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Vernacular architecture and traditional rural landscape in new socio-economic realities - a case study from Central Poland

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Abstract. The article presents the results of the research survey of the old rural constructions in the Koło Basin (Central Poland) and its closest vicinity, conducted by the authors in the period 2011-2013. From the beginning of the 19th century until the late 1960s, the population of that region tended to use for construction limestone, instead of wood which for centuries was the most common building material on Polish lowlands. Using the local deposits of limestone, excavated near Różaniatów village, various structures were built, with the parts of the building most endangered by degradation made of ceramic bricks (for corners and window/door frames) or glacial erratics (for wall base), thereby forming structures with specific architectural and aesthetic features, unique to that region. The survey was conducted in 165 villages of the region, cataloguing more than 2,000 such structures – residential buildings, farm facilities, industrial buildings. Many of these buildings display a similar elevation style of same-coloured stones, making them one of the most specific elements of the landscape.
The analysed area, just like the majority of rural Poland, is currently undergoing socio-economic changes which started in the 1990s and intensified after Poland joined the European Union. Changes in production profiles and farm sizes, migration of rural population to cities or countries of Western and Northern Europe, and progress of suburbanization are some of the main factors which trigger significant changes in the settlement network of the country. This is the right moment to assess whether the traditional solutions applied in the rural construction of the Koło Basin are worth modern application or whether they are only an element of cultural heritage valuable just from the historical perspective.

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1. Introduction

Over the last 50 years significant transformations have taken place within the agrarian structure of the countries of the European Union. These transformations, stimulated both by policies applied at the level of respective countries as well as the Union itself, have been focused on enhancing economic factors, increasing the acreage of farms and liquidating those displaying low efficiency. These actions, resulting in a considerable decrease in the number of farms and a simultaneous increase in the size of the remaining ones, show an advancement of the process of farmland merging (Biegańska, 2013). A similar development has been observed also in Poland, where since its incorporation into the European Union in 2004, the number of farms decreased by 30% within the first 7 years (GUS, 2012).

The above-mentioned changes in the agrarian structure had also a significant effect on the settlement structure of rural areas (Łowicki, 2008). Under these new conditions, the old structures are being dismantled, since they no longer meet the requirements of modern agricultural production with regard to size and functionality (Fuentes, 2010; Hernik et al., 2013). It means a profound transformation of the entire rural landscape, in which homestead had always been the most distinct element. One of the negative effects of this phenomenon is the destruction of homesteads as signs of the history of agricultural development, which represent a significant cultural heritage that ought to be preserved for contemporary society and generations to come (Kiełczewska-Zaleska, 1972; Palmer 2008; Bański, Wesołowska, 2010). This has led to many initiatives launched in different countries that aim to bring the traditional architecture, at least on the local scale, under historical protection and preservation or to skilfully adapt them into modern standards (Brunskill, 1999; Palang et al., 2005; Van der Vaart, 2005; English Heritage, 2006; Van Hoof, Van Dijken, 2008; Torreggiani, Tassinari, 2012; Yıldırım, Turan, 2012). These actions involved mostly those areas where using locally acquired materials that served for construction substantially contributed to the development of the community, creating area-specific technologies and techniques of construction and often leading to clear regional distinctiveness of the architecture (Özdeniz et al., 1998; Cała, Orzechowska-Szajda, 2008; Zurakowska et al. 2009; Lainga, Scotta, 2011; Carran et al., 2012).

In Poland, regionalism in rural architecture and construction, strongly present in the first half of the 20th century, is currently a decreasing phenomenon (Wróblewski, 1961; Tłoczek, 1972; Ciołek, 1984). The main reason for this is the fact that for centuries, wood was the most common building material used in the countryside, since it was the most easily available and easy to process material. Wooden structures therefore constitute the majority of region-specific architectural enterprises (Krassowski, 1961; Pokropek, 1976; Czerwiński, 2008).

However, despite the mentioned features which made timber the most attractive building material in rural regions of Poland, its natural susceptibility to degradation and damage caused by weather and biological processes contribute to it having a relatively short life-span. Wooden structures proved to be also vulnerable to fire. Because of these factors, in many cases the only structures of that kind were

preserved only due to some favourable coincidences, acting today as an ethnographic heritage park. Currently only in few regions buildings erected using traditional materials and technology are numerous enough in order to be perceived as an essential component of rural landscape.

