślązak”, „red sandstone of Silesia”	Red with a shade of dark cherry. It is patinating in dark red	– in sculpture and construction – plinths of buildings and retaining walls	Fine-grained undergoing in places in medium-grained-coarse-grained sandstones, with a o silica-loam-ferruginous-binder
	Radków	„Sandstone Radków”	Light gray with a shade of yellowish, pink or light brown; gray cream-colored. It is patinating weakly in gray brown	– for the manufacture of cladding and grinding discs	Coarse-, medium- to fine grained with the sub-content of varieties of fine-and -grained o with a silica-loam binder
	Szczytna Śląska	„Sandstone Szczytna”	Gray and yellowish sometimes with pink-reddish streaks. It is patinating weakly in gray brown	– acid- and fire resistant material	Layered, fine- and medium-grained, with a trace quantity of coarse grains. With a silica-loam binder, and partial only silica binder

Table 2. cont.

1	2	3	4	5	6
	Wolany near Polanica Zdrój	–	Light cream-colored, yellowish, gray yellowish, with a few grains of brown limonite. It is patinating in gray with a brown shade		medium-grained with the sub-contents of fine and coarse grains, with a silica binder with local admixture of loam or ferruginous substances
Holy Cross Mountains	Szydłowiec	–	White, light cream-colored. It is patinating in gray or dark gray	– in construction and sculpture – acid- and fire resistant material	Fine-grained with a silica binder with admixture of loam binder
	Sandstones from Kunów: Baranów, Rejów	–	Gray with a yellowish shade or yellow. It is patinating in dark gray with a brown violet shade	– production of plate cladding – acid- and fire resistant material	Fine-grained with sharp edges quartz grains and silica binder
	Kopulak, Tumlin, Sosnowica, Wąchock	„Włochy”, „Kopulak”, „Lisy”, „Tumlin”	Red, dark cherry		Fine- and medium-grained with a silica-loam binder with a admixture of ferruginous binder
Carpathian Mountains	Barcice near Nowy Sącz	–	Gray, Gray blue with a olive shade. It is patinating in reddish-yellowish or red gray		Fine-grained with a loam- calcareous binder
	Dąbrowa near Nowy Sącz	–	Light gray		Fine-grained with a calcareous- loam binder with a admixture of fine small plaques of mica
	Brenna	„Sandstone Brenna”	Gray greenish or ashen blue	– building material and for production of plate cladding – plinths of buildings and retaining walls	Quartz sandstone
	Surroundings of Krosno and Mucharz	„Sandstone Mucharz”	Dark ashen with a bluish z shade	– for construction purposes – elements of small architecture	Fine- and medium-grained, intermittently Coarse-grained, with a carbonate-loam binder

As can be seen with the data in Table 2, sandstones on Polish territory are fairly common, especially in Lower Silesia and in the Subcarpathian. For the topic of this study, the most important region is the Kłodzko Valley, namely the three districts in that area: Nowa Ruda, Radków, Szczytna. These places will be the subject of research in the further part of the paper. Samples of classic sandstones from the three districts are shown in Figure 9a, b, c.



Phot. 9. Classic sandstones from the area of the detailed research:
a) Ślązak from Nowa Ruda, b) Sandstone Radków, c) Sandstone Szczytna

3. RURAL SETTLEMENT IN THE KŁODZKO LAND

Because of its location and mountainous character, and the rich historical past, the Sudety region belongs to the areas where the architectural design was influenced by various factors and styles derived from Germany, Bohemia, Silesia and Lusatia. Despite cultural and social differences and use of decorative construction material, this region was compactly joined and the ethnic boundaries were bleared, and elements made of indigenous materials, i.e. stone and wood, harmoniously merged the built structure with the existing environment.

3.1. Characteristics of the research area

The broad passes between the mountain ranges around the Kłodzko Land were used as trade routes since antiquity and the early Middle Ages. Then in the areas of lowest location began the first traces of settlement. At the turn of the 9th century by the trade routes the first little settlements began to arise, and the Kłodzko Land alone was then a transitional region between Silesia and Bohemia. In 1459, the land was elevated to the rank of an independent county by the Czech King George of Podebrad, and this status remained until 1945. The most successful period of this region was the end of the 15th century, and especially the 16th century. Then there was a significant extension of the cities, rebuilding of villages, and mining began to develop and other branches of industry, i.e. drapery, canvas industry, glazing. In the seventeenth and eighteenth centuries this region has been subjected to numerous wars. After the 30-year war the Counter-Reformation began to stride the Kłodzko Land, which resulted in the emergence of large pilgrimage facilities (e.g. in Wambierzyce) and numerous chapels and roadside statues in the area. At the end of the 17th century, due to a change in proprietary rights, many areas turned to private hands of foreign noble magnate families, which resulted in the creation of residences (e.g. in Bożków). In the middle of the 18th century the Kłodzko Land passed to Prussian rule. The 2nd World War did not bring any damages to the area.

The name the Land of Kłodzko was first used in 1947, but it contains the territory of the then feudal Kłodzko earldom. The area of Kłodzko Land includes the Kłodzko Valley and the surrounding mountains. It has the shape of an elongated triangle. The Kłodzko Valley is surrounded to the west by Bystrzyckie, Eagle, and Table Mountains, to the east by Bialskie and Golden Mountains, and the Group of Śnieżnik, and to the north – east by the Owl and Bardzkie Mountains. The Kłodzko Land also includes a depression of Nowa Ruda, the Włodzickie Hills, the depression of Duszniki with the Lewińskie Hills. The state border with the Czech Republic closes on three sides the Kłodzko Land, and to the north and north-east it is closed by the counties of Kłodzko and Nowa Ruda.

The visual perception of this region is largely formed by the picturesque landscape, that manifests itself in the way of the shape of terrain, mainly by the contrasting composition of seemingly contradictory forms of relief (Fig. 2)⁶⁹.

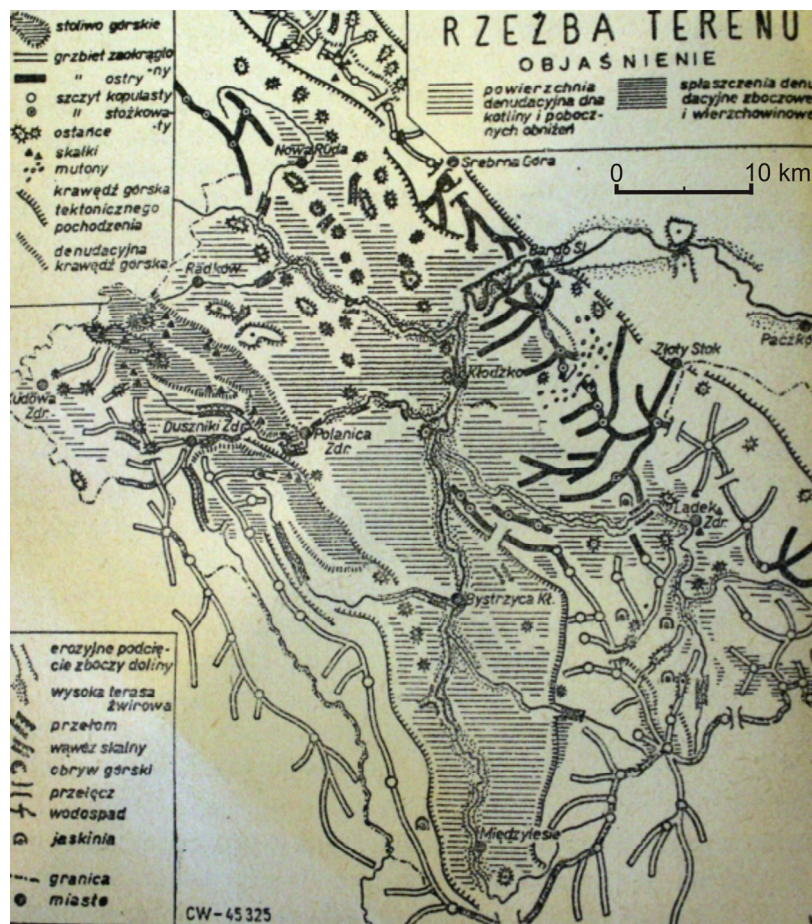


Fig. 2. Relief of the Kłodzko Land

The studied area is characterized by a complicated geological structure (Fig. 3)⁷⁰. It is composed of rocks from different periods, which arose under different conditions and were assigned to different geological units. To the oldest rocks forming the Kłodzko Land belong the metamorphic rocks occurring in the Eagle, Bialskie, Bystrzyckie, Golden Mountains and in the Massif of Śnieżnik. They originated in the Proterozoic and Paleozoic. These are essentially strongly folded gneisses, granite gneisses, mica schist and granulites and eclogites.

⁶⁹ Source: Walczak W., 1961: Ziemia Kłodzka. Wyd. Sport i turystyka. Monografia krajoznawcza, s. 11.

⁷⁰ Source: Migoń P., 1996: Ziemia Kłodzka. Przewodnik, Wyd. Kartograficzne EKO-GRAF, Wrocław, s. 17.

In the metamorphic complex one can distinguish: quartzites, amphibolites and crystalline limestones. In the area of Kłodzko Valley there are: metamorphic schists, lydites, amphibolites and diabases.



Fig. 3. The geological structure of the Kłodzko Land

Sedimentary rocks 1. Tertiary (sands, gravels, clays) 2. Upper Palaeozoic and Mesozoic (sandstones, conglomerates) 3. Devonian-Carboniferous (sandstones, graywackes, weakly metamorphosed conglomerates)

Igneous rocks: 4. Devonian-Carboniferous (granitoides) 5. Befor-Variscian period (gabbros and serpentinites) 6. Devonian-Carboniferous (vulcanites)

Metamorphic rocks: 7. Proterozoic and Lower Palaeozoic (gneisses, granite-gneiss, metamorphic schists) 8. Lower Palaeozoic (schists, lydites, amphibolites, diabases) 9. Proterozoic and Lower Palaeozoic (mylonites, cataclastics)

3.1.1. Geological structure

The youngest geological formations that come from the Low Carboniferous are the dominant in Bardzkie Mountains: sandstones, conglomerates and graywackes⁷¹.

The present appearance of the area is to a large extent influenced by the rapidly progressing destruction of the uplifted sandstone slab of the Table Mountains, that was facilitated the horizontally deposited layers of sandstone. The result of this process was, among others, the rise of rocky perches mainly in the area of Radków and Wambierzyce.

The area of the Kłodzko Land of interest to the author is full of sedimentary Upper Carboniferous rocks and Permian shoals of red sandstones and conglomerates. In this region there are also representatives of the magmatic rocks: the gabbroic-diabase block between Nowa Rudą and Słupiec, and porphyries and melaphyres in the region of Raszków and Stone Mountains.

The geological past for the study area is very significant. Under the influence of a changing climate, from the wet carbon to the dry, desert-perm, also the rocks altered, in them iron compounds began to dominate giving to the lands the characteristic red color. Periodic floats of river gravels and sands, deposited in the Intra-Sudetic Basin, led to the shoals of red conglomerate, sandstones and slates. They are primarily characteristic of the Ścinawka Kłodzka Valley Radków, Ratno, Wambierzyce and the depression of Nowa Ruda and in the Włodzickie Hills. Their presence is very distinctive and visible from a distance due to the brick-red color of the soil given by decomposed rocks.

For this part of the Kłodzko Land, a geologically important period is also the Permian period. It was then that the area of the basin was entered by the seas, depositing sandstones, shales, limestones and dolomites. A trace of that are speckled and white sandstones and conglomerates, which occur in the vicinity of Radków, Wambierzyce and Chocieszów.

In the Kłodzko Land there are numerous useful minerals and construction rocks (Fig. 4)⁷². Among the useful minerals the most important are deposits of coking coal in the depression of Nowa Ruda. In addition to coal, in the area there is also fire-resistant slate mined for the ceramics industry, and magnetite ores in shales, amphibolites and crystalline limestones⁷³.

Among the construction rocks we can distinguish:

- deep-seated rocks, "syenites" occurring between Kłodzko and Złoty Stok, gabbro near Nowa Ruda;
- effusive rocks: melaphyres, porphyries and diabases, occurring in the Ścinawka Valley and in the depression of Nowa Ruda, used for the production of paving stone and as aggregate for road construction;
- sedimentary rocks: there are quarries near Radków, where hew sandstone is operated. Red Permian sandstones – in the depression of Nowa Ruda. Crystalline limestones called marbles in the mountain range Krowiarek, in vicinities of Łądek Zdrój, Stronie Śląskie and Międzylesie.

⁷¹ Migoń P., 1996: Ziemia Kłodzka. Przewodnik, Wyd. Kartograficzne EKO-GRAF, Wrocław, s. 16–19.

⁷² Source: Walczak W., 1961: Ziemia Kłodzka. Wyd. Sport i turystyka. Monografia krajoznawcza, s. 14.

⁷³ Behan A.: Nowa Ruda. Przewodnik historyczno-turystyczny, Europejski Fundusz Rozwoju Regionalnego INTERREG IIIa Czechy-Polska 2000–2006, s.12–13.

