2. EUROPEAN LANDSCAPE CONVENTION – SELECTED ACTIVITIES AND RESEARCH ON IMPLEMENTATION IN CADSES AREA

2.1. THE EUROPEAN LANDSCAPE CONVENTION

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"The landscape ...
... has an important public interest role in the cultural, ecological, environmental and social fields, and constitutes a resource favourable to economic activity and whose protection, management and planning can contribute to job creation;
... contributes to the formation of local cultures and
... is a basic component of the European natural and cultural heritage, contributing to human well-being and consolidation of the European identity;
... is an important part of the quality of life for people everywhere: in urban areas and in the countryside, in degraded areas as well as in areas of high quality, in areas recognised as being of outstanding beauty as well as everyday areas;
... is a key element of individual and social well-being and
... its protection, management and planning entail rights and responsibilities for everyone."
Preamble to the European Landscape Convention,

Florence, 20 October 2000

The main objectives of the Council of Europe are to promote democracy, human rights, and the rule of law and to seek common solutions to the main problems facing the European society today. The Organisation is active in environment protection and in promoting sustainable development in line with the Recommendation of the Committee of Ministers of the Council of Europe to Members States on the Guiding Principles for Sustainable Spatial Development of the European Continent (GPSSDEC), previously adopted by the Council of Europe Conference of Ministers responsible for spatial/regional planning [CEMAT][1] . The aim is to bring the economic and social requirements to be met by a territory into harmony with its ecological and cultural functions and therefore to contribute to long-term,

[1] See: http://www.coe.int/CEMAT.

large-scale, and balanced spatial development. These seek to protect Europeans' life, quality of life and well-being taking into account landscape, natural, and cultural values[2].

The European Landscape Convention was adopted in Florence (Italy) on 20 October 2000 and came into force on 1 March 2004, with the aim of promoting European landscape protection, management and planning and organising European co-operation in this area. The Convention is the first international treaty to be exclusively concerned with all aspects of European landscape. It applies to the entire territory of the Parties and covers natural, rural, urban, and peri-urban areas. It concerns landscapes that might be considered outstanding as well as everyday or blighted landscapes.

The Convention entered into force on 1 March 2004. As of 15 April 2008, 29 out of 47 member states of the Council of Europe had ratified the Convention: Armenia, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Finland, France, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Moldova, the Netherlands, Norway, Poland, Portugal, Romania, San Marino, the Slovak Republic, Slovenia, Spain, the Former Yugoslav Republic of Macedonia, Turkey, Ukraine, and the United Kingdom. Six states had signed but not ratified it: Azerbaijan, Greece, Malta, Serbia, Sweden and Switzerland.

2.1.1 Presentation of the European Landscape Convention

The member states of the Council of Europe signatory to the European Landscape Convention declared their concern to achieve sustainable development based on a balanced and harmonious relationship between social needs, economic activity and the environment. The Convention represents therefore the first international treaty devoted to sustainable development, the cultural dimension also being included.

2.1.1.1 Origins of the Convention

On the basis of an initial draft prepared by the Congress of Local and Regional Authorities of Europe, the Committee of Ministers decided in 1999 to set up a group of selected experts responsible for drafting a European Landscape Convention, under the aegis of the Cultural Heritage Committee (CCPAT) and the

[2] Concerning the cultural heritage, see also the other conventions of the Council of Europe: Convention for the Protection of the Architectural Heritage of Europe (Granada, 3 October 1985), European Convention on the Protection of the Archaeological Heritage (London, 6 May 1969) (revised, Valletta, 16 January 1992) and Framework Convention on the Value of Cultural Heritage for society (Faro, 20 October 2005).

Committee for the activities of the Council of Europe in the field of biological and landscape diversity (CO-DBP). Following the work of this group of experts, in which the principal governmental and non-governmental international organisations participated, the Committee of Ministers adopted the final text of the Convention on 19 July 2000. The Convention was opened for signature in Florence, Italy on 20 October 2000 in the context of the Council of Europe Campaign "Europe, a common heritage".

2.1.1.2 Why a convention on landscape?

As an essential factor of individual and communal well-being and an important part of people's quality of life, landscape contributes to human fulfilment and consolidation of the European identity. It also has an important public interest role in the cultural, ecological, environmental, and social fields, and constitutes a resource favourable to economic activity, particularly to tourism.

The progress in production technologies, in agriculture, forestry, industry, and mining, together with the practices followed in town and country planning, transport, networks, tourism, and recreation, and more generally the global economic changes, in very many cases have led to degradation, debasement, or transformation of landscapes.

While each citizen must of course contribute to preserving the quality of landscape, it is the responsibility of public authorities to define the general framework in which this quality can be secured. The Convention, thus, lays down the general legal principles, which should guide the adoption of national and community landscape policies and the establishment of international co-operation in this field.

2.1.1.3 The objectives and specificity of the Convention

The aim of the Convention is to respond to the public wish to enjoy high quality landscapes. Its purpose is therefore to further the protection, management, and planning of European landscapes, and to organise European co-operation in this field.

The scope of the Convention is very extensive: it applies to the entire territory of the Parties and relates to natural, urban, and peri-urban areas, whether on land, water, or sea. It therefore concerns not just remarkable landscapes, but also ordinary everyday landscapes and degraded areas. Landscape is recognised irrespective of its exceptional value, since all forms of landscape are crucial to the quality of the citizens' environment and deserve to be considered in landscape policies. In particular, many rural and urban fringe areas are undergoing far-reach-

ing transformations and must receive closer attention from the authorities and the public.

Given the breadth of scope, the active role of the citizens regarding perception and evaluation of landscapes is an essential point of the Convention. Awareness raising is thus a key issue in order that the citizens participate in the decision-making process, which affects the landscape dimension of the territory where they reside.

2.1.1.4 Definitions

Terms used in the Convention are defined to ensure that they are interpreted in the same way:

– "Landscape" means an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors;

– "Landscape policy" means an expression by the competent public authorities of general principles, strategies and guidelines that permit the taking of specific measures aimed at the protection, management and planning of landscapes;

– "Landscape quality objective" means, for a specific landscape, the formulation by the competent public authorities of the aspirations of the public with regard to the landscape features of their surroundings;

– "Landscape protection" means action to conserve and maintain the significant or characteristic features of a landscape, justified by the landscape's heritage value derived from its natural configuration and/or human activity;

– "Landscape management" means action, from a perspective of sustainable development, to ensure the regular upkeep of a landscape, to guide and harmonise changes, which are brought about by social, economic and environmental processes;

– "Landscape planning" means strong forward-looking action to enhance, restore or create landscapes.