At the time of progressive suburbanization and depopulation, structures which are being erected nowadays by population migrating from cities rarely aim at maintaining local, traditional art in construction – neither culture-wise nor landscape-wise (Skowronek et al., 2005). Maintaining traditional structure design is not helped by the popularity of styleless catalogue projects and the availability of modern, highly processed and repeatable building materials (Morel et al., 2001). The artwork of local construction craftsmen, which made regional rural architecture unique, seems to be a thing of the past irrevocably gone.

Given all of the facts mentioned above, the specificity of traditional structures made out of limestone instead of timber which can be found in the Koło Basin presents a particularly interesting phenomenon worth exploring. It is a unique example of stone construction in Polish lowlands, which constitute 75% of the country's terrain. Similar methods of construction which use limestone silica can be found otherwise only in the uplands (Lublin Upland, Krakow-Czestochowa Upland and Silesia Upland). We have to remark here that in these constructions stone is not only used as a foundation, but it is the main component of the entire structure. The use of such building material facilitated the emergence of specific technology used for construction as well as mining of the building material and resulted in the formation of a region-specific architectural design (Gorączko, Gorączko, 2011, 2013).

The goal of this article is to describe and document the current state of vernacular limestone structures in the Koło Basin. It also aims at assessing the possibilities of preserving the architectural specificity of this region in the new socio-economic reality, i.e. the structural changes in rural areas.

Fig. 1. Location of the research area against the administrative units in Poland

Source: Author's own work

2. Study area and data collection

Located in Central Poland, the Koło Basin is a vast valley through which the Warta River and its right-side tributary, the Ner River. The valley is surrounded by post-glacial uplands: Kłodawa Upland to the east, Kujawy Upland to the north and Turek Upland to the west. Administratively, the analysed area is found on the border of two voivodeships; Wielkopolskie Voivodeship and Łódzkie Voivodeship (Fig. 1).

The area is predominantly agricultural. Due to average soil conditions, the crops in this area are cereal plants mainly, because of their low requirements for growth. The river valleys are dominated by meadows and pasture land. Forests, mostly pine or mixed, are rare here, in the form of isolated patches. The biggest city in that area is Koło (c.a. 23,000 residents) on the Warta River, followed by Poddębice (c.a. 7,800 residents), Kłodawa (c.a. 6,700 residents), Uniejów (c.a. 3,000 residents) and Dąbie (c.a. 2,000 residents) (Fig. 2). Apart from the most numerous villages of average and small population, the area includes also some big villages, which in most cases were settlements that lost their city status e.g. Grzegorzew (c.a. 1,600 residents), Grabów (c.a. 1,300 residents) and Świnice Warckie (c.a. 900 residents). The spatial arrangement is of mixed character – it contains both villages concentrated along the roads, as well as isolated homesteads, surrounded by fields.