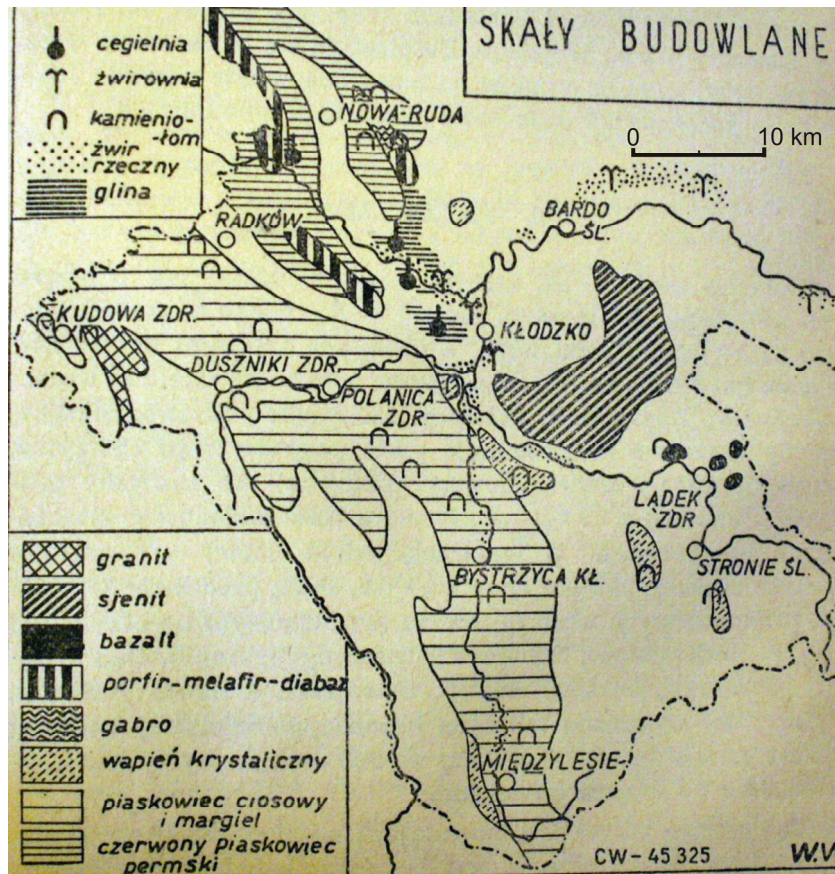


Fig. 4. Building rocks and the site of their extraction

In Ścinawka Średnia and Dolna, Włodowice and Leszczyna there are brickyards, which use thick layers of glacial till to manufacture bricks.

3.1.2. Local materials and regionalism

Silesia is the south-western area of Poland. It consists of four parts: Upper Silesia (with the Opole Land), Lower Silesia, Cieszyn Silesia and trans-Olza Silesia. The ethnic Polish-German border was until 1945 to the west and north-west, as a result of that it came to overlapping of two borders: ethnic and regional. This frontier area was incessantly under pressure from the German state and culture. Therefore, the land became an important symbol as a sacrum and ancestral heritage that must be preserved, and whose all the symbols of the Silesian and Polish separateness must be protected, such as the mother tongue and the whole moral-ritual complex.

Before World War II this area was inhabited by a population sitting here for centuries, i.e. autochthons. Therefore, resistance was often visible in this region to various

forms of German culture (hence the blurring of German inscriptions on roadside shrines chapels). The symbolism of separateness could also be seen in cultivation of Polishness, expressed among others by singing and praying in Polish, celebration of pieties in the native language, cultivation of a regional cult of Catholicism, which was expressed for example, in the mass pilgrimage to the nearby Marian shrines. Currently, all of Silesia is strongly mixed with immigrants from different regions of Poland and from abroad.

Silesia was always on the border, in contact with the two western neighbors. As a result, it was more than other areas exposed to the influence of foreign lands and societies. This situation was intensified even more as a result of wars. Then the border position of Silesia changed to a frontier situation. The influx of linguistically and ethnically alien population to the original inhabitants made that area become an area of cohabitation and coexistence of the populations ethnically, linguistically and nationally heterogeneous. This has led, among others, to the rise of many differences, both in cultural and social life, which are manifested in the intersection of cultural influences from different national backgrounds and the clash of disparate groups.

Due to its location and mountainous character, and the rich historical past, the Sudety region's architecture was under the influence of various factors of German, Czech, Silesian and Lusatian origin. Despite the cultural and social differences, the use of building and decorative materials consolidated the region and blurred ethnic frontiers, while constructions made of the indigenous stone and wood harmoniously blended into the existing environment.

In the cities there is a concentration of population, the rural areas are characterized by the dispersal of population in the often small settlement units. However, given the uniformity of the service standards for the entire population in the country, optimal spatial solutions must be sought for country planning solutions tailored to the existing settlement networks⁷⁴.

Most of the villages in the area of the Kłodzko Land are located in river valleys, usually close to flood area, raised about 3 m above the river. The outline of these places is usually elongated, as they extend along the valleys. The dominant form of villages, generated by these field conditions, were chain village and multiway village. In the studied area, with respect to shape, can be distinguished four types of rural settlements: multiway, chain, street settlements and dispersed settlement. The most common in this area is the presence of chain villages. Such villages are characterized by a large extension and expansion along the local creek⁷⁵. Among the settlements dominate the three centers: Kłodzko, Nowa Ruda and Bystrzyca Kłodzka, from which the village chains radiate. At an altitude of 500 m above sea level scattered settlements begins to appear. Related to this group of settlements are also small clusters of homesteads, so-called colonies that appear on the high bottom of the valley, often regardless of the network of flowing waters.

Important elements that distinguish the Kłodzko Land from the neighboring areas have become, after 1945, features which identify the society with the region. In historical sources it can be often found the term *Grafschafter*, specifying an inhabitant of the

⁷⁴ Teschich A., Wiśniewska M., Wiśniewski J., 1974: *Architektura i budownictwo wiejskie*, PWN, Warszawa, s. 7–14.

⁷⁵ Górniewicz B., 1999: *Geneza, rozwój i prognozowanie wiejskich układów osadniczych*, Wyd. Polit. Krakowskiej, Kraków, s. 8–9.

Kłodzko region. Another distinctive features have been the still functional elements of the cultural environment that evokes J. Oleszek⁷⁶:

- Language dialect,
- Folk art, tradition, custom,
- Style and form of the regional construction.

In the Kłodzko Land, the oldest relic of wooden buildings is the use of framework construction, which distinguishes this region from the rest of Lower Silesia. The most common arrangement is one-storey building covered with a gable roof, broad front, with entrance in the longitudinal wall of the building and a hallway separating the living-area part – wooden, from the economic part – made of stone. Distinctive groups in the Sudety region are the Tyrolean wooden houses erected by settlers from Tyrol. Occasionally, in the landscape of Kłodzko appear also buildings with a so-called pillar-bolt construction (Fachwerkhaus).

The rural settlement is part of the spatial structure of the country, expression of socio-economic activity and the historic structuring of the spatial structure and forms of the rural settlement. The last two elements were affected by natural conditions, socio-economic relations and the level of science and education⁷⁷.

The diverse function and specification of the rural areas are also associated with the form of housing. For the agricultural population, homestead building is a characteristic construction. By contrast, homes of the non-agricultural population are often detached or semi-detached houses and they are placed on smaller parcels and usually extend along communication routes, typically at the edge of the village.

Over the years the type of rural housing has evolved, due to the lack of performance requirements and technology based on growth of living standards.

Currently, among the Sudety rural buildings dominate brick homesteads with the buildings joining each other reciprocally, forming a quadrangle with a large courtyard. The residential building is set most frequently close to the road, with the longer wall facing south. Barn is parallel to the house, to provide convenient access from both the road and arable field. Livestock building is usually located perpendicular to the other buildings, near the border of the lot⁷⁸.

The development of the Kłodzko Land create objects with characteristic shapes and block properly connected with their function and purpose. They are well integrated into the natural landscape, creating a perfectly complementary entirety.

As noted by M. Wiśniewska⁷⁹, the formation of village development is closely linked with socio-economic changes. The traditional rural architecture is characterized by repetition of forms, consisting in, among others, the used building materials, roofing and the rhythm of the homestead systems, which were designed in line with a traditional, regionally differentiated model repeated throughout the region. There is a combina-

⁷⁶ Oleszek J., 2003: Kreowanie regionu poprzez wartości kulturowe, *Architektura Krajobrazu. Studia i prezentacje*. 3–4.2003. *Krajobraz wsi dolnośląskiej*, s. 5.

⁷⁷ Zaniewska H., Pawła-Zawczykraj A., Gloza-Musiał H., 2000: *Zagospodarowanie przestrzenne i zabudowa wsi*, SGGW, Warszawa, s. 24–25.

⁷⁸ Rzymowski A., Chowanec M., 1972: *Ruralistyka: planowanie obszarów rolniczych i budownictwo wiejskie*, Wyd. Arkady, Warszawa, s. 138–139.

⁷⁹ Wiśniewska M., 1999: *Osadnictwo wiejskie*, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa, s. 65, 92.

tion of functional systems, forms of construction, decoration and detail. A key element of spatial planning, according to R. and M. Szumański Giedych⁸⁰ is the local planning, which determines the landscape quality perceived by the public in the near future. The local planning in our country has functioned since independence, and it was implemented based on legal provisions adapted to the specificity of the region

In the architecture of Sudety for centuries were formed patterns which distinguish buildings with a characteristic form and detail created here from the rest of the country. A breakthrough in the previous history of the region brought World War II through the influx of repatriates and re-emigrants, who have met with a culture they did not know so far. Due to the total exchange of the rural population after 1945, the area has witnessed a complete breaking of cultural continuity and tradition of building. The new residents' attitude to the already existing elements, e.g. buildings, varied. Consequently, often followed devastation or demolishing of the existing building substance, resulting in distortion of the spatial structure of the countryside, which was harmoniously shaped for centuries.

After the year 1970 the interest in rural buildings has been increasing. But the economic neglect was still widespread, along with fading characteristics of the local folk building and the lack of efforts to maintain the regional rural building.

The Kłodzko Land is a separate geographical and cultural entity. According to some scholars, it is also an architectural region where the construction and plastic forms dominate, which have similar or identical characteristics, appropriate only for a separate region, which remained under the influence of similar conditions of development. As noted by J. Suchodolski⁸¹, the spread of the regionalism idea in the Sudety land, together with return to building with indigenous materials can affect the apparent change in form of the newly created development.

The regional differences in folk culture, and above all the specification of the characteristics of rural building are affected by several factors, which specifies Elżbieta Trocka-Leszczyńska⁸² after other researchers involved in the interpretation of the types of regionally distinct rural development, e.g.: I. Tłoczek, M. Pokropek, M. Trawińska:

- natural factors; shaped by the natural conditions of the region (the basic morphological elements), such as climatic conditions, soil conditions etc., which contribute to the development or disappearance of folk culture, conditioning its distribution or type;
- anthropogenic factors; associated with the activities of the local population, that include the following factors:
 - social,
 - economic,
 - socio-economic,
 - political,

⁸⁰ Giedych R., Szumański M., 2000: *Krajobraz z paragrafem*. Zeszyt 4. Planowanie miejscowe w zapisach prawa polskiego w XX w., Wyd. SGGW, Warszawa, s. 8–10.

⁸¹ Suchodolski J., 1996: *Regionalizm w kształtowaniu formy architektury współczesnej na obszarze Sudetów*, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław, s. 184–185.

⁸² Trocka-Leszczyńska E., 1995: *Wiejska zabudowa mieszkaniowa w regionie sudeckim*. Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław.

- politico-legal,
- cultural.

The last ones result from accepted practices, principles and standards of conduct and directly affect the development of material culture, together with the tradition of building created by generations. They define, inter alia, the principle of making buildings, resolution of details, use of color, equipment. With strong conservative tendencies they contributed to homogeneous and stable architectural features of rural buildings.

The rural areas under the influence of technological, social and economic changes keep changing over time. The disappearance of cultural uniqueness is one of the negative effects. Regionalism is the movement whose priority is the preservation of individuality and tradition of the village culture. It is also a movement whose aim is to highlight and consider certain phenomena and objects occurring on the surface of the earth at a specific location⁸³.

The regionalism identified in the Kłodzko Land holds direct and indirect justification that derives from the land itself. It is, however, emphasized by two factors: nature and man. Construction is formed by natural local materials, but it is the man that introduces new features and distinguishes types, regardless of natural conditions.

According to G. Ciołek, who writes after A. Farquharson: "*of the regional characteristics in the architecture one can talk about if the indigenous materials are used for construction, and the style created at least partly reflects the style of the country*"⁸⁴.

When considering the elements that create regionalism one should include all those which depend on the two previously mentioned factors, i.e. nature and man. Elements of the first group include topography, soils, climate, distribution of natural building materials, water, etc.

The idea of regionalism consists in linking the construction with the surrounding area and tradition. This term shall designate objects and buildings with characteristics associated with their place of origin⁸⁵.

The regional architecture is usually identified with the traditional rural architecture, because it is closely linked with the environment and derives from the forms of old building. The regional architecture has certain characteristics differentiating it from the universal architecture. Taking into account the psychological and sociological factors, A. Chwalibóg created a comparative summary, which is shown in Table 3⁸⁶.

The Polish countryside under the influence of natural factors and human activity developed into distinct regions. Many researchers attempted to identify regions of rural settlements. Among them were: Jan Karłowicz, Adam Zakrzewski, Władysław Matlakowski, Adam Chętnik, Gerard Ciołek, Ignacy Tłoczek, Marian Pokropek, and also Franciszek Piaścik and Witold Krassowski. Their findings were based on two methods of analysis⁸⁷. First, the ethnographic groups were assumed associated with traditional

⁸³ Drożdż - Szczybura M., 2000: Wybrane problemy ochrony krajobrazu kulturowego polskiej wsi. Na przykładzie Markowej w woj. podkarpackim, Kraków, s. 5–6.

⁸⁴ Ciołek G., 1981: Regionalizm w budownictwie wiejskim w Polsce, Monografia 24, Politechnika Krakowska, Kraków, s. 4.