2.1.1.5 Undertakings of the Contracting Parties

National measures. In accepting the principles and aims of the Convention, the Contracting Parties undertake to protect, manage and/or plan their landscapes by adopting a whole series of general and specific measures at a national level, in keeping with the subsidiarity principle. In this context, they undertake to encourage the participation of the public and of local and regional authorities in the decision-making processes that affect the landscape dimension of their territory.

The Contracting Parties undertake to implement four general measures at the national level:

– legal recognition of landscape as constituting an essential component of the setting for people's lives, as reflecting the diversity of their common cultural and natural heritage and as the foundation of their identity;

– establishment and implementation of policies to protect, manage and plan landscapes;

– procedures for the participation by the general public, local and regional authorities and other parties interested in the formulation and implementation of landscape policies;

– integrating landscape into regional and town planning policies, cultural, environmental, agricultural, social, economic policies, and any other policies, which may have direct or indirect impact on the landscape.

The Contracting Parties further undertake to implement five specific measures at a national level:

– awareness-raising: improving appreciation by civil society, private organisations and public authorities regarding the value, function and transformation of landscapes;

– training and education: providing training for specialists in landscape appraisal and landscape operations, multidisciplinary training programmes on landscape policy, protection, management and planning, aimed for professionals in the private and public sector, for interested associations, and school and university courses, which, in the relevant subject areas, cover landscape-related values and issues of landscape protection, management and planning;

– identification and evaluation: mobilising those concerned to reach a better knowledge of landscape, guiding the work of landscape identification and evaluation through exchanges of experience and methods between the Parties at a European level;

– setting landscape quality objectives: defining quality objectives for landscapes which have been identified and evaluated, after consulting the public;

– implementation of landscape polices: introducing policy instruments for the protection, management and/or planning of landscapes.

International measures: European co-operation. The Contracting Parties also undertake to co-operate at an international level in catering for the landscape dimension in international policies and programmes, and to recommend as appropriate the inclusion of landscape considerations in them. They accordingly undertake to co-operate in respect of technical and scientific assistance and exchange of landscape specialists for training and information, and to exchange information on all questions covered by the Convention.

Transfrontier landscapes are covered by a specific provision: the Contracting Parties undertake to encourage transfrontier co-operation at local and regional levels and, wherever necessary, to prepare and implement joint landscape programmes.

Council of Europe Landscape Award. The Convention intends to give a "Council of Europe Landscape Award". It will recognise a policy implemented or measures to be taken by local and regional authorities or non-governmental organisations to protect, manage, and/or plan their landscape which have proved effective in the long term and can thus serve as an example to other authorities in Europe. Thus, it contributes to the stimulation of those working at a local level and to the encouragement and recognition of exemplary landscape management.

2.1.2 Implementation of the European Landscape Convention.

The Convention provides that existing competent committees of experts set up under Article 17 of the Statute of the Council of Europe shall be designated by the Committee of Ministers of the Council of Europe to be responsible for monitoring its implementation [Déjeant-Pons 2006]. It also provides that, following each meeting of the committees of experts, the Secretary General of the Council of Europe shall transmit a report on the work carried out and on the operation of the Convention to the Committee of Ministers and that the said committees shall propose to the Committee of Ministers the criteria for conferring and the rules governing the Landscape Award of the Council of Europe.

On 19 July 2000, when the European Landscape Convention was adopted, the Ministers' Deputies " … instructed the Committee for the activities of the Council of Europe in the field of biological and landscape diversity (CO-DBP) and the Cultural Heritage Committee (CDPAT) to monitor the implementation of the European Landscape Convention" [Déjeant-Pons 2006].

The Declaration of the Second Conference of Contracting and Signatory States to the European Landscape Convention adopted in Strasbourg on 29 November 2002, of which the Committee of Ministers took note on 28 May 2003, also asked the Committee of Ministers to associate the Committee of Senior Officials of the European Conference of Ministers responsible for Regional Planning (CEMAT) in the work of the committees of experts responsible under Article 10 for monitoring implementation of the Convention.

On 30 January 2008, the Committee of Ministers adopted the terms of reference of a new Steering Committee for Cultural Heritage and Landscape (CDPATEP), which is now responsible for dealing with natural and cultural heritage issues. It has the task of monitoring the following Conventions on the cultural heritage and the landscape [Déjeant-Pons 2006]:

– the European Convention on the Protection of the Archaeological Heritage and the European Convention on the Protection of the Archaeological Heritage (revised);

– the Convention for the Protection of the Architectural Heritage of Europe;

– the European Landscape Convention.

With regard to following up the European Landscape Convention, the terms of reference provide that the CDPATEP shall also take into account the work of the periodic Council of Europe conferences on the European Landscape Convention and other work by appropriate experts.

The work done to implement the European Landscape Convention is aimed at:

– monitoring implementation of the Convention;

– fostering European co-operation;

– raising awareness of the importance of landscape in relation to the Council of Europe's core objectives, landscape being considered as people's living environment from the angle of sustainable spatial development and an issue for democratic debate.

2.1.2.1 Measures taken since the Convention was drafted to implement and promote it

Recommendation CM/Rec(2008)3 of the Committee of Ministers to member states on the guidelines for the implementation of the European Landscape Convention was adopted by the Committee of Ministers on 6 February 2008 at the 1017th meeting of the Ministers' Deputies. The recommendation, which contains a series of theoretical, methodological and practical guidelines, is intended for Parties to the Convention which wish to draw up and implement a national landscape policy based on the Convention. It also includes two appendices entitled:

– Examples of instruments used to implement the European Landscape Convention;

– Suggested text for the practical implementation of the European Landscape Convention at a national level.

Appendix 1 to the recommendation may be supplemented by the experiences of parties to the Convention on their own territories, which will provide practical and methodological lessons. It is proposed that each party contributes to the setting up of a database to appear on the website of the Council of Europe's European Landscape Convention, which would be a "toolbox" to help provide mutual technical and scientific assistance, as provided for in Article 8 of the Convention.

Summary descriptive notes on the landscape policies pursued in the Council of Europe member states. A document entitled "Summary descriptive notes on the landscape policies pursued in Council of Europe member states", giving the key facts concerning the landscape of the various Council of Europe member states, has been produced and the information in the notes has been analysed [Déjeant-Pons 2006].