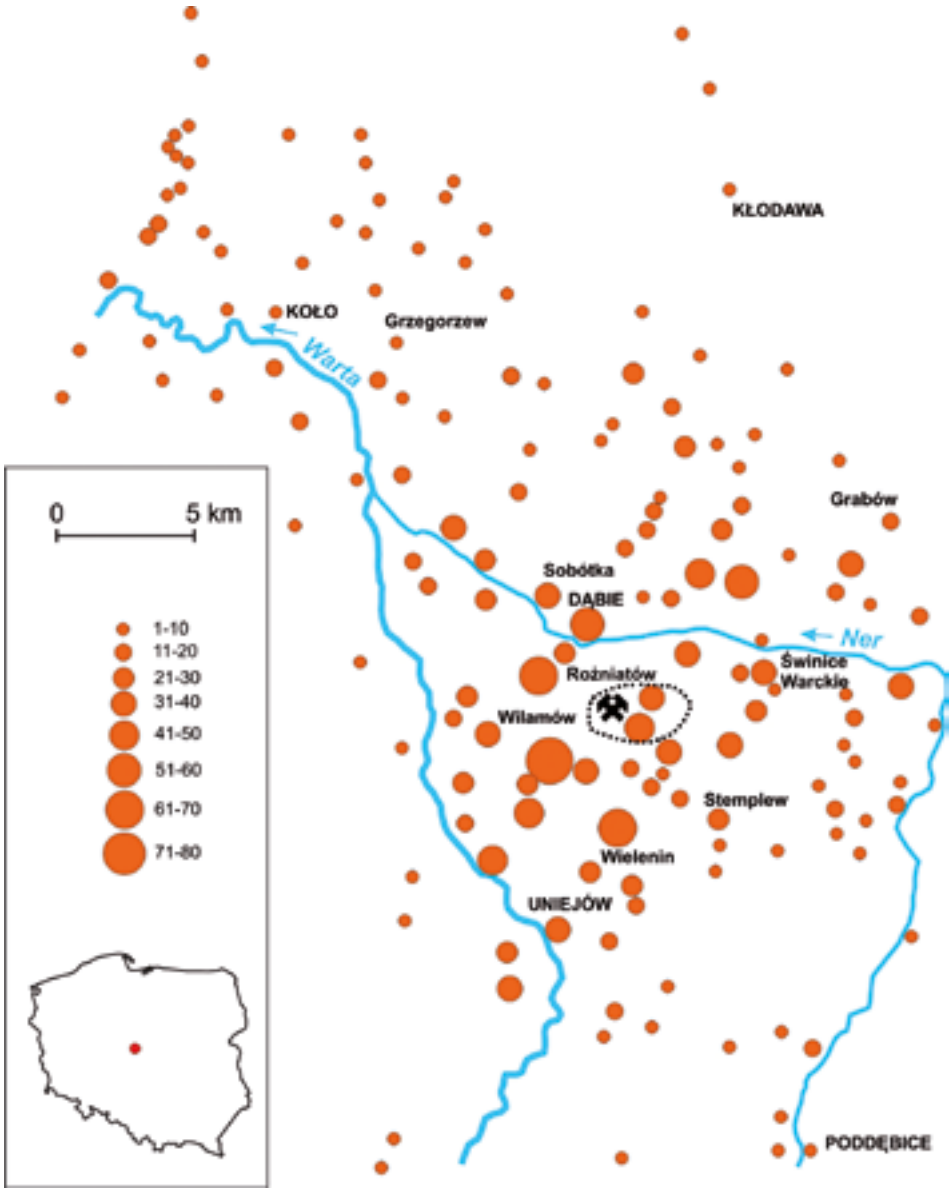

Fig. 2. Distribution of limestone buildings and their number in the locations analysed

Source: Author's own work

The geological structure of the area can be considered a typical one for Central European Lowland. It consists mainly of postglacial clays and fluvioglacial and fluvial sands, gravels and aggregated mud in river valleys or peats and gyttjas in marshy or lake-like environment. Only in the region of the village of Rożniatów (Fig. 2), as a result of an uplift of mesozoic substratum as well as denudation and eroding of younger formations, late-cretaceous, marine origin limestone appears near the surface. Hence, the exploitation of that material has been feasible and led to its common use in local constructions.

The article presents the results of research into the region-specific technology of rural construction in the Koło Basin. The survey, conducted by the authors in the period 2011-2013, included 165 settlements in an area of about 1,100 km^2 (Fig. 2).

The survey succeeded in cataloguing 2,240 structures erected with the use of limestone from local outcrops and allowed the recreation of the construction techniques used in the Koło Basin in the past to erect stone structures.

3. Diagnosis and discussion

3.1. Characteristics of the building material. Technology and technique of construction

Silica limestone from Rożniatów are sedimentary rocks with characteristic light creamy or light yellowish hue, composed mostly of organogenic silica and calcium carbonate. In the natural state the limestone from Rożniatów is a soft highly-porous rock, once it is outcropped onto the surface however, and seasoned outdoor, it hardens and becomes significantly more compact. Due to these characteristics, the material outcropped from the deposit was easily formable by simple tools such as axes, hammers, saws, etc. The building limestone from Rożniatów was referred to as 'warm stones' because of its isolating properties and it proved to meet functionality standards for housing and farm building purposes.