⁸⁵ Borcz Z., 2003: Architektura wsi, Wydaw. Akademii Rolniczej we Wrocławiu, Wrocław, s. 17.

⁸⁶ Source: Drożdż - Szczybura M., 2000: Wybrane problemy ochrony krajobrazu kulturowego polskiej wsi. Na przykładzie Markowej w woj. podkarpackim, Kraków, s. 6

⁸⁷ Borcz Z., 2003: Architektura wsi, Wydaw. Akademii Rolniczej we Wrocławiu, Wrocław, s. 25–26.

historical, administrative and political divisions with the superior division of the geographical lands. The primary determinant was the differentiation of characteristics observed between certain cultural or geographical areas⁸⁸.

Table 3. The main features of regional and universal architecture by. A. Chwalibóg (*vide*: Drożdż-Szczybura)

Research category	Architecture	
	Regional	Universal
Purpose of the architectural work	Responsibility	Perfection
of the form	Uniqueness, individuality	universality
Formal result	Diversity	Oneness
Creative experience of author	Emotionalism	Intellectualism
Character of acceptance of user	Sensitivity	Knowing the regularity
Design method	Reduction	Deduction
Creative direction	Realistic	Abstract
Semiotic Interpretation	Connotation	Denotation

This method, according to E. Trocka-Leszczyńska⁸⁹, was used by : G. Ciołek (1943), I. Tłoczek (1957), F. Piaścik (1957), W. Krassowski (1957) and F. Pokropek (1976). Linking a specific area to a specific type of construction allowed to identify a cottage whose name was directly associated with the geographical land⁹⁰. In this way the Sudety cottage was created.. The cottage thus determined was a representative type and the architectural features describing it were sometimes taken from several buildings that arose in the study area at different times⁹¹.

The second type of regionalism was to designate an architectural region by identifying the coverage of specific architectural elements or only one parent dominant characteristics, so that it was not possible to determine the full characteristic of the researched area⁹².

The area of interest for this study, according to Tłoczek, belongs to the region of Lower Silesia, and more specifically to the micro region of Kłodzko.

The first steps towards regionalization were taken by J. Karłowicz in 1884. He has determined two types of Polish cottages based on analysis of their characteristics. In 1943, G. Ciołek⁹³ – researcher of the rural architecture – identified architectural regions in the area of Poland, which once were characterized by similar features of rural architecture, among other things: the shape of the buildings, design, interior layout, decoration, colors used, and also the use of homogeneous construction materials. These regions usually coincide with the geographical regions He distinguished three main regions:

⁸⁸ Pokropek M., 1976: Budownictwo ludowe w Polsce, LSW, s. 2.

⁸⁹ Trocka-Leszczyńska E., 1995: Wiejska zabudowa mieszkaniowa w regionie sudeckim, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław, s. 12.

⁹⁰ Tłoczek I., 1980: Polskie budownictwo drewniane, Wrocław, Ossolineum, s. 93.

⁹¹ Gładyszowa M., 1976: Budownictwo. Terytorialne zróżnicowanie budownictwa, Etnografia Polska, t. 1, Przemiany kultury ludowej, Wrocław, Ossolineum, s. 279.

⁹² Trocka-Leszczyńska E., 1995: Wiejska zabudowa mieszkaniowa w regionie sudeckim, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław, s. 12.

⁹³ Ciołek G., 1981: Regionalizm w budownictwie wiejskim w Polsce, Monografia 24, Politechnika Krakowska, Kraków.

lowland, highland and the Carpathian region, and around the lowland region – the north-eastern and north-western region. They are characterized by relatively homogeneous features of rural architecture. The use of local materials contributes to the individual development in the region and the overall spatial order. In 1957, I. Tłoczek resumed research on regionalization of folk buildings, distinguishing 20 regions. Most frequently they overlap with the territories determined by separate social groups⁹⁴. In 1976, M. Pokropek increased that number by 2 – specifying 22 regions. Currently, a division of regional forms of folk architecture is employed that dates back to 1976, determined by F. Piaścik, W. Wieczorkiewicz and J. Wiśniewski. They have distinguished seven major regions, which correspond to geographical lands, and several smaller ones around large urban agglomerations (Fig. 5)⁹⁵.

Within certain regions were also isolated micro-regions. An example is the Sudety and the Sudety Foothills where, as a result of detailed studies carried out mainly by E. Trocka-Leszczyńska⁹⁶, who analyzed the extents of the architectural characteristics of the rural residential houses, five micro-regions have been marked off: the Kamienna Góra, Kłodzko, Jelenia Góra, Wałbrzych and Zgorzelec micro-region.



Fig. 5. The current approximate location of folk architecture regions in Poland

The idea of regionalism in architecture should consist in striving to protect the material and spiritual contents represented by the local traditions that were shaped by experiences of many generations⁹⁷. As noted by Z. Novák, the basic ingredient in the spatial-organic planning is the interior.

⁹⁴ Tłoczek I., 1985: Dom mieszkalny na polskiej wsi, Państwowe wydawnictwo naukowe, Warszawa, s. 64.

⁹⁵ Borcz Z., 2003: Architektura wsi, Wyd. Akademii Rolniczej we Wrocławiu, Wrocław, s. 26.

⁹⁶ Trocka-Leszczyńska E., 1995: Wiejska zabudowa mieszkaniowa w regionie sudeckim, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław.

⁹⁷ Radziewanowski Z., 2005: O niektórych problemach regionalizmu i ekologii w architekturze i urbanistyce. Wyd. Polit. Krakowskiej, Kraków, s. 10–11.

"And the development of these forms of interiors is, to a greater or lesser extent, always the work of man ... sometimes ugly ... sometimes beautiful."⁹⁸ The ideas of regionalism is being reborn periodically. At the turn of the nineteenth and twentieth century in the Polish architecture and art, appeared the Podhale trend referring to the themes of the native folklore. Also in the 1970s there was a return to some regional forms, when at the road sides pseudo-folk inns began to appear. Nowadays also efforts are often made to put up objects whose forms refer to the old tradition. Often, however, this has little to do with regionalism, due to the use of incorrect proportions or materials foreign to the area. As rightly noted by Z. Borcz⁹⁹, traditional forms should be only an inspiration for the architects, who should adapt their designs to the current functional requirements of the users. The remnants of an old rural building, picturesquely integrated into the rural landscape, should be preserved as evidence of material culture.

Nowadays, striving to originality in the contemporary architecture and willingness of the creators to enchant the user is increasingly apparent. However, as noted by T. Barucki¹⁰⁰, this phenomenon is detrimental to the harmonious and sustainable environment. The project is primarily the work of an architect, but for its realization can't be done without the influence of the investor. In the quest for compromises the educational issue should be included, with the view of shaping the societal tastes and preferences. That method is used for example in Małopolska, where, thanks to the activities of the Jurassic Landscape Parks Team was issued a catalog "*House like a dream*"¹⁰¹, which promotes the Polish architectural patterns adapted to the surrounding landscape.

When trying to maintain rural architectural styles, one should also have regard to the statement of M. Petelenz: "... the true regional architecture can occur only, where there is a cultural need, where there are clear, cultivated and accepted local differences, awareness and a need for local identity"¹⁰².

3.2. Local materials in the rural construction of the Sudety Land

In the Polish rural construction, due to different natural conditions, i.e. soils, climate, terrain, local building materials and other factors associated with human activity (cultural, political, ethnic factors), a considerable diversity of architectural forms has taken place, as well as the occurrence of areas with different characteristics of development, called architectural regions.

For construction of their homes, people used mostly wood, stone and clay, later also brick and roof tile¹⁰³.

⁹⁸ Novák Z., 1979: Planowanie regionalne i udział w nim architekta, II wydanie, Kraków, s. 209.

⁹⁹ Borcz Z., 2003: Architektura wsi, Wyd. Akademii Rolniczej we Wrocławiu, Wrocław, s. 18.

¹⁰⁰ Barucki T.: O pięknie ale i o tożsamości naszej współczesnej architektury, [w:] Architektura Z. 13, z. 6-A, s. 10.

¹⁰¹ Dom jak marzenie. Katalog 30 oryginalnych projektów, Wyd. Zarząd Jurajskich Parków Krajobrazowych, Kraków, t. I, 1992; Dom jak marzenie. Katalog 30 oryginalnych projektów, Wyd. Zarząd Jurajskich Parków Krajobrazowych, Kraków, t. II, 1994.

¹⁰² Petelenz M., 1996: Dwudziestowieczne „style” architektoniczne wsi podkarpackich. Wieś polska w pracach Instytutu Architektury i Planowania Wsi, Wydaw. IAI PW PK, Kraków V, s. 140.

¹⁰³ Balińska G.: Wpływ materiału regionalnego i tradycji budowlanych na kolor i fakturę zabudowy wsi polskiej, Architectus, nr 1 (7) 2000, s. 133–136.

Wooden construction on the Polish lands is characterized by its extensive popularity since time long ago. Its origins are linked to the oldest forms of settlement. Wood was very popular because of its universality and relatively easy treatment. This material has remained dominant in the rural buildings and in small towns until the nineteenth century. Over the centuries, wooden building underwent various modifications and its diversity characterized individual geographical regions. For the southern Poland the most characteristic structure was the framework construction, while in the north-west the skeletal-bolt construction was dominant, which at the turn of the seventeenth and eighteenth centuries also appeared in Greater Poland.

The Polish countryside was characterized for centuries by the largest richness of its wooden buildings. Those buildings were marked by considerable diversity of form and detail, which was due to different natural and economic conditions. Today, the originality of the wooden architectural construction that we can mainly see in the heritage parks, which still, in many parts of Poland, represent the building characteristics of the region, rescued from destruction. Next to the rural homesteads there, and wooden churches, often appear rural buildings of an industrial style, i.e. mills, wind mills, sawmills, etc. Even more rarely, the wooden buildings can be seen in their natural surroundings. The picturesque landscape of the Polish countryside, whose main component was a wooden building, often fades into insignificance.

In the rural construction in the Sudety region there were used various materials, such as wood, stone and clay, and then mostly brick and tile. Wood was used for erecting bolt, half-timbered (German –Umgebindehaus) and framework structures, and for the construction of walls, ceilings, roof framing, as well as for interior decoration¹⁰⁴. In Lower Silesia, in typical residential construction it was characteristic to combine the framework system with the skeletal system. The pillar–frame skeleton apposed from outside against the walls is to take the weight of the roof, and the framework wall the weight of the ceiling. This type is called half-timbered.

Another popular material was stone, mostly sandstone and granite, occurring in this region in the natural form. It was used for foundations of buildings, final and decorative elements, and in farm buildings for erecting entire walls, and also fields of bolt construction. A popular stone used mainly in the West and Middle Sudety were shales. Some of the varieties were used as a finishing material for flashing of whole buildings or only for external walls or their fragments, and other for roofing. They were arranged in various geometric patterns.

In the 18th century, in these areas burnt brick become increasingly widespread. It was used to build housing, for construction of foundations, as well as final and decorative material.

Clay was often used as a filling in the bolt structures, where, together with sand, small stones and straw it formed a bond. It is also used to fill gaps between the beams in the framework walls or as admixture to mortar.

In the Kłodzko Land, stone was one of the basic building materials. It was used for walls and foundations, finishing of elevations, construction of stairs, portals, window and door frames, lintels, window sills. In farmhouses the stone constituted a significant

¹⁰⁴ Trocka-Leszczyńska E.: Kolor w architekturze wiejskiej obszaru Sudetów, *Architectus*, nr 1 (7) 2000, s. 144.

percentage of the whole structure. A popular type of stone, which serves as an architectural, construction and decorative material, is sandstone, used in the study area very commonly.

The use of various building materials such as wood, stone, clay or brick and their combinations constituted, regardless of the form of building, a very interesting and unique coloring. In the architecture of Sudety, numerous building materials were used, singly or combined, (E. Trocka-Leszczynska, 2000¹⁰⁵), e.g.:

Single-material buildings:

- wood: for framework construction
- stone: for walls of stone masonry
- brick: for walls of brick masonry

Buildings of mixed materials:

- stone-wooden: a wooden framework filled with stone. Bolt, half-timbered construction
- stone-brick: with walls of brick and stone masonry
- brick-wooden: a wooden framework filled with brick. Bolt (Prussian wall, half-timbered wall) and pillar-bolt construction
- wooden-clay: a wooden framework filled with clay. Half-timbered construction and pillar-wattle-and-daub
- clay-brick: bolt construction, walls filled with clay and brick
- clay-stone: bolt construction, walls filled with clay and stone

In the single-material solutions of the rural development, sandstone is relatively rare. The farm buildings received mostly the natural color of the stone walls. In residential buildings the tone of the stone used in the external cladding of elevations or detail is varied. Interesting color combinations are also connections of sandstone with brick. The most common stone elements were the finishing elements in brick walls, while brick elements were decorations in stone walls. In the study area the most frequent combination is a stone wall with the plaster. By using indigenous material, which in this case is red sandstone, building takes the characteristics of regional construction.

In the formation of settlements in the rural areas, regardless of the form of a village, whether it is spontaneous or established, dominates the system of fields and farms. Nowadays, the integrated developments of rural settlements are subjected to analysis of their compositional value for the purpose of their conservation, or recreating, or enrichment. These activities aim to preserve the architectural and spatial harmony. A sense of order and harmony of all the elements affecting man has become the overriding objective of spatial composition.