An updated version of the notes was presented at the Council of Europe Conference on the European Landscape Convention held in Strasbourg on 22 and 23 March 2007.

The descriptive notes are due to be updated regularly.

National seminars on the European Landscape Convention. Intended for states which have or have not yet ratified the Convention, the national seminars on the European Landscape Convention help generate debate on the subject of landscape.

Five national seminars on the European Landscape Convention have been held to date, with declarations or conclusions adopted at the end of each one:

– Seminar on "Spatial planning and landscape", Yerevan, Armenia, 23-24 October 2003;

– Seminar on "Spatial planning and landscape", Moscow, Russian Federation, 26-27 April 2004;

– Seminar on "Sustainable spatial development and the European Landscape Convention", Tulcea, Romania, 6-7 May 2004;

– Seminar on "The contribution of Albania to the implementation of the European Landscape Convention", Tirana, Albania, 15-16 December 2005;

– Seminar on landscape, Andorra la Vella, Principality of Andorra, 4-5 June 2007.

Other seminars may also be held.

2.1.2.2 Promotion of European co-operation

The European Landscape Convention provides that the contracting Parties undertake to co-operate internationally at the European level in the consideration of the landscape dimension of international policies and programmes. The Council of Europe organises this co-operation through the Conferences on the European Landscape Convention and the meetings of the Workshops for the implementation of the European Landscape Convention.

The Council of Europe Conferences on the European Landscape Convention. Several Conferences on the European Landscape Convention have already been held. They are attended by representatives of the parties and signatories and representatives of the three Council of Europe bodies - the Committee of Ministers, the Parliamentary Assembly and the Congress of Local and Regional Authorities of Europe. Representatives of Council of Europe member states which are not yet parties or signatories and various international governmental and non-governmental organisations also attend as observers.

Two Conferences of the Contracting and Signatory States to the European Landscape Convention were held at the Council of Europe in Strasbourg on 22 and 23 November 2001 and on 28 and 29 November 2002. In particular, they served to:

– promote the signature and/or ratification of the Convention so that it could swiftly enter into force;

– provide legal assistance for the signatory states and Council of Europe member states invited to sign the Convention;

– pave the way for the actual implementation of the Convention following its entry into force.

Following the entry into force of the European Landscape Convention on 1 March 2004, a conference to mark the event and a joint meeting of the Steering Committee for Cultural Heritage (CDPAT) and the Committee for the activities of the Council of Europe in the field of Biological and Landscape Diversity (CO-DBP) were held in Strasbourg on 17 and 18 June 2004.

A further Council of Europe Conference on the European Landscape Convention was held in Strasbourg on 22 and 23 March 2007. Final conclusions concerning the "Guidelines for the implementation of the European Landscape Convention" and the "Rules governing the Landscape Award of the Council of Europe" were adopted [Déjeant-Pons 2006].

It is planned that the next conference will be held in 2009.

Meetings of the Workshops for the implementation of the European Landscape Convention. Organised by the Council of Europe on a regular basis since 2002, the meetings of the Workshops for the implementation of the European Landscape Convention take a detailed look at the implementation of the Convention. Special emphasis is given to the experiences of the state hosting the meeting. A genuine forum for sharing practice and ideas, the meetings are also an opportunity to present new concepts and achievements in connection with the Convention.

Six meetings of the Council of Europe Workshops for the implementation of the European Landscape Convention have been held so far:

– 23-24 May 2002, Strasbourg: "Landscape policies: contribution to the well-being of European citizens and to sustainable development (social, economic, cultural and ecological approaches) (Preamble to the Convention); Landscape identification, evaluation and quality objectives, using cultural and natural resources (Article 6 of the Convention); Awareness-raising, training and education (Article 6 of the Convention); Innovative tools for the protection, management and planning of landscape (Article 5 of the Convention)";

– 27-28 November 2003, Strasbourg: "Integration of landscapes in international policies and programmes (Article 7 of the Convention) and transfrontier landscapes (Article 9 of the Convention); Landscapes and individual and social well-being (Preamble to the Convention); Spatial planning and landscape (Article 5 of the Convention)";

– 16-17 June 2005, Cork (Ireland): "Landscapes for urban, suburban and peri-urban areas" (Article 5(d) of the Convention);

– 11-12 May 2006, Ljubljana (Slovenia): "Landscape and society" (Preamble to the Convention);

– 28-29 September 2006, Girona (Spain): "Landscape quality objectives: from theory to practice" (Article 6 C, D, E of the Convention);

– September 2007, Sibiu (Romania): "Landscape and rural heritage", in the context of the Year "Sibiu, European Capital of Culture" (Article 5(d) of the Convention).

The seventh meeting of the Council of Europe Workshops for the implementation of the European Landscape Convention will be held in Piestany, Slovakia, on 24 and 25 April 2008 on the subject of "Landscape in development policies and governance: towards integrated spatial planning" (Articles 4 and 5(d) of the Convention).

The proceedings of the workshops are regularly published in the Council of Europe's Spatial Planning and Landscape series.

2.1.2.3 Awareness-raising and information

Council of Europe Landscape Award. The Convention (Article 11) provides for a Council of Europe Landscape Award. In particular, it states that, on proposals from the committees of experts supervising the implementation of the Convention, the Committee of Ministers shall define and publish the criteria for conferring the Landscape Award, adopt the relevant rules and confer the award. The Committee of Ministers adopted Resolution CM/Res (2008)3 on the rules governing the Landscape Award of the Council of Europe on 20 February 2008. The award will be launched in 2008 and conferred for the first time in 2009.

The Landscape Award of the Council of Europe may be conferred to local and regional authorities or groups thereof which have instituted, as part of the landscape policy of a party to the Convention, a policy or measures to protect, manage and/or plan their landscape, which have proved lastingly effective and can thus serve as an example to other local and regional authorities in Europe. The distinction may also be conferred to non-governmental organisations having made particularly remarkable contributions to landscape protection, management, or planning.

European Landscape Convention website. The Convention website (http://www.coe.int/EuropeanLandscapeConvention (English) and http://www.coe.int/Conventioneuropeennedupaysage (French)) is currently being redesigned and should include the following:

– Presentation of the European Landscape Convention;

– State of signatures and ratifications of the European Landscape Convention;

– Implementation of the European Landscape Convention (before and since its entry into force);

– Meetings of the Workshops for the implementation of the European Landscape Convention;

– National Seminars on the European Landscape Convention;

– Reference texts on landscape;

– National policies;

– Network of partners of the European Landscape Convention;

– Landscape calendar;

– Publications;

– Contacts.