The process of mining involved removing the soil layer and sub sequential excavation of the stone, using pickaxes and crowbars, until reaching the level of ground waters. Then the mining was relocated to another spot. Separated architectural forms were brought onto the surface, sorted out and piled in heaps. In such form the material was sold and then transported to the construction site where the final steps of the processing were made. The architectural forms were crushed in order to obtain chips which could be then manipulated by hand to give them the final shape. The process of extracting the material as well as its preparation for masonry work can be seen as time and effort consuming, when compared with modern technologies. Standard building walls of 50-55 cm in width were mostly made out of building limestone cemented with clay mortar. The stone elements differed in shape, dimensions and treatment method, depending on the purpose of the structure (Fig. 3). To develop front walls stones were used that had a shape similar to a rectangular prism with the outside surface of the block almost flat and rectangular. Alternatively walls were formed out of rectangular split stones, assembled in parallel, yet with discontinuous joints. Walls built in these ways, regardless of their purpose, are characterized by being made out of layers. While the face of the stone was mostly flattened, the sides that formed the inner wall were processed only roughly. The consistency of filling elements indicates that they were made mainly of chips obtained during processing of the main building blocks. As mentioned before, the binding substance used was clay, although in the case of quoins and lintels cement-lime mortar combination was sometimes used.

Structures with walls built solely from limestone silica are very rare, occurring almost exclusively in the closest vicinity of the place of exploitation. Structures in which ceramic bricks served as a supplement are more numerous. Their application was due to both practical and aesthetic reasons. Bricks were used to make sections of the wall which required greater durability such as frames of windows and portals. In the case of lintels bricks were formed in a segmental arch. They were also used for ventilation holes, quoins and cornices. The proportion of bricks in the construction increases with the distance from the limestone mine, especially to the north and to the north-east of the region where small upland brickyards operated basing their production on local clay deposits. In these areas bricks were the favoured material for the entirety of front and back walls, while the warmer limestone was

used for gable walls. The colour contrast obtained by putting together the creamy-yellow limestone silica with the red colour of thermally processed brick was also used as a means of decoration in the form of geometrical patterns, very often crosses, found especially in pre-war buildings (Fig. 4). Another supplementary material were glacial boulders used in foundations and shallow underpinnings.

Fig. 3. Examples of limestone walls

Source: Author's own work

3.2. Limestone buildings – their area of distribution and quantity

The key factor determining the popularisation of using limestone in rural buildings within the Koło Basin and its vicinity was related with the costs and logistics of its transportation. The material mined in Rożniatów region was generally transported to construction sites by horse wagons – a means of transportation having an obviously limited range. It was used mostly within Uniejów commune where the mining site itself was located, as well as in adjacent communes. Consequently this is the region in which majority of structures made of this material can be found. The survey was able to conclude that within 15 km from Rożniatów, from the end of the 19th century until the end of the 1960s limestone was the most essential building material used for rural construction The technology, however, was used much further: in more than a dozen of cases structures made of limestone can be found more than 40 km away from the source of exploitation. Transportation of limestone to the areas of the Kłodawa Upland was facilitated by the line of narrow-gauge railway running along the eastern margin of the region, while the Warta River was a natural barrier stopping the transit of this materi-

Fig. 4. Ornamental brick details on limestone masonry buildings

Source: Author's own work

al to the west. On its right bank buildings made from limestone mined at Rożniatów are typical and common, while on the left bank they can be found only in locations neighbouring a bridge or a ferry crossing.

There have been catalogued 2,240 structures erected from local limestone in the area of about 1,100 km^2 in 165 locations. The survey succeeded at cataloguing 2240 structures erected using limestone from local deposits – 839 residential houses, farm buildings, 415 barns and 8 special-purpose structures (churches, mills, a fire station, distillery and a manor).

Local limestone was mostly used for erecting rural structures. In cities of the region it can be found sporadically, mostly on their margins where structures were also rural in nature. Dąbie represents a noticeable exception, as a considerable portion of terraced houses in the central part of the town was made from limestone.

3.3. Architectural features

The farms were built mostly using the quadrilateral layout (Fig. 5) which included: a residential house in its front (facing the road), two farm buildings perpendicular to it on both sides and a barn (made out of limestone or wood) closing the property from the side of the field. The central part contained a vast yard hardened with cobbled pavement. Large farms had also minor homesteads erected in their close vicinity for hosting hired farmworkers, and were usually made up of two buildings – a residential quarters and a utility building.