The landscape of the Kłodzko Land consists of clearly distinct ranges that make up the inhabited valleys, over them stretching slight slopes, bottom covered with orchards while top with arable fields. The occurring stones form small rocky perches (Phot. 10.), with villages built of red sandstone visible in the distance. The whole thing is a beautiful work of nature and human beings in mutual association.

The picturesqueness of numerous geographic regions is the result of skillful use of the stones occurring in the places, which besides the construction role also serve as finishing material. That is, the case in the Kłodzko Land, where the clear specific links of

¹⁰⁵ Trocka-Leszczynska E.: Kolor w architekturze wiejskiej obszaru Sudetów, *Architectus*, nr 1 (7) 2000 s. 143–161.

the architecture with the local stone material can be admired. This raw material represented in the site mainly by the red sandstone was widely used. In addition to the strictly utilitarian as a building material it is also used as a decorative and finishing material. When walking in the area the narrow village streets, one cannot help noticing the versatile and very wide use of the local sandstone (Phot. 11, 12).



Phot. 10. Rock perches of the red sandstone (photo author)



11



12

Fig. 11, 12. Comprehensive use of the native rock material in Słupiec near Nowa Ruda (photo author)

As follows from research conducted by the author, the frequency of the occurrence of the local sandstone is from 60 to 98% of all the building materials. When conducting research, such architectural and decorative elements were taken into account as: wall bases, elevations, construction of walls, window and door frames, window sills, external stairs, small walls and spans of fences and the small architecture.

With such a widespread occurrence of red sandstone the whole region takes on its color, not only the elements of buildings or the small architecture, but also the soil and rocks.

According to the French colorist J. P. Lenclos (*vide* Tarajko J.)¹⁰⁶, creator of the definition of color geography, each geographical area through its shape, light and climate wakes in man a certain instinctive behavior associated with a choice of a specific color of home and objects. For this natural color based on the locally available materials the man adds the dabbed color, which should be the result of an in-depth analysis of the color of the region and a search by the architect-colorist for colors that individually fit into the landscape, creating a beautiful, harmoniously matched environment. The two colors: the natural and the dabbed color create a unique and unrepeatable color of the region – the color of the site.

Analyzing selected villages in the Kłodzko Land the author tried to extract the regionalism of the area in terms of the use of a uniform, local construction and decorative material (sandstone), which also commonly occurs in the landscape in the natural form. The distinguishing feature of this material in the whole country is the color: in the Nowa Ruda and Radków municipality – red, and in the Szczytna municipality, the less original, – light yellow-gray with pink admixture.

3.3. Color as a factor affecting the rural area of the Kłodzko Land

There are many beautiful places in the world. They delight us with unique landscape, unique architecture. Their external qualities encourage us to visit. There are also those which in the opinion of some people have in themselves nothing interesting. But that's only a semblance, because their beauty lies in the interior. These areas have a timeless character, which the course of a turbulent history has given variable shades. The climate of these places has remained unchanged, however, perceived differently by each, but always connected with the impression of uniqueness. Many places can be assessed by determining their cultural characteristics. This applies both to the historical, as well as geographical values. Few, however, deserve to be termed unique. To this class belongs the Kłodzko Land whose uniqueness lies precisely in the cultural landscape, where nature and human activity coexist and seem to be inextricably linked.

Natural and architectural elements are presented in a landscape as appropriately composed areas that appear as colored points, lines and planes which make certain shapes. Therefore, as reported by H. Zaniewska et al.¹⁰⁷, an important element in the open landscape is the color that varies according to the seasons and may interact variously with the elements created by man.

¹⁰⁶ Tarajko J., 2003: Rola koloru w kształtowaniu przestrzeni współczesnej wsi, Kierunki planowania przestrzennego i architektury współczesnej wsi. Współczesne przekształcenia przestrzenne obszarów wiejskich – stan istniejący oraz uwarunkowania i możliwości rozwoju. Białystok, s. 272.

¹⁰⁷ Zaniewska H., Pawła-Zawczykraj A., Gloza-Musiał H., 2000: Zagospodarowanie przestrzenne i zabudowa wsi, SGGW, Warszawa, s. 91.

The tradition of local color, based on available materials and dabbed color, which are related to the cultural traditions of the region in many regions of the world existed until recently. Over the centuries there were used different combinations of integration of the natural materials, rocks, soil and vegetation, that created a distinctive image for the region. The consistent development of buildings, consistent with the occurrence of local color, enabled many localities to preserve even to this day their beauty and distinctiveness¹⁰⁸.

Color, since time immemorial, has been an integral component of the architecture, often dominating among the factors affecting the perception of a block of buildings. This applies both to natural colors, decided by the local material, and the procedures of painting¹⁰⁹.

The role of color from the earliest times remained in the human consciousness, that attributed to it a variety of symbols. The color as a symbol is one of the most widely known and deliberately used in the liturgy, alchemy, art and literature. There are two groups of colors, which, according to a fixed but admittedly often rough optics and psychology, collect cold and warm colors. Warm colors correspond to the processes of assimilation, intensity and activity. Here belong red, orange and yellow color. Cool colors – the processes of rejection, weakness and passivity. In this group there are the colors of blue, violet. An interim color is green.

For centuries there has been credence in symbolism and magic of color. In our culture, white color symbolized purity and perfection, black was associated with death and black magic. Red is the color of life, blood, fire, danger; brown (earth) – humility and humiliation; yellow – cheating, betrayal, envy, but also the symbol of light and sun; blue (sky and water) – quietness, meditation, infinity; green – the color of hope, life, youth¹¹⁰.

Color is omnipresent, but due to its dynamism and changeability the same color may be by each perceived otherwise. This is so because we perceive color within certain limits, compositions and neighborhoods; and the passage of time, changing seasons, days and hours give it different visions. In the rural construction, in contrast to urban areas, color was used more sparingly. The natural color of building materials dominated mainly¹¹¹.

As noted by J. Włodarczyk¹¹², color is manifested in our lives through daily experience. However, we too seldom realize how much we rely on the colors and how valuable they are to us. We notice it usually only when we are missing them, especially during the gray a day or winter¹¹³. Color is one of the indispensable elements of our life. Like the air we breathe, we absorb almost unconsciously colors. Subdued, warm colors affect us positively. Unnaturally screaming or strangely acting colors induce in us a negative attitude. This occurs especially when we are creating or shaping our own

¹⁰⁸ Kowicki M.: Szkice architektoniczne; próby definiowania form współczesnej architektury wiejskiej z uwzględnieniem tradycji lokalnej, Kierunki planowania przestrzennego i architektury współczesnej wsi. Współczesne przekształcenia przestrzenne obszarów wiejskich – stan istniejący oraz uwarunkowania i możliwości rozwoju. X Międzynarodowa Konferencja. Białystok, 29–30. 05. 2003 r., s. 58–61.

¹⁰⁹ Gatz K., 1961: Color in architecture, Reinhold Publishing Corporation, N.Y., p. 47.

¹¹⁰ Cirlot J.E., 2006: Słownik symboli, wyd. 2, Kraków, password: color.

¹¹¹ Pohl C., 1998: Bauliches Gestalten und Wohnen im Erzgebirge. Das Wohnhaus im ländlichen Raum. Dorfentwicklungsverein Steinbach e.V. 1998, p. 23.

¹¹² Włodarczyk J.: Kolor i ślepcy, [w:] Czasopismo Techniczne Architektura Z. 13, z. 6-A, Politechnika Krakowska, s. 158–161.

¹¹³ Lamprecht B., Manske K.: Bauen im ländlichen Raum. Besser Aufklären als Verbieten. Region Ostthüringen. Zentrum für Thüringer Landeskultur e.V., 2004, p. 28–34.

environment. This mainly concerns the design of the nearest neighbourhood, our own home. The colors are a visual picture that, as an indicative means, constitute a way of expression and are helpful in communicating in life¹¹⁴.



13



14

Fig. 13, 14. Red earths (from left: in Krajanów and Niwa), (photo author)

The earth has always been the closest to man – a patrimony, associated with highest values, with *sacrum*. Therefore, it is the color of the earth which is such an important element among the wide colorful variety of the Polish countryside landscape. The arable layer of the soil may have various colors, from light to dark gray through brown to red (Fig. 13, 14). It looks so most of the year, only during the growing season its natural color is hidden under the color given by the plants.

¹¹⁴ Bendin E., Mehnert A., Mehnert F.: Sächsisches Land-Farbenbuch, Freistaat Sachsen, p.12–16

The color of the surrounding landscape determines largely the perception of the rural landscape, which consists of all the elements of the environment: the color of trees, of ornamental plants at homesteads, of crop fields, and the color of the sky, water, earth, rocks. It is the color of the latter two elements that clearly dominates, and greatly affects the visual reception of the landscape of the Kłodzko Land.



Phot. 15. The natural color of the arable lands in Dzikowiec (photo author)

The visual perception of this region is determined largely by the picturesque landscape (Phot. 15), which manifests itself mainly in the terrain configuration. The explanation of this phenomenon must be sought in the geological structure: in the types of ground rocks, their layout and varied resistance to the damaging processes, and consequently in detrital rock which is a form of a developing soil. However, with a change of the point of observation, the same spatial configuration can be viewed as a very different sequence of views¹¹⁵, which also depends on the amount of moisture and sunlight on the observed object.

3.4. Effect of light and water on color intensity

Sociological and biological research confirms that there is a widespread and common perception of the visible human environment by definite groups of people. This is due to the physiological and anatomical characteristics of eyesight.

In the open landscape the ratio of brightness of most objects varies depending on light intensity. Brightness of the sun = 300 000 x brightness of the clear blue sky. On a sunny day and cloudless sky 80% of the light comes directly from the sun, while only 20% from the sky.

¹¹⁵ Böhm A., 2004: „Wnętrze” w kompozycji krajobrazu. Wybrane elementy genezy analizy porównawczej i zastosowań pojęcia, Wyd. Polit. Krakowskiej, Kraków, s. 17.

Man cannot fully sense how great the differences in brightness are around him. This is because our eye very quickly and well adapts to any lighting. Comparing objects illuminated by sunlight and moonlight, we can conclude that in sunlight the illumination is 10 000 times greater than in moonlight. And objects in the shadows are illuminated 10 times less than objects exposed to sunlight. To better understand the differences in brightness of individual objects in the landscape, table 4¹¹⁶ shows a comparison of reflection coefficients.

Table 4. The difference in brightness of individual landscape objects shown by comparing the reflectance

Objects	Reflection coefficients (%)
Fresh snow	80–85
Old snow	40
Grass	10–33
Wet soil	8–9
Dry soil	14
Water in rivers and pools	7
Deep oceans	3
Water in ponds	2

Most visible is the change the brightness of various parts of landscape due to scattering of light observed from an airplane, because then the reflection on the clouds goes up to 80%.

An important element in the perception of light and color is our eye; because we constantly make different observations owing to it. When perceiving colors and their saturation, it is very important to assess what nature really gives us and distinguish what our visual organ gives, or takes away, from the received impressions. Properties of the eye are best tested in the open air, because it is the natural environment to which we are adapting.

Also, it is not without difference the setting of the observer in relation to the sun, because the color and structure of subjects may vary, depending on the direction of watching a landscape in relation to the sun. Then the whole impression the landscape makes on us may change. For example a meadow which in the direction of sun light is green – yellow-green, whereas it is bluish in the opposite direction. Similarly with branches and tree trunks, which are gray and brown in the direction of the sun and black and void of details in the opposite direction.

Another important factor influencing change in color intensity is water, particularly in the form of precipitation, mostly rain. After a rainfall in the landscape we see quite significant changes. They concern not only the emerging changes of contrast of the sky, but also bright reflections freely scattered in the landscape, which by creating a special

¹¹⁶ Minnaret M., 1961: Światło i barwa w przyrodzie, Państwowe Wydawnictwo Naukowe, Warszawa, s.135, (modified).

mood affect our feelings. Rain fundamentally changes the color of landscape; among others the color of sandstone rocky perches or arable fields becomes darker and warmer. This is so because water penetrates the gaps between the grains of sand. The border between a grain of sand and water reflects less light than the boundary between the grain and air. A ray of light passing through grains of sand, instead of dispersing in the upper parts of it may go deeper into it before it is sent back to our eye, and during this long way it will be almost completely absorbed.

In the remainder of the paper will be present the results of research on changing color of sandstone samples in relation to different degree of wetness. They were carried out on the stone material collected in the three studied districts.

4. STONE IN ARCHITECTURE OF THE KŁODZKO LAND

Analyses carried out in villages of the Kłodzko Land were supposed to determine the participation of local sandstone in the overall development of the rural settlements in relation to the use of other materials and to determine its impact on the formation of regionalism in this area. A distinguishing feature of this material in the country is color: in the municipality Nowa Ruda and Radków – red, in the municipality Szczytna – bright yellow with additives. The research area is characterized by diverse geological structure, and the related occurrences of numerous strip mines, quarries, bare rocky perches, which largely influence the visual reception of the study area. Each of the municipalities is built of formations of rotliegendes, primarily of sandstones. Thanks to it the local rock material is readily available and can be broadly applied, especially since in many places there are to this day still active quarries.

4.1. Detailed analysis of selected settlement units

Preliminary studies have been performed on three municipalities belonging to the county of Kłodzko, i.e. Nowa Ruda, Radków and Szczytna, which together covered 40 localities (3 municipal towns and 37 villages). Then, 13 villages were covered by a detailed inventory, and for 3 villages (one for each municipality) catalogue charts were made.

4.2. Choice of the objects for basic research

Basic research has been conducted on all the localities belonging to 3 municipalities: Nowa Ruda, Radków and Szczytna, listed in Table 5.