The site will also offer access to the database provided for in Recommendation CM/Rec (2008)3 of the Committee of Ministers to member states on the guidelines for the implementation of the European Landscape Convention.

Reports and information documents. Reports by Council of Europe experts are submitted to relevant committees of experts for the purpose of monitoring implementation of the provisions of the Convention.

To date, reports have been produced on the following subjects:

– Landscape policies: contribution to the well-being of European citizens and to sustainable development (social, economic, cultural and ecological approaches) (Preamble to the Convention);

– Landscape identification, evaluation and quality objectives, using cultural and natural resources (Article 6 of the Convention);

– Awareness-raising, training and education (Article 6 of the Convention);

– Innovative tools for the protection, management and planning of landscape (Article 5 of the Convention);

– Landscape, towns and suburban and peri-urban areas;

– Landscape and transport infrastructures: roads;

– Landscape and education (under preparation).

Several information documents and four issues of the Council of Europe's *Naturopa* magazine have been devoted to landscape and the European Landscape Convention [Déjeant-Pons 2006]:

– "Landscapes: the setting for our future lives", Naturopa, No 86, 1998.

– "The European Landscape Convention", Naturopa, No 98, 2002.

– "Landscape through literature", Naturopa/Culturopa, No 103, 2005 (special issue, European Landscape Convention). This issue brought together texts and pictures from the 46 Council of Europe member states to show that landscape has always had a key spiritual part to play in the lives of individuals everywhere.

– "Vernacular rural housing: heritage in the landscape", No 1, 2008.

The magazine has been renamed *Futuropa, for a new vision of landscape and territory* so as to highlight the cross-sectoral nature of the themes more clearly.

A future issue may focus on landscape and transfrontier co-operation.

The Action Plan adopted by the Heads of states and government of the member states of the Council of Europe on 17 May 2005 in Warsaw at the Third Summit of the Council of Europe states include a section to the promotion of sustainable development and states: "We are committed to improving the quality of life for citizens. The Council of Europe shall therefore, on the basis of the existing instruments, further develop and support integrated policies in the fields of environment, landscape, spatial planning and prevention and management of natural disasters, in a sustainable development perspective" [Déjeant-Pons 2002].

The European Landscape Convention represents an important contribution to the implementation of the Council of Europe's objectives, namely to promote democracy, human rights and the rule of law and to seek common solutions to the main problems facing European society today [Council of Europe 2006]. By taking into account landscape qualities, the Council of Europe seeks to protect Europeans' quality of life and individual and collective well-being.

2.2. LANDSCAPE IDENTIFICATION AND EVALUATION RESEARCH WITH THE HELP OF THE ECOVAST METHOD, AS A CONTRIBUTION TO THE PROCESS OF IMPLEMENTATION OF THE EUROPEAN LANDSCAPE CONVENTION EXEMPLIFIED BY THE MUNICIPALITY OF WIŚNIOWA

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Even though the regulations of the European Landscape Convention (ELC) ratified by Poland on 27th. September 2004 are not yet widely followed in Poland at the national level, there are a number of valuable initiatives for Convention implementation, particularly at regional and local levels. This may be exemplified by landscape identification research carried out for the first time in Poland with the help of the ECOVAST method conducted in the municipality of Wiśniowa (the Region of Malopolska).

The method, which will be presented closer in this chapter of the monographic volume, not only assumes conducting landscape identification activities but also making local communities interested in the processes of landscape protection and shaping. It was this aspect of the ECOVAST method that the research carried out in Wiśniowa reflected above all. Workshop leaders observed representatives of the local authority and inhabitants of Wiśniowa "opening their eyes" at the sight of assets their municipality can boast new directions of development, disappearing elements of their cultural heritage, and threats to natural life fundaments. The research resulted in the creation of guidelines for specific activities (projects) to protect and shape natural and cultural resources of Wiśniowa's landscape in an active way. In this sense the conducted work is also the first step towards sustainable rural development and "good regional governance".

One of the basic issues that always should be taken into account when working with and for the ELC is the surprisingly simple but nevertheless comprehensive landscape definition of the CoE experts: "Landscape means an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors". It stresses the point that the human perception is a decisive part of landscape itself. Without its perception, landscape does not occur for human beings; and it also emphasises the importance of understanding landscapes and their differences [ELC 2000].

2.2.1 The ECOVAST method as a user-friendly method stimulating grass-roots activities for landscape protection and shaping

Landscape surrounds man and matters to him because it is the setting of our daily lives and it contains evidence of how previous generations used the land. Landscape is filled with human history and nature. In recent years, people and governments of most European countries have realized that landscape is a major element of their national and European heritage. They have appreciated the significance of landscape activities, embracing both its natural and cultural features in an integrated way. They have come to realize that many of Europe's landscapes have been gravely damaged in recent years by, for example, unsuitable investments or loss of their natural features. Such an approach to landscape is expressed in the European Landscape Convention, which is to protect and improve the state of landscapes in order to prevent their further degradation. Its priority is to encourage people and governments throughout Europe to care for the landscapes of the continent in a comprehensive way, through processes of understanding, identification, assessment, protection, management, and planning landscapes [ELC 2000].

Phot. 1. Wiśniowa seen from the south-east (photo: J.M. Pijanowski)

Landscapes of Europe, with all their diversity, have been created by people over thousands of years. They constitute some of the main elements of our heritage and identity and play a number of functions in people's lives. Identification and understanding of processes occurring in landscape gives a lot of satisfaction. It is like studying works of art, but it can also trigger specific activities (projects) to protect and shape landscape resources.

Landscapes have always been changing due to natural or cultural events and they will continue to change. It is our obligation to make these changes positive. We should make efforts to ensure that the quality and unique character of each landscape does not deteriorate with subsequent transformations. That is why it is so important to understand the character of each landscape, its basic elements and the way it is changing.