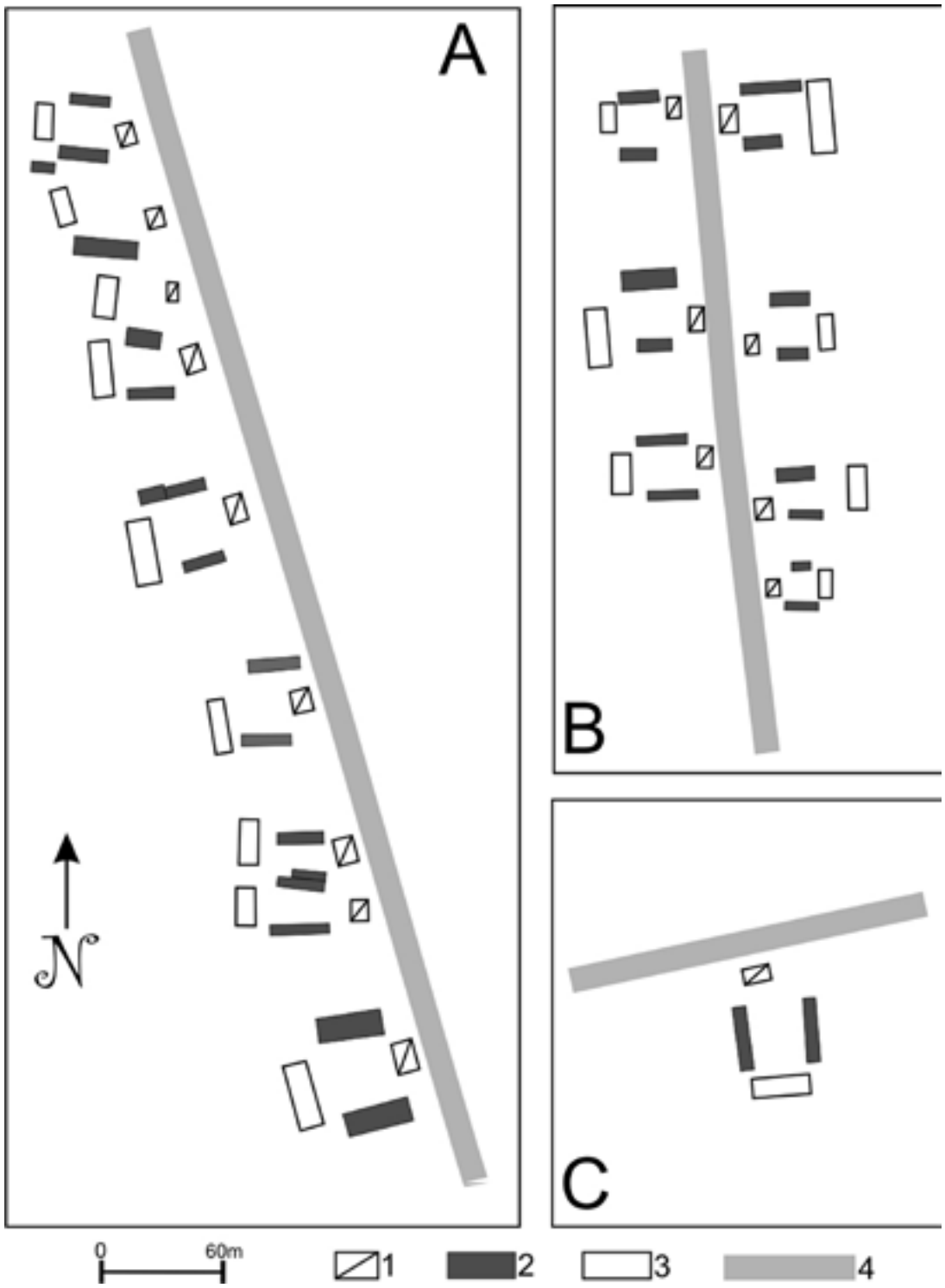

Fig. 5. Examples of typical settlement layouts: A – a linear settlement on one side of the road, B – a linear settlement on either side of the road, C – a single farm on quadrilateral layout; 1 – a residential house, 2 – a farm building, 3 – a barn, 4 – a road

Source: Author's own work

A typical stone residential structure found in that area is a free-standing single-floor building with a double-pitched roof with a slope at around 45° angle (Fig. 6). The dominant architectural forms are simple – only in a dozen or so cases structures possess a high attic cut into the roof slope. Hous-

es are positioned parallel to the road, especially in the case of wide lots. Gable location was used much more seldom, usually in areas with high density of buildings.