4.3. Choice of the objects for detailed study

Detailed study has been conducted on 13 villages. Four villages from the municipalities Nowa Ruda and Szczytna, and 5 villages from the municipality Radków. They are listed in Table 6.

Table 5. The list of places that have undergone a general inventory

Community		
Nowa Ruda	Radków	Szczytna
1. Bartnica 2. Bieganów 3. Bożków 4. Czerwieńczyce 5. Dworki 6. Dzikowiec 7. Jugów 8. Krajanów 9. Ludwikowice Kłodzkie 10. Nowa Wieś Kłodzka 11. Przygórze 12. Słupiec 13. Sokolec 14. Sokolica 15. Świerki 16. Włodowice 17. Wolibórz	1. Gajów 2. Karlów 3. Pasterka 4. Raszków 5. Ratno Dolne 6. Ratno Górne 7. Suszyna 8. Ścinawka Dolna 9. Ścinawka Średnia 10. Ścinawka Górna 11. Tłumaczów 12. Wambierzyce	1. Chocieszów 2. Dolina 3. Łężyce 4. Niwa 5. Słoszów 6. Studzienno 7. Wolany 8. Złotno

Table 6. The list of villages that have been subjected to a detailed inventory

Municipality Nowa Ruda	Municipality Radków	Municipality Szczytna
1. Bożków 2. Dzikowiec 3. Słupiec 4. Świerki	1. Raszków 2. Ratno Dolne 3. Ratno Górne 4. Ścinawka Górna 5. Wambierzyce	1. Chocieszów 2. Niwa 3. Studzienno 4. Złotno

4.4. Detailed analysis of the impact of indigenous rock material on the formation of landscape of selected Kłodzko villages

The research presented in this section consists of 4 parts:

I: microscopic examination

II: analysis, the results of which are presented in the form of graphs, tables, diagrams and statistical graphs

III: inventories: catalogue charts

IV: soil science research

4.4.1. Mineralogical characterization of sandstones occurring in selected localities

Microscopic studies were designed to verify whether the broadly used rock material actually comes from the study area. Cuts of sandstones were made in the PAN Institute of Geological Sciences in Wrocław, which the author then carefully examined under

a polarization microscope MIN-8. The result of these observations is detailed characteristics of 14 samples (2 samples were collected in Wambierzyce, including one in Kalwaria) collected in 13 localities belonging to three municipalities.

As seen in Table 7¹¹⁷ (Phot. 16–20), all the samples are sandstones. This is evidenced by the mineral composition, which is primarily filled with quartz, and plagioclase and potassium feldspar. Watching the cuts of sandstone under a microscope, they can be clearly divided into three groups, even without a deeper analysis. The first group includes the vast majority of the sandstones in the commune of Nowa Ruda and Radków. The second group, with an admixture of glauconite, – all the sandstones from commune Szczytno. The third group comprises only one cut – sandstone collected in Ratno Górne. This cut, already after an initial analysis, was excluded as a native material. It has a completely different type of binder – carbonate binder, which is not characteristic of the study area (it was brought here from another part of Poland and placed as a freestanding stone).

Among the studied sandstones can be distinguished: greywacke, arkose and quartz sandstones. Quartz sandstones include all sandstones collected in the municipality of Szczytna and one representative from the municipality Radków. Most of the cuts from samples taken from the Radków municipality are arkose sandstones, and those from the municipality Nowa Ruda, except for one arkose sandstone, are greywackes.

Each of the cuts studied, mainly from the Nowa Ruda and Radków municipality also contains larger or smaller fragments of iron, which contributes to their reddish color. By contrast, in samples taken from the Szczytno municipality there is a high content of glauconite, which affects the characteristic gray-greenish color of the rocks. A schematic arrangement of the dominant color resulting from the use of local building materials for spatial development of the studied villages is shown in Figure 6¹¹⁸.



Fig. 6. The dominant color given by the local building material in the three studied municipalities, where: NR – Nowa Ruda, R – Radków, Sz – Szczytna

¹¹⁷ Own elaboration.

¹¹⁸ Own elaboration.

Table 7. Characteristics of the samples of sandstones taken for testing

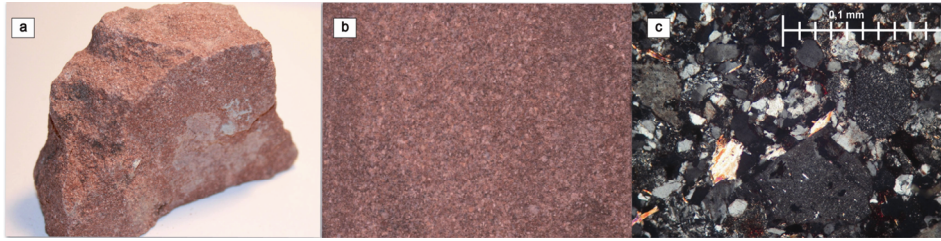
	Name	Grain size	Binder	Sorting	Roundness	Texture	Mineral composition
1	2	3	4	5	6	7	8
1	Greywacke sandstone (Fig. 22.)	fine-grained	silica - clay	weak	weak	disorderly	Rock fragments this are mainly mosaic quartz aggregates from fine-crystalline quartzites. Somewhat less commonly are met fragments of acid vulcanites and sedimentary siliceous rocks.
2		medium-grained		good	good	layered	
7				good	good	disorderly	Its skeleton consists of mineral fragments and rock fragments. Quartz with a wavy light extinction represents mainly mineral grains. The second, somewhat less frequently represented group are plagioclase, characterized by a dense network of albite twinnings. These grains are fresh and contain a large amount of hematite pigment, giving them the color of reddish shade. Similarly, there are many grains of potassium feldspar, as fresh as plagioclases, and as they containing hematite pigment Myrmekite is in the single grains to meet with a very characteristic band structure. In accessory amounts there is olive-green tourmaline, minor muscovite lamellas with high interference colors and isotropic iron oxide pellets. Opaque pigment of unspecified iron compounds occurs quite commonly in the binder.
3	Arkose sandstone (Fig. 23.)	fine-grained	silica - clay	good	weak	disorderly	There is a predominance of grains of potassium feldspar and plagioclases over other mineral fragments, among which quartz is dominated. There are not rock fragments in sandstones of this type or almost not there.
4				weak	weak		
6				weak	good		
9				good	good		
13				good	good		Rock fragments these are mainly mosaic quartz aggregates from fine-crystalline quartzites. Somewhat less commonly are met fragments of acid vulcanites and sedimentary siliceous rocks.
8	Quartz sandstone (Fig. 24.)	fine-grained	silica - clay	good	weak	disorderly	The binder of rock contains a lot of clods of isotropic iron compounds giving the rock a red tint.
5	Greywacke sandstone (Fig. 25.)	fine-grained	carbonate	weak	good	disorderly	The carbonate binder is very rich in hematite pigment, giving the rock pink tint. In the fragment material can be distinguished primarily quartz grains with the quiet extinction of light, probably of volcanic origin. Similar origin are fragments of potassium feldspar with equally extinction of light. There are also grains of quartz with wavy extinction of light, probably derived from fragmentation of metamorphic rocks. Grains and epidote fragments represent the same material. The volcanic material is also represented in the small crumbs of rock type rhyolite and rhyodacite. Common rock fragments of metamorphic origin belong to quartzites (mosaic quartz aggregates) and aggregates of crystalline calcite, which are fragments of marbles.

Table 7. cont.

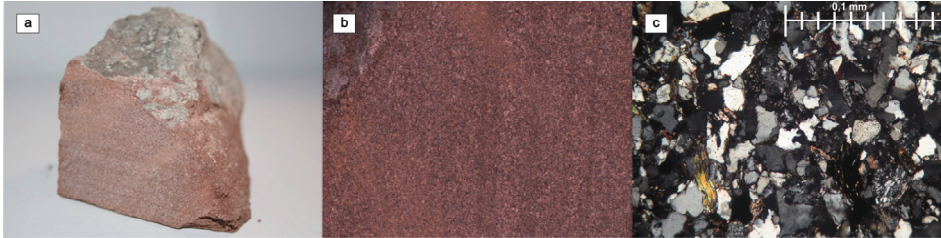
1	2	3	4	5	6	7	8
10	Quartzite sandstone (Fig. 26.)	fine-grained	silica - clay	good	good	disorderly	In the fragments material quartz grains dominate with the wave extinction of the light. The second, numerous represented mineral is glauconite, which green grains are well-rounded. It is a characteristic mineral of the deep-sea sediments, clearly indicating the specific of the sedimentary environment. The green glauconite occurs partly also inboard binder, tightly filling intergranular spaces. Muscovite is a mineral accessory occurring among the fragments, which tiny lamellas are characterized by high interference colors. High content of glauconite in the rock affects its characteristic gray-greenish tint.
11							
12							
14							

The numbers of samples correspond to successively localities:

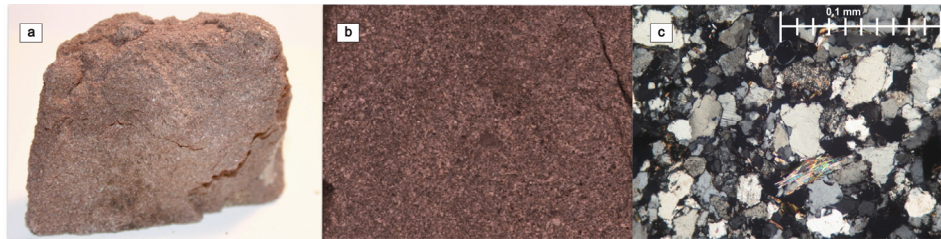
1 – Słupiec, 2 – Bożków, 3 - Wambierzyce, 4 – Ścinawka Góra, 5 – Ratno Górze, 6 – Dzikowice, 7 – Świerki, 8 – Raszów, 9 – Wambierzyce (kalwaria), 10 – Niwa, 11 – Chocieszów, 12 – Studzienko, 13 – Ratno Doline, 14 – Złotno



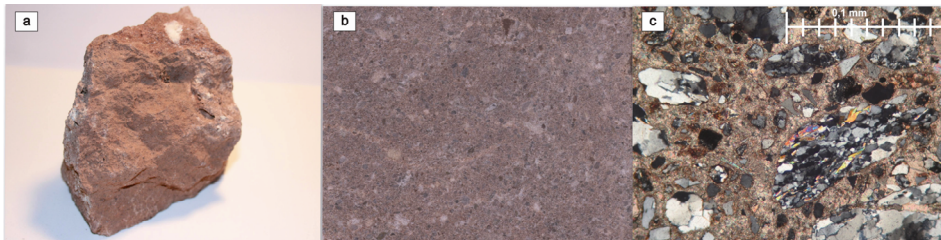
Phot. 16. Greywacke sandstone, sample No. 2



Phot. 17. Arkose sandstone, sample No. 6



Phot. 18. Quartz sandstone, sample No. 8



Phot. 19. Greywacke sandstone with carbonate binder, sample No. 5



Phot. 20. Quartz sandstone with high content of glauconite, sample No. 12

Where: a) rock sample, b) polished sample, c) picture of the rock under the polarizer microscope

4.4.2. The share of native sandstone in the spatial planning of the studied localities

- Diagrams

Diagrams (Figs. 7, 8, 9)¹¹⁹ were performed for 13 villages. After a detailed inventory of all holdings in selected localities a percentage statement was made, which shows the use of local stone in relation to the use of other materials. Conducted observations showed that in every village the share of sandstone in many structures exceeded 50%. For example, in Słupiec the presence of native rock material in various types of construction and decorative elements was very high and up to 88% (of the 212 objects cataloged, 186 showed any share of indigenous rock material).

Community Nowa Ruda

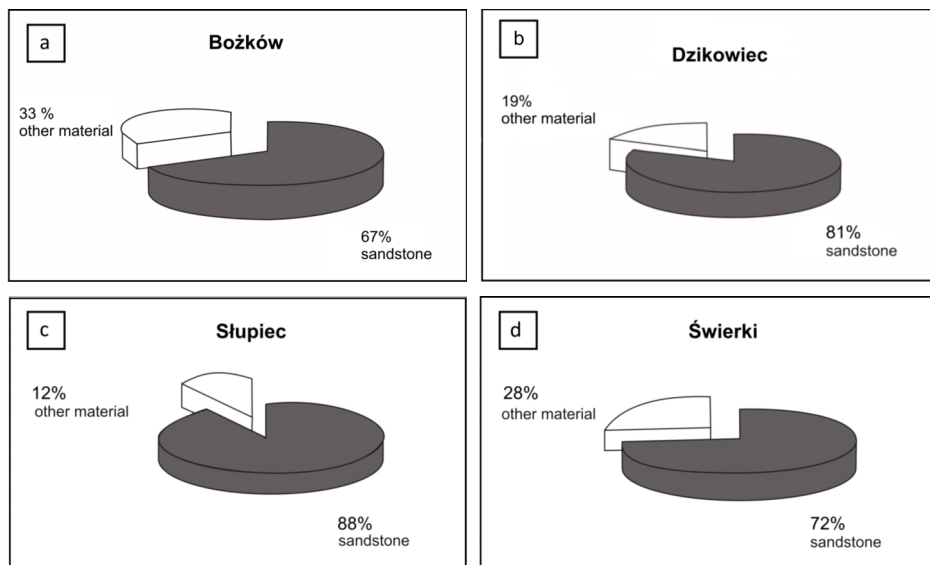


Fig. 7. a, b, c, d. The share of native sandstone in the construction and decorative elements in relation to the use of other materials in the localities of the municipality Nowa Ruda

¹¹⁹ Own elaboration.