In the light of the above, the ECOVAST method consists of the following components:

– landscape evaluation, which refers to the process of assessing which landscape features should be particularly protected and "exposed";

– definition of objectives as to the future quality of landscape;

– definition of landscape management guidelines, based on the assumption that its character and aesthetic assets are influenced by human activity. Only if we can provide also the economic proposition to keep sufficient population in rural communities, the maintenance of landscapes in our and the ELC's meaning can be granted (e.g., grazing of livestock or maintaining hedges or walls and characteristic farm houses);

– definition of planning measures in landscape where wide-scale changes seem indispensable due to economic or environmental reasons (e.g. areas requiring revitalisation).

– The problem to be solved can be condensed in the following sentence: to allow indispensable changes while keeping up landscape character. The situation is most favourable if the above-mentioned decisions are taken in cooperation with the local community, local and regional authorities and local people to be involved [Weber and Stöglehner 2006].

– Throughout several years the ECOVAST Working Group on Landscape has developed and tested a method of assessing landscapes and identifying landscape units [Spiegler and Dower 2006] which was supposed to support widely conducted activities within ELC implementation. This method is mainly designed for small groups of local people, who within 2-3 days can, with the help of an expert, identify and describe a given landscape unit, in a way which will make it possible to recognize its resources and threats. This may serve as a starting point for practical activities (projects) to protect and shape natural and cultural resources of this landscape unit.

Although this method has been designed primarily to identify landscape units on the whole of a country's territory - one of the main issues of the ELC implementation - it could proof its ability to be adapted for different purposes and different scales (e.g. the local scale). ECOVAST is very happy to find its ideas and work helpful for applications that originally were not intended.

2.2.2 Landscape identification as a significant incentive for the local community

In order to protect and shape landscape, the following question has to be answered in the first place: What is the quality of landscape? Every landscape in Europe is unique. Each landscape has a distinct character. The character emerges from the form of the land, the quality of the soil and the vegetation, the way the land is used, the pattern of human settlement and - what is most important - the understanding and perception of landscape by people (see the above-mentioned landscape definition of the ELC). This distinct character is what makes a place feel like home for those who live there and makes tourists wish to visit and return to this area. The character of landscape creates a "sense of place".

The ECOVAST method, (known as ECOVAST Landscape identification - a Guide to Good Practice, can be downloaded from www.ecovast.org) is comparably simple and based on a matrix of natural and cultural landscape elements, starting with rocks, climate, land form and soil, moving on to embrace land cover, that is vegetation and natural habitats; proceeds to pick up varied human features and activities on land, and focusing finally on emotional aspects of landscape.

In detail, the matrix looks as follows (cf. Table 1):

- spirituality and associative feelings,
- characteristic historic features (castles, monasteries, archeological sites),
- other man-made features (industry, tourism, infrastructure),
- characteristic features of houses and settlements,
- characteristic features and patterns of agriculture and forestry,
- land cover (vegetation, wildlife, habitats),
- soil,
- landform (geomorphology),
- climate (hydrology, rivers, lakes, glaciers)
- rocks (surface geology).

The 10 "landscape layers" as listed above consist of 5 anthropogenic/cultural elements and 5 natural elements. The fact that natural and cultural elements are examined jointly, not in isolation, reflects a very significant advantage of the ECOVAST method. The matrix makes it possible to register relative importance of each landscape feature. The matrix also embraces:

- a short description of a landscape,
- a shorten evaluation of its character,
- possible additional comments,

that are also reflected in the landscape resources evaluation matrix.

Table 1 presents the results of research activities on the characteristic landscape features carried out in Wiśniowa.

Table 1. Landscape identification matrix for the village of Wiśniowa (the so-called "checklist")

Landscape features ("Landscape layers")	**Relative strength of the features (graduation 1-4)[4]:**			
	dominating	**strong**	**moderate**	**low**
Feelings and associations [5]		**D.** Prevailing calm, associative feelings		
Characteristic historic features[6]		**E.** Existing religious and historical objects		
Other man-made features [7]			**F.** Power lines, a blot on the landscape	
Characteristic features of houses and settlements[8]	**A.** Low-density housing, homestead form			
Characteristic features and patterns of agriculture and forestry [9]			**G.** agricultural and forest production space attractive in terms of landscape, typical for the foothills (the Beskid Wyspowy Mountains) orchards (apple and others)	
Land cover [10]	**B.** Unique foothill landscape (the Beskid Wyspowy Mountains)			
Land form [11]	**C.** Incredibly characteristic, memorable valley land form	**F.** Typical hilly area with a valley		
Soil [12]				
Climate (water, rivers and streams, lakes, glaciers, etc.)[13]				
Rocks [14]				

Short description[15]

The landscape of Wiśniowa, when compared with neighbouring communities, is relatively original. It is particularly distinguished by a sharp border between the forest area on the hills and the lower meadows with arable land. Wiśniowa's landscape is characterized by almost idyllic atmosphere and tranquillity. The sights and historical objects are hidden in the landscape. They bring back special feelings - especially two small war cemeteries of Austrian soldiers from the beginning of the last century. Agricultural production space is characterized by strongly mixed agricultural use. Dominated by meadows, with a relatively large proportion of arable land and few special cultivations. Wiśniowa's landscape is strongly inhabited, with preserved historical architecture. Many old farms are still preserved. One characteristic feature is that they are in the immediate vicinity of many fruit trees.

Assessment[16]

Original landscape with regional importance. It seems important that the communities in the immediate neighbourhood reveal a different landscape character. Dobczyce is characterized by a large water reservoir. On the other hand, Raciechowice is characteristic for apple tree plantations. The strong urban layout (and wiring) both in the valley as well as on the slopes is unpleasantly striking. Nevertheless, even in such a layout can we find distinctive regional farms and their yellow-brown wood colouring.

Additional comments[17]

Many old farms are still preserved in Wiśniowa. It is characteristic that they are in the immediate vicinity of fruit orchards. They should be perceived as small agricultural enterprises. They can be an additional source of income for the farmers, at least partly, thanks to mountain cycling paths.

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[4] Exceptional features shall be marked in bold.

[5] Identifying landscape is not a "cold" process, undertaken like a scientist dissecting of a dead animal. It is a "warm" process, concerned with a living entity, a place that lives and changes, which has a past and a future and is imbued with the emotions of people. One should therefore be alert to these emotions and feelings that the landscape brings to people, the ideas that they associate with landscape. These feelings may be expressed in music, painting, and poetry. Almost every landscape or region is the homeland of at least one renowned artist. The CoE dedicated a volume of its "**naturopa"** to the topic "landscape through literature; but it could as well publish a volume on "landscape and painting" or "landscape and music". In the names that are applied to landscape by the people; in the associations with past events or famous people; or in the feeling that certain landscapes are sacred. One should be alert to one's own emotional reaction to landscape. This will help you in writing the description, the wording of the illustrations and in making the 'assessment' which is provided for on the form.