Fig. 6. Typical examples of residential limestone houses

Source: Author's own work

Farm buildings, except for barns, show a very high variation in terms of surface, cubature and shape of the architectural form (Fig. 7). Larger structures comprised stables, pigsties, chicken coops, a coach house, etc. Free-standing structures of that kind had double-slope-pitched roofs, just like the residential structures, unless they were located on the border of the plots, in which case they were built with a single-slope-pitched roof. Due to a large variety of shapes and placements of doors and windows in those buildings, their front walls significantly differ from one another.

Fig. 7. Examples of farm buildings

Source: Author's own work

Barns usually display simplicity of the architectural form, which creates an impression of massiveness (Fig. 8). They usually differ in the sizes and number of gates. In some cases buildings have also an inner compartment for animals or a residential quarters.

Fig. 8. Barns

Source: Author's own work

A number of special-purpose structures deserve an individual approach due to the specificity of their design and architecture. Amongst these we can mention churches in Wilamów (dating back to 1895), Wielenin (1926) and Dzierżawy, 1958), the fire station in Rożniatów (built in 1928), the distillery in Stemplew, the mill in Wilamów, the mill in Sobótka and the manor in Kozanki Podleśne – all of which can be dated to the second half of the 19th century.

After WWII limestone constructions were developing in the new socio-economic reality, which was reflected in the architectural form of residential houses mainly. A common feature of the structures erected in that period was a number of cost-saving organizational and design solutions getting more popular, which, as a result, harmed the well-developed structure of the traditional architectural form of the residential building in the rural areas. The functional area and general cubature of the buildings usually became clearly smaller. Their look deteriorated: the ground floor was moved higher while the roof slopes decreased. Architectural details, although already quite inconsiderable, were clearly neglected, e.g. segmental arches over the openings were given up for the benefit of a horizontal row of bricks with bottom reinforcement. In the 1960s and 1970s straw roofing, originally dominant in the region, was commonly replaced with corrugated Eternit boards (cement-asbestos).

One can thus see clearly that at that phase the application of stone was almost completely due to economic reasons. The selection of that material was simply due to the fact that it was available in close vicinity and that it was cheapest, especially since it was accompanied by a chronic building materials deficit on the market. For the same reason in the 1970s and 1980s in the rural construction of the region, the local stone was, in turn, pushed away by slag concrete blocks manufactured on the spot.

3.4. Current technical condition of limestone structures in the area

When properly built and cared for, limestone buildings can maintain good technical condition for tens of year, as it can be seen by the current state of many structures erected in the early 20th century or even earlier. The surface of their walls does not show marks of time, and original signs of processing are still clearly distinguishable. The material, however, is very susceptible to degradation due to weather, especially rain. Although rain reaching

the wall surface can have even a positive effect, removing airborne pollution influence, a concentrated flow of rainwater coming through roof leaks can result in serious degradation of limestone walls. Water which manages to soak into the inner structure of a wall begins to quickly wash away the clay mortar, loosening the stones and ultimately causing a profound erosion of the wall and a serious damage to its integrity. Furthermore, places susceptible to damage (and considerably deteriorating the aesthetics of the elevation), include parts of the wall above shallow underpinnings, cornices, sticking out from the face of window/door frames, etc. Raindrops bouncing off them cause moistening of the wall, and since this phenomenon is cyclical in nature it results in decalcification of the stone and its peeling off.

Another frequent cause of degradation lies in unprofessional and provisory repairs, especially when missing elements are replaced by or expansions are made using other materials (Fig. 9). Particulary, when the owner of such a building experiences inflow of funds for construction purposes, the primary action most often taken is insulation and plastering of the walls, depriving them of their architectural uniqueness.

Fig. 9. Examples of old limestone building extension

Source: Author's own work

Besides the material properties, building degradation rate is influenced by the method and the intensity of its utilization (Penkala, 1966). The highest degree of degradation is experienced by structures involved in production – stables, barns, etc. On the other hand, the commune, like most rural areas in Poland, is undergoing depopulation (Szymańska, 2009), leading abandoned homesteads to rapid deterioration (Fig. 10).