Community Radków

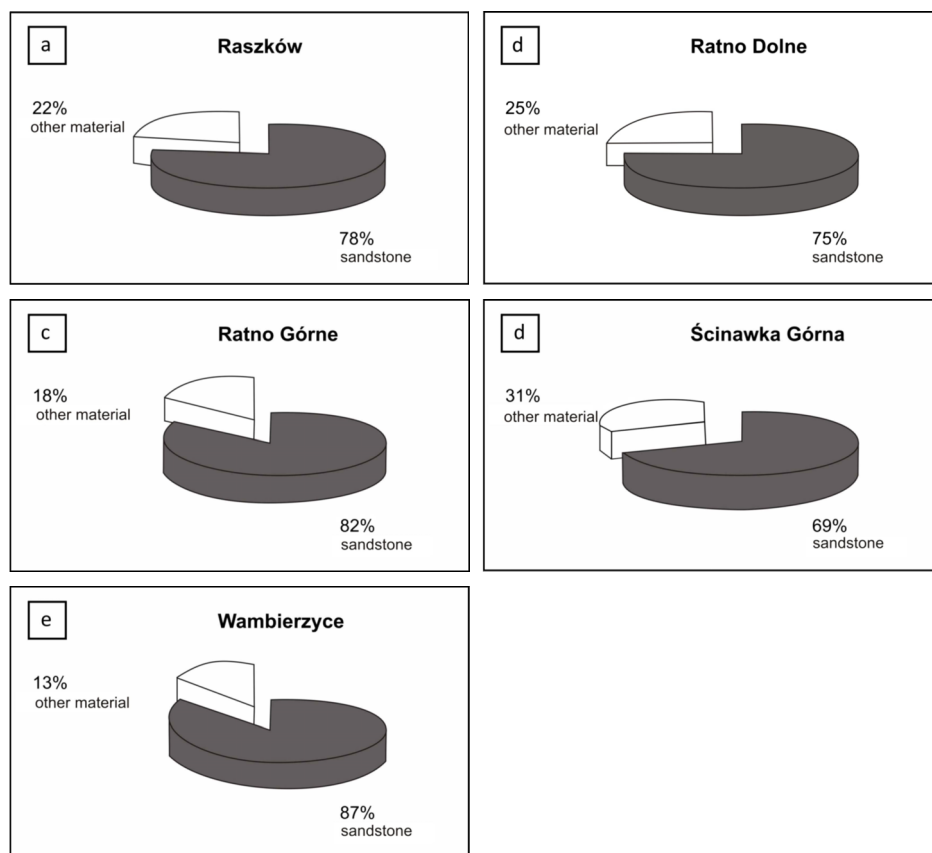


Fig. 8. a, b, c, d, e. The share of native sandstone in the construction and decorative elements in relation to the use of other materials in the localities of the municipality Radków

Community Szczytna

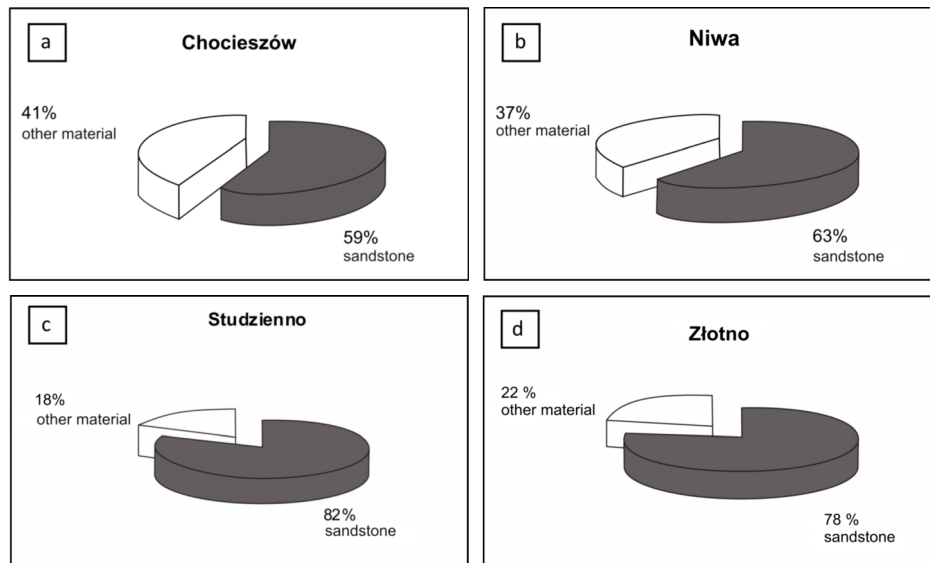


Fig. 9. a, b, c, d. The share of native sandstone in the construction and decorative elements in relation to the use of other materials in the localities of the municipality Szczytna

- Tables

Next, table statements were made illustrating the broad participation of the indigenous sandstone in each farm. And so, for example, all the buildings were counted in which underpinnings, stairs, window sills or other detail have been made from sandstone; including small walls, fences, pavements and the small architecture present on each property studied. Elements made of sandstone and located in public areas in the village were also analyzed.

Table 8¹²⁰ shows a compilation of construction and decorative elements made of sandstone. In view of the large volume of the entire table, only a portion of the data was placed in the elaboration gathered in the locality Słupiec at Radkowska Street. In a similar manner were also inventoried the other two municipalities: Radków and Szczytna¹²¹. These inventories were made for entire localities taking into account only those households where any impact of sandstone was noticed according to the established criteria. Holdings without explicit participation of indigenous stone in architectural constructions and small architecture were skipped.

¹²⁰ Own elaboration.

¹²¹ Cała A., 2009: Wpływ rodzimego materiału skalnego na kształtowanie krajobrazu Ziemi Kłodzkiej. The doctoral thesis carried out at the Institute of Landscape Architecture, University of Environmental in Wrocław under the direction of dr hab. Marek Lorenc, prof. nadzw., s. 110–129.

Table 8. The share of native sandstone in the structures of the individual farms in the villages: Dzikowiec, Bożków, Słupiec and Świerki from the community Nowa Ruda

No.	Community	Village	Building number	Share of native stone							
				Wall bases of buildings	Stairs	Windowsills	Detail	Wall bases of fences small walls	Pavements	Small architectur	
1	2	3	4	5	6	7	8	9	10	11	
Nowa Ruda	Słupiec ul. Radkowska	1	+			+					
		2	+			+	+				
		6	+				+				
		7	+					+			
		11	+	+							
		12	+	+	+	+					
		14						+			
		15		+					+		++
		17		+							
		18	+					+			
		19	+	+					+		
		21		+				+	+		
		22						+			
		23	+	+	+	+	+	+			
		25	+	+				+			
		Church	+	+	+	+	+	+	+		+
		29	+	+				+	+		
		31	+	+					+	+	
		32	+	+				+			
		33	+	+					+		
		34	+	+	+	+	+	+	+		
		36	+					+			
		37	+	+				+			
38	+	+				+					
39	+	+					+				
40	+	+	+						+		
42	+							+			
44	+										
45	+										

Table 8 cont.

1	2	3	4	5	6	7	8	9	10	11
			47	+				+		
			49	+						
			49a	+						
			49b	+				+		
			53	+	+			+		
			55	+	+			+		
			56	+						
			58	+			+			
			59	+				+		
			63					+		
			64	+			+			
			66					+		
			67	+				+		
			68	+					+	
			69	+						

As the table above shows, the participation of local sandstone in developing the Kłodzko villages is frequent and varied. It is strongly dominated by wall bases of buildings, whose height varies from 50 cm to 2 m. Other analyzed elements were made of the local rock material less often. The locality in which the greatest diversity in the use of sandstone was noted was Słupiec in the municipality of Nowa Ruda, then Niwa in the municipality of Szczytna and Ścinawka Górna in the municipality of Radków.

In the surveyed localities was also noted a widespread use of local material as a construction or decorative material in sacral objects (Phot. 21, 22). Common decorative elements crowning e.g. the entrance to a church are sacral stone sculptures. Small objects of religious worship appear quite often in the study area, usually several of them in a village, and their location is never accidental. They stand in selected places, on the border of the village or in its center, in front of churches, strengthening the sacredness of the surroundings; also by country or forest roads, by wells, springs with reputedly therapeutic water, in places of important events, as well as at junctions and crossroads.

- Diagrams and statistical charts

In order to demonstrate the frequent and widespread use of indigenous stone, cluster analysis was made. Cluster analysis is an exploration method, which allows to isolate groups of elements in such a way that objects belonging to different groups show greater similarity between themselves than do elements located in different clusters. The result of clustering is a hierarchical tree containing the previously entered variables.



21



22

Fig. 21, 22. The use of local sandstone in a small sacral architecture (photo author)

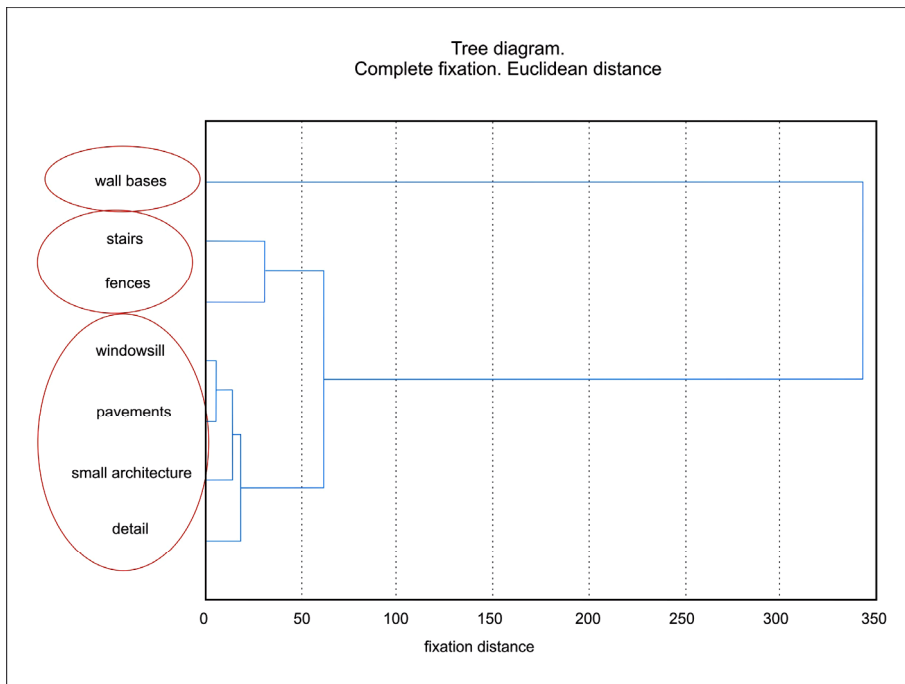


Fig. 10. Classification dendrograms of the participation of stone elements in all the studied villages

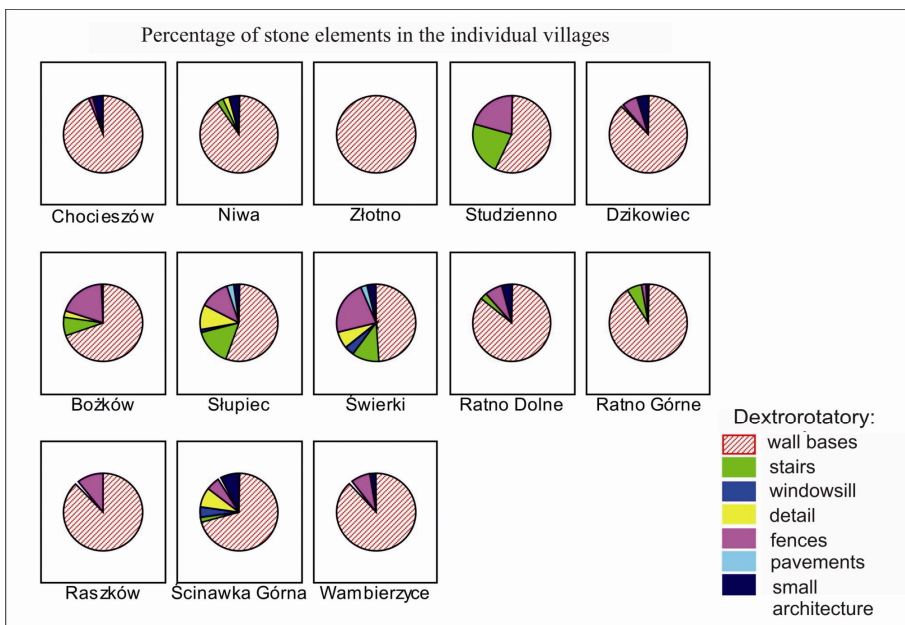


Fig. 11. Percentage of stone elements in the individual villages

The diagram in Figure 10¹²² combines data from all 13 villages. Three clusters were identified that accumulated in them elements of similar distribution of the presence of local rock material. From the diagram can be read that the share of stone in wall bases significantly deviates from the participation of stone that occurs in other elements. Another cluster of elements with similar intensity, stairs and fences, no longer differ so much from cluster 3, created by sills, pavements, small architecture and detail, and only marginally outweigh them.

The diagram in Figure 11¹²³ shows a percentage compilation of the presence of stone elements in 13 villages. It can be noted that the largest share in each of the localities surveyed have stone foundations, that appear most frequently and clearly dominate the rest of the stone elements. Sandstone fences and stairs can be found quite often in the area. Other elements are far less frequently made of the indigenous rock material.

- Catalogue charts

Catalogue charts contain the information collected from field research, and from the literature and source materials¹²⁴.

They were made for three villages, as representatives of each of the municipalities. Each card usually consists of 3 parts:

- descriptive – containing 10 points,
- photographic,
- drawing – showing the approximate projection of the holding, indicating the presence of the local sandstone.