[6] Europe as a whole is special among continents in being so long and so densely settled. The settlement pattern and the land uses of today are overlaid on those of past generations. Sometimes, the historic features are highly visible, and may set the special character of the place - the hill towns of Croatia, castles in many regions, the windmills of Holland. Elsewhere, the historic pattern may be partly obscured, and it takes a keen eye to pick out what we inherit from the past - the curve of ridges in a field where oxen used to pull the plough, the line of the channel which used to bring water to the mill, the great ditches which mark the boundaries of a hill fort. The landscape contains the evidence of history. So understanding of local history can help you to interpret what you see in the landscape.

[7] The landscape is a stage on which appear many actors. You may expect the farmer, the forester the householder or the priest. But what about the miner, the quarryman, the soldier, the electricity engineer, the road-builder? The features that they have created - roads, railways, cement works, factories, quarries, military camps, power stations - may provide strong elements in the landscape. These - and the changes in them - need to be recorded.

[8] During thousands of years, people have settled throughout Europe. They sought sheltered places, where water was available, where they could make a living. They built their houses of local materials - stone, wood, clay, flint, thatch, lime. They created villages, towns and cities. From this process, each area has inherited a pattern of specific houses and settlements which are characteristic to that place; which (to greater or lesser degree) reflect or harmonise with the underlying rocks, the climate and the land form; and which may bring dramatic punctuation to the landscape, as with the towers and spires of churches or the compact form of a village street. Of recent years, the advent of long-distance transport and mass-produced building materials has prompted a fall in the use of local materials: building styles have become more uniform across wide regions. But this process has not destroyed the variation in local building traditions and in settlement patterns, which remain strong elements in many landscapes. You may wish to study these traditions and patterns, to note how far they still exist, but also what changes are taking place in the pattern and design of buildings and settlements.

[9] Almost 90% of the land area of Europe is used for either forming or forestry. The regime that is observed by the farmers and foresters has a strong effect on the shape of rural landscape and upon the seasonal changes in the appearance of the landscape. Ploughing, sowing, harvesting of crops; cutting of hay or gathering silage; moving herds or flocks within or across the land; planting, thinning and felling of forest trees - these bring change, colour, patterns and movement to the landscape, often in ways (such as the colour of the cows) that are special to a particular place. The way in which farmers maintain their land has a decisive influence on the ecology as well as the view of landscape. The roots of our ‘cultural landscape’ stretch back to the time when mankind changed its habit from hunters to farmers! So, it is necessary to keep an eye on how the farmers and the foresters are using the land, and on the buildings and other features - barns, silos, walls, hedges, machinery - which they have brought into the landscape. Also, look for the changes which are occurring, such as the planting of trees instead of farm crops, the construction of new farm buildings, or the abandonment of fields. And for sure the changing to “energy plants” may change landscape ecology and landscape view dramatically!

[10] In many rural landscapes, vegetation is the most obvious visible feature. Even in some villages and towns, trees and other greenery may provide a ‘cloak’ within which the buildings sit. So, you should look closely at how the land is covered, the broad pattern of vegetation, the division between woodlands and fields, the network of hedges or other field boundaries, the avenues or single trees, the areas of water and the rivers and streams - because these are the landscape elements in which landscapes may differ from each other. Land cover produces a visual pattern: it also offers varying habitats for wildlife, which further enrich the landscape. Wild flowers, so easily visible, and birds, wild animals but also the herds of cattle and other domesticated animals contribute to the special character of each landscape. As with the landform, the main pattern of land cover will show up on a physical map: but one needs to look keenly in the field to see the detail and the impact of this pattern. It is also necessary to note the changes which appear to be taking place, for example, the growth of scrub in places which were previously kept open by grazing, or on abandoned and decaying terraces.

[11] In many landscapes, the strongest visible shapes come from the form of the land - the mountains, the hills, the gentle curves of a rolling landscape, the horizontal lines of a flat plain, the dip of a river valley, or the curve of a lakeshore. Europe is richly varied in landform, both across its broad land mass and on its complex edges. No other continent has so broken a coastline, including almost separated oceans such as the Baltic, the Black Sea and the Mediterranean. Careful reading of physical map, with its clear contours, may tell you what to expect in terms of land form: but a keen eye needs to be applied in the field in order to judge how the shape of the land is expressed in what you see, and how it relates to 'imposed' features such as trees and buildings. For example, sometimes a castle gives dramatic emphasis to a hilltop, or a line of trees marks the path of a river.

[12] In some landscapes, the soil is scarcely visible because it is covered throughout the year by woods, heath or pastures. Elsewhere, the soil may be exposed by seasonal cultivation, by erosion or by wind. But everywhere the soil is a major factor in the landscape: its thickness, fertility and level of acidity determine the plants, the trees, the crops and the farm animals that will flourish there. Its colour may 'paint' the landscape. So, you can understand a landscape better if you know something about the soil.

[13] It seems odd to suggest that you record the climate, as part of the landscape: you cannot see the wind but you can feel it, just as the temperature and the humidity. Landscape experience is a multi-sensual perception. Furthermore the climate has a profound effect upon the features in, and the appearance of, the landscape. Rainfall, frost, sun and wind may determine the abundance or shortage of vegetation and the shapes and movement in the landscape. On the western shores of Europe, the Atlantic winds cause the trees to bend permanently eastwards: in the flat lands of the Netherlands, wind and water combine to produce vivid movement and reflections in many landscapes: in the Alps, the cold air in the mountains sets a line above which trees are not survive (the so-called 'timber-line'). An understanding of your local climate will help you to interpret what you see in the landscape. A most essential part of climate is water in any state (vaporous, liquid or solid as snow and ice). It is possible to see or sense its presence directly (e.g., through heat, frost, dryness, humidity, sunshine, wind). Indirectly also, you may 'see' the climate through its effect upon landform - as in deserts, steppes, swamps, lakes or glaciers - and upon the typical vegetation.