Fig. 10. Residential houses ruins

Source: Author's own work

4. Discussion

Long-term observations which proceeded this formal survey indicate a significant decrease in the numbers of structures made of limestone in the Koło Basin. Many of the structures found in the survey are derelict buildings, at an advanced stage of devastation.

A serious obstacle in the efforts to preserve these unique objects of cultural heritage is the low awareness of their historical, architectural and aesthetic value amongst members of the local community. It is a common prejudice shared by the local people that inhabiting an old limestone building is a mark of poverty and lack of other possibilities.

What are the perspectives for quantitative and qualitative changes of limestone buildings from the Koło Basin? Generally, the current utilization of existing structures does not involve the required complex repairs. Owners usually settle for provisory repairs using modern materials, neglecting details and the original form and aesthetics of the structure. That results in gradual degradation and devaluation of the buildings and loss of the unique regional architectural pattern. The constant decrease of rural population results in the increase of structures that are being abandoned and doomed to devastation.

If the current tendency holds, it can be expected that within 15-30 years, the architectural uniqueness of the region will be a thing of the past. In the case of locations closer to cities, this can happen at a more accelerated rate, vanishing completely in 10-15 years (Gorączko, Gorączko, 2013). Already now, the newly erected structures, often built in place of older buildings that were taken apart, do not exhibit regional features. They are made according to out-of-catalogue projects, using modern finishing materials.

Meanwhile, interestingly, limestone is still being exploited in Rożniatów, although at a much lower scale than before, and could successfully be used in construction of modern rural structures which relate back to the regional traditions (Fig. 11). Modern techniques of chemical protection of surfaces of porous materials would surely allow fulfilling modern requirements of functionality, as defined for the building materials. It might even result in producing better longevity effects than those of many elevation veneers currently applied.

Fig. 11. Examples of contemporary use of stone material in new farm constructions

Source: Author's own work

An essential, if not basic, role in keeping up the regional traditions in rural architecture should be also kept by the local authorities governing the local counties and communes. They have a number of economic and administrative tools to stimulate individual investors who plan construction, extension or redecoration of buildings in the region. Planning documents can include a directive aiming at maintaining the specific local nature of architecture and ensure its consequent execution. In such a scenario the construction, redecoration and modernization of public utility and service-providing buildings, such as public offices, schools, libraries, community centres, restaurants, inns, etc., which are financed from public funds, are conducted using the local building materials (Fig. 12). Yet even before that happens, it is indispensable to first of all include the most valuable, in terms of architecture and engineering, structures made from local limestone in historical preservation programs. Regional architecture could be also one of the important elements of socio-economic development, of this area, next to the health resort recreational values (Mokras-Grabowska, 2009; Poczta, 2013).

Fig. 12. Examples of contemporary use of stone material in new public buildings

Source: Author's own work

5. Conclusions

From the late 1800s the Koło Basin has witnessed a 70-year period during which rural construction was made using local deposits of limestone, mined in the vicinity of the small village of Rożniatów. Yet today, 40 years after most of Różaniatów quarries were closed down, structures built with limestone which used to be mined there represent distinct elements of the local landscape.

In recent years, the number of these structures remaining in good technical condition has been gradually decreasing. This tendency seems to be al-

most unavoidable. The region of the Koło Basin, just like other rural areas of Poland, is undergoing serious socio-economic transitions. Permanent migration of countryside population to big cities, or even abroad results in an increasing number of abandoned and forgotten homesteads. The farmlands are being consolidated by big land owners and unnecessary structures are being demolished. However, a large number of limestone constructions still present in the area might be a factor that could lead to the preservation of this region-specific architectural phenomenon. The current efforts of developing the region and the support of local authorities and law regulations might be another one. Modern tendencies to highlight regional elements in newly-erected structures raise increasing interest in stone as one of three completely natural building materials, next to timber and clay. Limestone is still actively mined near Różniatów, even if hardy comparable to the scale seen in the past. This material can be used for siding, face layer of three-layered walls, stone fences or other small architectural forms, thus creating a very credible effect and supporting the specificity of the cultural landscape of that area.

Despite the apparent decline of the use of limestone as a building material, it is clear that it could still undergo a renaissance as not solely an element of cultural heritage and historical value, but as what can successfully be used in modern construction.

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