The information contained in the cards covered the following topics:

1. locality, house number,
2. municipality,
3. location,
4. surroundings,
5. age,
6. condition of elevations,
7. participation of indigenous sandstone in individual construction and decorative elements,
8. material and color of walls,
9. type of roof, covering, color,
10. small architecture.

Data sheets were included in an annex to the doctoral dissertation¹²⁵. In this chapter, there is only an example of such a card (Phot. 23 a, b).

¹²² Own elaboration.


¹²³ Own elaboration.

¹²⁴ Marx J., Klemenz P., 1977: Ortsverzeichnis der Grafschaft Glatz, III erweiterte Auflage, MARX Verlag, Leimen/Heidelberg; Marx J., 1983: Die Grafschaft Glatz. Einwohnerbuch 1937. II. Teil Landkreis Glatz mit Stadt und Kreis Neurode, MARX Verlag Leimen; Staffa M., Janczak J., Mazurski K., Zając C., Czerwiński J., 1992: Słownik geografii turystycznej Sudetów, nr 13, Wydawnictwo PTTK Kraj, Warszawa – Kraków; Staffa M., Janczak J., Mazurski K., Zając C., Czerwiński J., 1994. Słownik geografii turystycznej Sudetów, nr 15. Wyd. I-BIS, Wrocław.

¹²⁵ Cała A., 2009: Wpływ rodzimego materiału skalnego na kształtowanie krajobrazu Ziemi Klodzkiej. Annex to the doctoral dissertation performed at the Institute of Landscape Architecture Wrocław University of Environmental and Life Sciences under the direction of dr hab. Marek Lorenc, prof. nadzw.

Catalogue charts of the object No.5


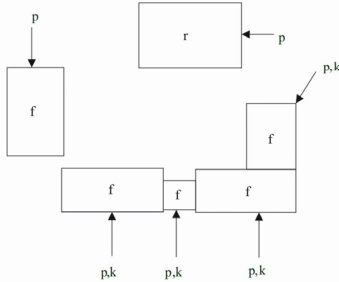
1. Słupiec, Klodzka Street No. 9
2. Nowa Ruda
3. At the main road
4. High greenery
5. Before 1945
6. Good
7. Wall base, stairs
8. Brick, plastered, light gray
9. Pitched roof, red tiled
10. Stone small benches



a

Catalogue charts of the object No. 28

1. Ścinawka Górna, No. 58
2. Radków
3. At side road
4. Unveiled front
5. Before 1945
6. Average/bad
7. Wall base (p), construction of farm buildings(k)
8. Brick, plastered, light gray
9. Pitched roof, dark tiled
10. -

r - residential building
f - farm building

b

Phot. 23 a, b. Sample catalogue charts

On the basis of the data sheets it can be seen how frequent and widespread was the use of local sandstone in the study area, whether it is exposed in the landscape and if the whole block of constructions is in harmony with each other and with the surroundings and what condition it is in. Catalogue charts were made for those homesteads where any participation of local sandstone was noted, the others were omitted in that part of the research.

4.4.3. The color of soils in the analyzed localities

The soil science research presented in this section are designed to show differentiation of the color of the soil, depending on the degree of wetness. The scale of colors used for this purpose conforms to the pattern of colors from the Munsell Color Chart¹²⁶. For 13 localities soil samples in their natural state were collected into Kopecky cylinders of 100 cm³ capacity. Then, after transfer to the laboratory of the Institute of Soil Science of the University of Environmental and Life Sciences in Wrocław, the samples with their water content were weighed, and then placed on a capillary bed and into dryer, where they have been subjected to the temperature of 105°C. After each of the treatments the samples were weighed again, in order to determine the sample's mass with soil after capillary drying and then the mass with dried soil. Thus were calculated the following: the current relative humidity (WA_w) and capillary water capacity (KPW_w) with the following formulas:

$$WA_w = \frac{a-c}{c-d} \cdot 100, \quad KPW_w = \frac{b-c}{c-d} \cdot 100, \quad \text{where:}$$

- a – mass of cylinder with current water content in soil,
- b – mass of cylinder after capillary drying,
- c – mass of cylinder with soil dried at 105⁰C,
- d – mass of cylinder.

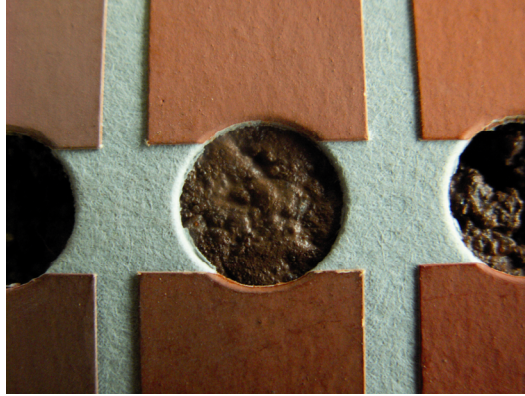
The color of soil samples was then compared with the Munsell scale (Phot. 24, 25). Each color in this scale is determined by the three elements:

- Tint, allows to distinguish the primary and intermediate colors, designated with large Latin letters. The scale distinguishes five basic shades: R – red, Y – yellow, G – green, B – blue, P – purple; and 40 intermediate shades, e.g. YR – yellow – red. Among the intermediate shades the proportions of ingredients can vary, e.g. 2,5 YR. The tint of the color can be read from the upper corner of the card
- Brightness was placed on the vertical axis of coordinates. It is expressed with a number from 0 (red) to 10 (white). Numbers 1–9 express various degrees of gray. To determine the extent of soil brightness the range 1–8 is enough.
- Saturation is expressed by Arabic numerals from 0 (no saturation) to 14 (pure color). Pure colors do not occur in soils; therefore, to determine the extent of saturation, numbers 1–8 are sufficient. Saturation of color is placed on the horizontal axis of the card.

¹²⁶ Munsella Soil Color Charts, 1954. Munsella Color Company, Inc, Baltimore 2, Maryland. USA.

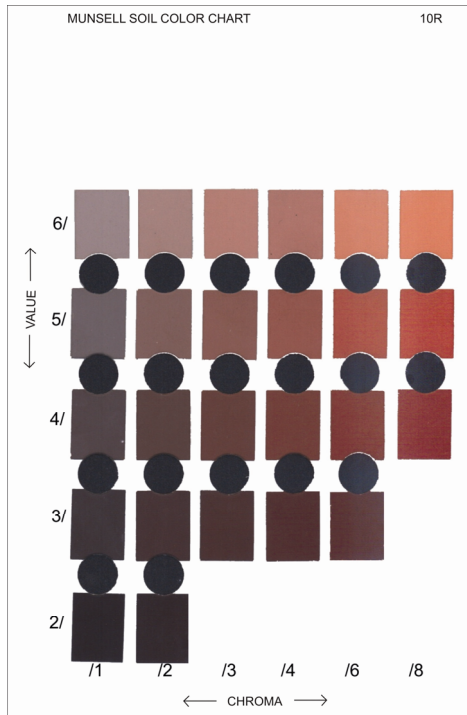


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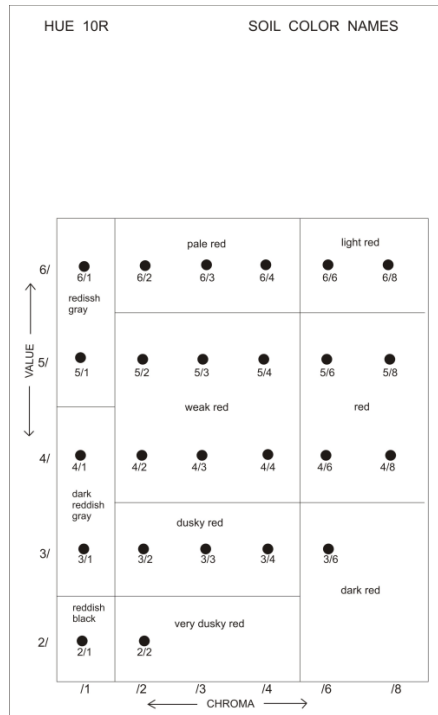


25

Phot. 24, 25. Reading the color of the soil on the basis of the Munsell color-scale (photo author)



12



13

Fig. 12, 13. Model of the Munsell cards with the colourful scheme and nomenclature (modified)

Table 9. Determination of soil color in varying degrees of wetness

Object	The color of the soil by the current humidity		The color of the soil after capillary rise			The color of the soil after drying in 105°C		
	WAw in weight %	The value of color	Name	KPWw in weight %	The value of color	Name	The value of color	Name
1s	15,54	10R 4/3	Weak red	18,65	10R 4/6	Red	10R 6/4	Pale red
2s	20,41	2,5YR 3/4	Dark reddish-brown	27,88	2,5YR 4/4	Reddish-brown	2,5YR 6/4	Light reddish-brown
3s	16,37	10R 4/3	Weak red	17,97	10R 4/3	Weak red	10R 5/6	Red
4s	13,67	10R 3/3	Dusky red	15,68	10R 3/3	Dusky red	10R 5/3	Weak red
5r	15,96	5YR 4/3	Reddish-brown	26,11	5YR 4/4	Reddish-brown	5YR 6/4	Light reddish-brown
6r	15,24	5YR 4/2	Dark reddish-gray	26,94	5YR 4/2	Dark reddish-gray	5YR 5/4	Reddish-brown
7r	14,55	10R 4/3	Weak red	16,89	10R 4/4	Weak red	5YR 6/4	Pale red
8r	10,04	10R 3/3	Dusky red	17,04	2,5YR 4/4	Reddish-brown	2,5YR 5/4	Reddish-brown
9r	8,23	10R 4/3	Weak red	16,10	10R 4/6	Red	10R 5/6	Red
10sz	24,73	5YR 3/3	Dark reddish-brown	38,09	5YR 3/3	Dark reddish-brown	5YR 6/4	Light reddish-brown
11sz	16,11	5YR 3/2	Dark reddish-brown	22,08	5YR 3/2	Dark reddish-brown	5YR 5/3	Reddish-brown
12sz	13,54	10R 4/6	Red	13,61	10R 4/4	Weak red	10R 6/3	Pale red
13sz	14,56	5YR 3/2	Dark reddish-brown	23,27	5YR 3/3	Dark reddish-brown	5YR 5/3	Reddish-brown

Determination of soil color consists in finding in the Munsell Color Chart (Figs. 12, 13) a color pattern similar to the assayed soil. A color read on the basis of the Table is recorded with a code in an appropriate sequence: tint, brightness, saturation, e.g.: 10R 4/6 is read as: 10R – tint, 4 – brightness, 6 – saturation, which in effect gives us red color.

As shown in Table 9, all the samples exhibit in their color the red tint, which indicates at similar geological structure of the surveyed municipalities and the presence of rotliegendes sandstone in each locality. Coloration of the soils in the 3 communes surveyed is also presented schematically the Figure 14¹²⁷.

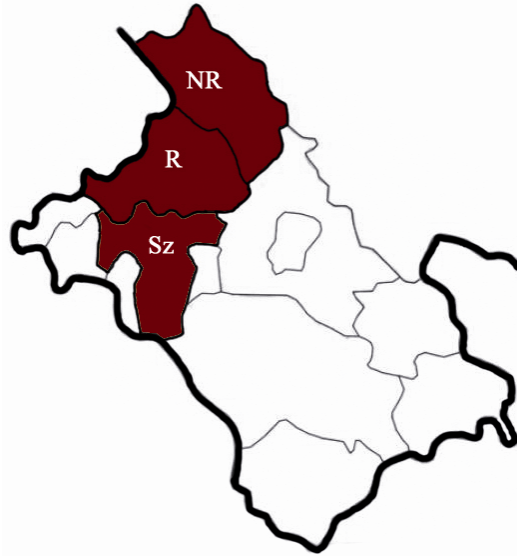


Fig. 14. The dominant color in the open landscape, given by the local material in the three municipalities where: NR – Nowa Ruda, R – Radków, Sz – Szczytna

Analysing the results presented in Table 9¹²⁸, one can see that there is a slight difference in color intensity between the samples with moisture and those after capillary drying. This is because the soil samples were collected after rainfalls, and hence the water content in some containers both before and after capillary drying was similar. The biggest change in the shade of the color of a soil could be seen only after it has dried at 105°C. Then the color markedly fades.

4.4.4. Guidelines for shaping the rural areas in line with maintenance of spatial order

The studied area of the Kłodzko Land fill Upper Carboniferous sedimentary rocks and shoals of red Permian sandstones and conglomerates. Due to the still occurring numerous active sandstone quarries, this material is readily available and widespread in the whole region.

¹²⁷ Own elaboration.

¹²⁸ Own elaboration on the basis of the Munsell Color Chart, 1954. Munsella Color Company, Inc, Baltimore 2, Maryland. USA.

The vast majority of the catalogued developments within the three studied municipalities is characterized by the use of similar building materials, bright colours (shades of gray and yellow, and white), pitched roof mostly red-tiled and the use of local sandstone in varying percentage, both in buildings as well as in the whole property. The analyzed localities are definitely old villages, with no new development, and a new building can rarely be seen there. Though the one that arose after 1980 has some regional features. If the construction or ornamental elements are not made from local sandstone, it is replaced with imitating ceramic tiles of color corresponding to the local rock material.

The local rock material, which is used mainly for wall bases, is often less visible in the period of intensive vegetation because obscured by lush greenery. In many households it happens also that the high fences tightly obscure the allotment. The best exposition of sandstone occurs in the period from late autumn to early spring, excluding winter when there is snow cover. Water is an important element that affects the intensity of color. Rain changes fundamentally the color of the landscape; among others the color of the sandstone rock perches or agricultural fields becomes darker and warmer. The position of the observer in relation to the sun and the object observed makes also a difference, because the color and structure of objects may much depend on that.