[14] In a mountain landscape, or on a seacoast, it is often possible to see the rocks exposed: they are visible elements in the landscape. Elsewhere, the rocks may be invisible under a mantle of vegetation but they may appear in quarries, gorges and pits. You should focus on what is visible: but you may also note that the underlying rock - what is technically called the 'surface geology' - has a profound effect upon the nature and quality of the soil and (through the soil) upon the vegetation, the crops and the woodlands. Moreover, rocks have been used in many areas as a prime building material, and are thus reflected in the visible structures such as the smooth masonry of houses and churches, walls of flint or rammed earth, or bricks whose distinctive colour comes from the local clay. Before going out to look at the 'local landscape' it is worth studying a map showing the surface geology of the area.

[15] Referring at least to dominating features and describing the total impression of the landscape.

[16] First evaluation of the importance of the landscape.

[17] E.g. reference to regulations due to conservation orders or requirements.

To describe landscape better, photographs and description of dominating landscape features should be also included, another example from Wiśniowa is given below (Table 2) and an aerial map of the described landscape unit.

Now in Table 2 „Illustrations" follow, meaning the pictures and descriptions of the most important character items of the landscape of Wiśniowa. This is the second important part of the „landscape identification" accompanying and completing the matrix (check list).

Table 2. Description of dominating features of Wiśniowa's landscape

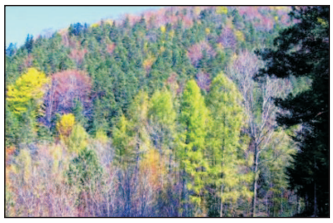
Dominating landscape features (according to Table 1)	Photograph
A. Low-density housing, homestead form In Polish foothills, farmers can build their farms without any restrictions in a dispersed manner. Villages are more compact only in higher situated areas of the Tatra region (e.g., the village of Trybsz). This design became general in recent times, making the buildings located in the agricultural area of Polish foothills very distinctive. This is also connected with the fact that private property was maintained after the World War II. This was not the case in Slovakia, which makes these two cultural landscapes so different, especially when it comes to certain landscape features. In the lower part (Phot. 2) one of many traditional farms of typical size, shape, and colours is seen. These small arable farms can sustain themselves by cultivating fruit trees as a basis for fruit juice market (juice, apple wine, or cider). They can also sell their product directly to consumers (agro-tourism, hiking, and cycling trails). Also accompanying meadows and wooded stream banks and small isolated wetlands are still common for this place. Construction type of a farmhouse and successful extension (Phot. 3); which is characteristic for the Beskid Wyspowy region. Typical, traditional farmhouse is plain, with characteristic yellow-brown colours and symbolism with rural motives mostly above the entrance door (Phot. 4). The extension, if not of wood but brick, can be described as successful as it incorporates suitable dimensions and proportions. The establishment of snack bars and other technical requirements needed for further development of agro-tourism, must take into account extensive traditional, rural architectural principles and construction types.	 **Phot. 2.** Historically formed farmstead of Wiśniowa village (photo: A. Spiegler)  **Phot. 3.** An example of old cottage extension in Wiśniowa (photo: A. Spiegler)  **Phot. 4.** Well-preserved historical cottage (photo: J.M. Pijanowski)

B. Unique foothill landscape (the Beskid Wyspowy Mountains)

A detail from the landscape of Beskid Wyspowy: one of many characteristic wooded peaks (Phot. 5); including small fields and meadows. Despite unattractive settlement pattern, the landscape is still rich. People have developed certain forms of agrotourism, using local resources (snack stations operated by farmers, cycling trails).

Forest vegetation is characteristic for the Beskid Wyspowy Mountains: mixed forest (pine, beech, birch, larch, spruce, and others) in the higher, steeper landscape parts (at the peak groups and altitude up to 1000 metres above sea level) (Phot. 6).

Phot. 5. Sharp border of the forest, typical for Wiśniowa landscape (photo: J.M. Pijanowski)



Phot. 6. Admirable colours and shades of mixed forests through the vegetations period (photo: A. Spiegler)

C. Characteristic and impressive valley landform

The dominant impression is a wide, gentle valley with its fields and meadows, surrounded by hills, with somewhat steeper peak groups and smaller hoods of mixed forests.
The landscape is open to the north, where the hills decline towards the Polish lowlands. The altitude ranges from 400 to 500 meters above sea level in the north to about below 1000 meters above sea level in the south.
The landscape is part of the Beskidy Mountains, the so-called the Beskid Wyspowy Mountains (Island Beskid).
Typical scenery for the Beskid Wyspowy Mountains. This region is the central area of the narrow but long, east-west zone of the northern, lower belt of the Beskidy Mountains. It dominates strong urban settlement - a triad of field crops, grassland, and forests.
What defines Wiśniowa is that the village is located in a relatively small, clearly defined valley. This does not include neighbouring communities as they do not resemble Wiśniowa's distinctive, fairy-tale character.

Phot. 7. Wiśniowa is laid in a valley surrounded by distinctive hills (photo: J.M. Pijanowski)

D. Prevailing calm, associative feelings

Wiśniowa's landscape is characterized by nearly idyllic atmosphere and tranquillity. The sights and historical objects are hidden in the landscape. They bring about special feelings - especially two small war cemeteries of Austrian soldiers from the beginning of the last century (Phot. 9).
The Forest Cemetery is an example of a historic site as well as special feelings or memories connected with this place.
Wiśniowa is also known for its astronomical associations. Some years before World War II a Cracovian scientist
discovered a comet in Wiśniowa's Space Observatory.

Phot. 8. Idyllic rural landscape of Wiśniowa (photo: J.M. Pijanowski)

Phot. 9. Cementary of Austrian soldiers from the First World War (photo: J.M. Pijanowski)

E. Existing religious and historical objects

The sights and historical objects are hidden in the landscape. They bring back special feelings - especially two small war cemeteries of the Austrian soldiers from the beginning of the last century. It is a sign of a dramatic battle from the 1914 between Austria and Russia. Churches, small meadows and road chapels are present in the landscape.
It should be noted that historical farms in Wiśniowa represent an important cultural value.

Phot. 10. Historic wooden church in Wiśniowa (photo: J.M. Pijanowski)

Phot. 11. Roadside shrine, located next to the road to Myślenice (photo: J.M. Pijanowski)

F. Power lines, a blot on the landscape

Power lines overwhelmingly cover the entire valley and the settlements. There is also a problem of waste water disposal.
On the opposite side - a characteristic landscape typical for the entire valley: fields and meadows in the valley and the slopes, crowned by the somewhat steeper, peak groups with the characteristic sharp boundary between forest and fields.