To maintain spatial order, the newly designed, emerging Kłodzko rural building should meet the following criteria:


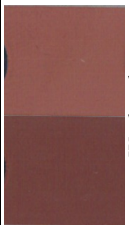
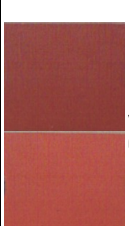
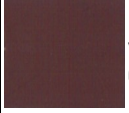
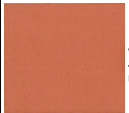

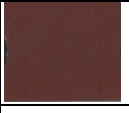
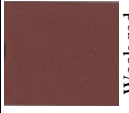
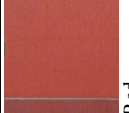
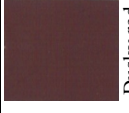
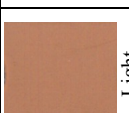
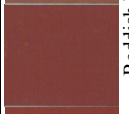
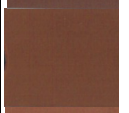
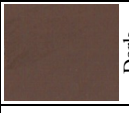
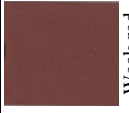
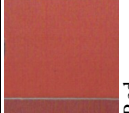
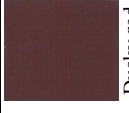
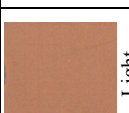
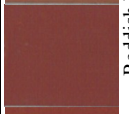
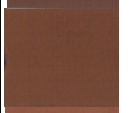
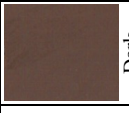
- It should have the characteristic form for the region (maximum 2 storeys + usable attic, pitched roof, red-tiled).
- By being appropriately integrated into the existing environment it should harmonize with the local landscape. Helpful here would be provisions indicating how to differentiate the proportions of the used materials within one main principle (e.g. the local sandstone should constitute a minimum of 25% of the elevation material on the background of a light wall). Such regulation exists, i.g., in Austria, Germany and Switzerland, where the flexible rules allow to differentiate proportions of the used materials within the same basic principle, (e.g. wood should be at least 30% of the elevation material on the background of a bright wall)¹²⁹.
- The choice of materials should be in line with aesthetic, regional and ecological factors (the local sandstone should be in the wall base, elevation, or detail).

To maintain the regional color, it would be very helpful to apply specific color palettes referring to the colors of indigenous materials. In this study such a palette was proposed (table 10)¹³⁰ for 2 municipalities studied. It was developed based on the soil science research. Because of the substantial difference between the colors of soil and local materials used in the development of villages in the Szczytna municipality, this district was not included in the palette created.

¹²⁹ Freistaat Thüringen: Dorferneuerung In Thüringen. Thüringer Ministerium für Landwirtschaft, Naturschutz und Umwelt, 1999, s. 18–22; Hausen A.: Bauen im Moseltal. Eine Initiative der Dorferneuerung in Rheinland – Pfalz. Wein Kultur Landschaft, s. 8–14; Tarajko-Kowalska J., Kowalski P.: Kształtowanie harmonii wizualnej między krajobrazem a architekturą w oparciu o kolor. Materiały z międzynarodowego Kongresu Polskich Architektów Krajobrazu. Sztuka ochrony i kształtowania środowiska. Twórczość – nauka – dydaktyka, Kraków 20–22 września 2007 r., s. 101.

¹³⁰ Own elaboration based on: Munsella Soil Color Charts, 1954. Munsella Color Company, Inc, Baltimore 2, Maryland, USA.

Table 10. The proposed color palette for the developer fragment of the Klodzko Land for use in a small architecture and construction

Community	Colors						
Nowa Ruda							
							
Radków							

5. SUMMARY AND CONCLUSIONS

Observations of regional types of rural architecture confirm the dependence of its form on the natural environment. The strongest role in shaping the rural architecture have played two components of the natural environment: climate and topographical feature. Originally, due to the low diversity of building materials the man used mainly the local material, the most available in a given area. In Poland, once because of the large forestation, the dominant building material was wood; and in economically active areas the straw was a popular material for thatching and as auxiliary material for making clay-beaten walls. Stones were used for foundations, mostly granite and sandstone, as well as limestone and field stones. Stone is one of the primary and also one of the oldest mineral materials. In the Polish construction, use of stone as a homogenous material is not widespread. This is mainly due to the climatic conditions and characteristics of the stone marked by the lack of insulation property with respect to damp and cold and the difficulties in processing. Of great significance in guiding the whole work to a proper form was also the talent of the builder. In areas rich in timber, mainly in the mountains, developed the art crafts of carpentry, joinery, wood-carving. Used in the exposed parts of building, the decorative motifs referred to plants or animals and thus they emphasized the close relationship of man with nature.

The climate and soil conditions determine the existence of adequate natural resources, which then impose, as it were, the use of specific building, architectural or decorative materials. This is evidenced among others by comparative studies, where the use of local material or a particular color often contributes to the emergence of regionalism. A concrete material or color contribute to the site's individuality and are an indispensable element of a particular style. Some Polish regions are directly identified with local mineral resources such as limestone from the Polish Jura, which is, as it were, a kind of a visiting card, with which the area is recognizable quicker and on a larger scale. The researched region of the Kłodzko Land, despite the presence of the local rock material of unique color among sandstones in the territory of Poland, does not "enjoy" so much popularity, and thereby is not readily associated with a specific region. And although the use of sandstone is very common and widespread in the area where it occurs in the natural state, few people realize that it is an important element of the environment in this part of the country.

An important factor in the appearance of an architectural construction was its adaptation to the environmental conditions. Among the conditions initiating the creation of traditional forms in the architecture was the construction of walls, ceilings and roofing.

When determining the geographical scope of regional architectural forms, the characteristics of a given area are important. They overlap mostly with the territorial range of a given social group. An architectural region is an area where there were or still are building forms with a certain characteristic, produced as a result of similar conditions

for the development of material culture of the existing population in relation to the historical process. The regional individuality covers the plastic and technical part of a building: its construction system, construction material, type of roof covering, ornamentation, arrangement of rooms, etc.

Buildings erected by our ancestors were characterized by purposefulness of the means necessary to meet the specific needs. In the past, the visual effects of the house played a large role and also the styles prevailing in a given period, or regional types, were respected. After 1945, residential buildings have been increasingly losing their individuality. This was associated with too little oversight of the architectural and urban planning authorities.

As a result, in the rural areas more and more errors began to appear which are still repeated in the current construction, e.g. the use of diverse materials (increasingly artificial), complex functional systems, residential programs ill-suited to the economic and agricultural needs.

The rural building that manifests the local characteristics should play an inspiring role for architects and planners in the integration of form, space shaping, perception and interaction of architecture with landscape.

When shaping the rural environment it is important that at every level of investment i.e. investors, designers and local authorities comply with such factors as . local atmosphere, individuality and self-identity. This should be manifested in showing concern for the preservation and drawing on the content of the existing historic building.

5.1. Specific conclusions (arising directly from the research)

1. The use of local building material makes the place more conspicuous. Some Polish regions are directly identified with local mineral resources, such as e.g. limestone from the Polish Jura, which is its "visiting card" by which the area is readily recognizable anywhere.
2. In the study area of the Kłodzko Land, sandstone was one of the basic building and decorative materials. Of it were performed buildings, small architectural objects, epitaphs, tombstones, garden terraces with stone decoration, railway viaducts, bridges, etc. In farmhouses the stone filled a significant percentage of the whole structure. Its incidence frequency in relation to the use of other materials is (as evidenced by studies of the author) from 60 to 98%. As a result, in the Kłodzko Land the specific relation between the architecture and the local stone material can be admired.

The visual perception of the landscape of the Kłodzko Land is significantly affected by the color of the local rock material. The dominant color in the landscape of the localities surveyed are shades of red in the commune of Nowa Ruda and Radków, while in the Szczytna commune the light yellow color dominates in the buildings, and red in the open landscape. Owing to the widespread use of the local rock material, the unique and unrepeatable regional color – the color of the place – is formed in these areas.

Nowadays, more and more often we encounter the disappearing of the traditional use of local materials and replacing them with common synthetic materials of a wide range of colors. As a result, integration of the architecture with the surrounding landscape is difficult.

For improving the future state of the Kłodzko architecture, of that referring to regional patterns, the following factors are of great significance:

1. Support for the idea of regionalism by local authorities and appropriate, permanent provisions in the Local Spatial Development Plans and in the provincial management study of regional planning for the use of indigenous patterns in the new Kłodzko architecture.
2. Creation of standard templates showing exemplary solutions of for newly constructed buildings in a given area; which would both continue the characteristics of the regional architecture and meet the requirements of modern buildings.
3. Widespread awareness, by the construction supervision and local administration, contractors and local people, of the values of the indigenous rural building and the possibilities of its preservation and modernization.
4. Architects associated with the Sudety region who would continue the local tradition in the contemporary architecture. For that aim it would be helpful the Polish Symposium on Regional Architecture that has already operated in the Cracow and Lower Silesian community.
5. Back to construction made of native materials (other western European countries have been using local materials for many years). To ensure visual harmony between the surrounding landscape and the designed and erected architecture, relevant legal provisions can be created, such as e.g. in the Alpine countries, which allow varied proportions of the materials used but within one main principle. However, individuality in the choice of the color detail would be permitted, provided it visually matches the whole complex. An important element guiding the selection of an appropriate color that would match the color of the local rock material should be the color palette developed for a particular municipality.
6. The use of specific color palettes (Table 10) referring to the colors of indigenous materials.

Revival of the publication activity, which would show charms of the regional architecture of the Sudety region.

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SANDSTONE IN THE LANDSCAPE AND BUILDINGS OF SELECTED DISTRICTS IN THE LAND OF KŁODZKO

S u m m a r y

Observations of regional types of rural architecture support the existence of the dependence its forms on the natural environment. The most powerful role in shaping the rural architecture is played by two components of the natural environment: climate and topographical features. Climatic and soil conditions determine the presence of adequate natural resources, which then as it were impose a specific use of concrete building, architectural or decorative materials.

This work has an interdisciplinary character. It is dedicated to research into the influence of the indigenous rock material – sandstone – on the landscaping in the Kłodzko Land. This material thanks to its ubiquitous presence in the chosen area has found a very broad application. As confirmed by a research conducted by the author, sandstone is present not only in buildings, details or sculpture. Due to the complex geological structure of the region, it also is present in the landscape in its natural form and is without a doubt an integral part of it. An additional advantage of these lands is that the intense color of the local rock material makes that Polish region unique among neighboring areas and gives it a specific character, both architecture and the open landscape.

This work has by assumption a cognitive character. In essence, the current state of the countryside has been analyzed, so that some words and thoughts can be applied in the practice of urban and country planning. To improve the future state of the Kłodzko architecture, that would refer to regional patterns, color palettes were proposed and guidelines designed for the development of rural areas in accordance with maintenance of spatial order for those responsible for the appearance of Polish villages, among others for construction supervision, and local administration, contractors and the local population.

Key words: landscaping, local sandstone, the Kłodzko Land, identity of place, regional color

PIASKOWIEC W KRAJOBRAZIE I BUDOWLACH WYBRANYCH GMIN ZIEMI KŁODZKIEJ

Streszczenie

Obserwacje regionalnych typów wiejskiej architektury potwierdzają istnienie zależności jej formy od środowiska przyrodniczego. Najsilniejszą rolę w kształtowaniu architektury wiejskiej odgrywają dwa składniki środowiska przyrodniczego: klimat i ukształtowanie terenu. Warunki klimatyczne i glebowe warunkują występowanie odpowiednich surowców naturalnych, które to następnie niejako narzucają zastosowanie konkretnych materiałów budowlanych, architektonicznych czy dekoracyjnych.

Niniejsza praca ma charakter interdyscyplinarny. Poświęcona jest ona badaniom nad wpływem rodzimego materiału skalnego – piaskowca na kształtowanie krajobrazu Ziemi Kłodzkiej. Materiał ten dzięki swojej powszechności znalazł na wybranym obszarze bardzo szerokie zastosowanie. Jak potwierdzają badania przeprowadzone przez autorkę, piaskowiec obecny jest nie tylko w budowlach, detalach czy rzeźbie. Dzięki złożonej budowie geologicznej badanego regionu obecny jest on również w krajobrazie w naturalnej formie i jest bez wątpienia nieodłączną jego częścią. Dodatkowym atutem tych ziem jest fakt, iż intensywna barwa rodzimego materiału skalnego sprawia, że kamień ten zdecydowanie wyróżnia badany region Polski od obszarów sąsiednich i nadaje mu specyficzny charakter, zarówno w architekturze, jak i w krajobrazie otwartym.

Praca ma w swoim założeniu charakter poznawczy. W głównej mierze przeanalizowano aktualny stan wsi, w związku z czym, niektóre sformułowania i przemyślenia mogą być wykorzystane w praktyce planowania przestrzennego. Dla poprawy przyszłego kształtu architektury kłodzkiej nawiązującej do wzorców regionalnych zaproponowane zostały palety barwne oraz wytyczne projektowe do kształtowania przestrzeni wiejskiej zgodnie z utrzymaniem ładu przestrzennego dla osób odpowiedzialnych za wygląd polskich wsi, m.in. dla nadzoru budowlanego oraz miejscowej administracji, wykonawców i lokalnej ludności.

Słowa kluczowe: kształtowanie krajobrazu, lokalny piaskowiec, Ziemia Kłodzka, tożsamość miejsca, kolor regionalny