Phot. 12. Scattered village housestead is typical for Wiśniowa (photo: A. Spiegler)

Phot. 13. Idyllic landscape is disturbed by inertly located electric cables (photo: J.M. Pijanowski)

G. Agricultural and forest production space typical for the foothills (the Beskid Wyspowy Mountains)

The agricultural production space is characterized by strong mixed agricultural use: dominated by meadows, with a relatively large proportion of arable land and few special crops.

Phot. 14. Landscape of Wiśniowa is still closely connected with agriculture - dominating form of land usage (photo: J.M. Pijanowski)

2.2.3 Process of landscape unit assessment with the help of the ECOVAST method - an outline

To study a landscape unit and prepare its descriptions like those exemplified by Wiśniowa is a fairly straightforward process. The task should be tackled by a small group of people. The ECOVAST method yields best results if the group consists of members of the local community and, if possible, local students. Ideally, the group should be guided by someone who has some practical experience with this method.

The process involves three stages: preparatory work, fieldwork (looking at the landscape) and the writing up in a group (evaluating the landscape and its character).

2.2.3.1 Preparatory work

The preparation phase for landscape research with the help of the ECOVAST method mainly involves studying a map, preferably a physical map at a scale of 1:100 000 or 1:5 000 which allows you to see the whole of the landscape in question (or even several landscape units) on one sheet. To choose such a map one needs to have some idea in advance which landscape unit(s) will be analysed, even if one does not know where their edges are. The map may be the means by which the edges are provisionally identified. They are usually marked off by a sharp change in the pattern of contour lines, woodlands, towns or villages, hills and altitudes).

It can be also very useful to analyse scientific studies devoted to the assessed area, such as information about geology, the quality of the soil, the climate, and the history of how the land in the area has been used (farming, forestry, mining, quarrying, human settlement, etc.). This will help to understand the analysed landscape better. This additional information can be very useful even if this landscape is very well-known to the people taking part in the process. It will help them to look at a seemingly familiar landscape with new eyes, and to make "unconscious knowledge conscious", thus gaining a better understanding of the landscape as a whole and its character.

2.2.3.2 Fieldwork (looking at the landscape)

The ideal way to start fieldwork is to find viewpoints from which broad views over or through the landscape can be gained. Then, the group should travel through the landscape, gaining further impressions. On the way, the participants keep a record of what they see regarding all 10 groups of features which, in their opinion, determine the character of the given landscape.

On travelling across the landscape, the participants should discuss their observations and make notes on both visual landscape elements as well as feelings (sensual perception of the landscape); for example areas where mountain slopes become steeper, where plains begin, where land form and its colours, the degree of afforestation, or forms of rural buildings change.

It is also essential to take photos of the landscape, and particularly its dominating and striking features. All the knowledge which helps you to understand the landscape but which is not visible in fact, should be explained outside the matrix and in the text of the illustrations (cf. Table 2).

The aim is to gain a general impression of the whole landscape unit and also determine, on the ground, where the edges of the landscape unit are.

2.2.3.3 The writing up - group work

The last stage of the process is filling in the landscape matrix (Table 1) with observations regarding particular "landscape layers" contributing to its character. This should be done with the help of photographs. The emphasis should be on the visible elements of the landscape.

Each of the observations should be given a weight thus defining whether a given feature (a group of features) is "dominating", "strong", "moderate", or "low" in its contribution to the character of the landscape. These weights have been defined in such a way as to minimise discrepancies in assessment made by different groups of people:

– dominating feature - existing in all parts of the landscape unit; visible from most viewpoints; and contributing greatly to the character of the whole landscape unit.

– strong feature - contributing greatly to the character of part of the landscape unit, but not found in other parts of that unit or found thorough the landscape unit, but not a dominant element in its character.

– moderate feature - found in most parts of the landscape unit, but not a dominant element in its character.

– low feature - found occasionally but contributing to the character of the area. (This category is worth noting where this element is not found in the neighbouring landscape units and therefore contributes to the difference between units).

Observations made in the matrix will be then used as a basis for a short description and assessment of the landscape unit (cf. Table 1). Photographs should be used to illustrate most characteristic elements contributing to the character of the landscape (as shown by the illustrations above). They should be also described with information on their origin and on how they relate to the contemporary reality (cf. Table 2).

After finalising fieldwork (looking at the landscape) notes that have been made by all participants are compared to delete doubles. This is achieved by reading the notes to each other and crossing out double votes. After dismissing double entries, there will be a bigger or smaller collection of characteristic landscape forms left. They should be shortened to single words or very short expressions and written on stickers, each term on a single sticker.

Then, the stickers should be applied onto an enlarged or hand written checklist or matrix on a wall (or a flip chart) in accordance with the categories of the ten landscape layers. The next very significant step involves giving weights (the

evaluation). Each person in the group is given 8 sticky coloured dots that he or she is free to apply to the stickers that in his/her opinion contribute most to the character of that landscape. Each person may choose whether to use all 8 dots for one dominating feature or to mark several different items. The items that "win" the most dots are the strongest contributors to the landscape character. This procedure usually generates a very valuable discussion, which makes the group identify themselves with the landscape even stronger.

Finally the term on the beginning of every line of the matrix is given the sum of all points of the stickers of the respective line. If you look on photo 16 there will be no question, that the line number 7 - houses and settlements - has achieved the most dots, namely 16. Now you have to search for a term that represents best all the issues of this line - it might be "characteristic farmhouse". This term will be the term that is written down in the final matrix and evaluated as a "dominant" factor to the landscape character. The same counts for the line 5 with 12 dots. The terms that collected seven dots (in the lines 2 and 10) still contribute "strongly" to the landscape's character, and "moderate" could be called what collected, lets say 2 to four dots, less would be called "low". Thus the graduation is achieved. But do not totally forget stickers that could not collect one single dot, because they still might offer interesting hints to the understanding and description of the landscape that can be regarded in the landscape description or the text of the illustrations (see Table 2).

Discussions held by participants play a very important role in the landscape identification research carried out with the help of the ECOVAST method. Therefore it is of utmost importance that it is participated by people, which may influence development of the given area, such as politicians, scientists, or local leaders. It should be always remembered that these activities are supposed to be the first step in the process of landscape unit identification, which should be carried out by specialists, particularly in a country like Poland, where the process of identification and categorisation of cultural landscape resources, in accordance with the ELC requirements, has not begun yet. The end of this process and at the same time the request of the CoE carried out by the means of ELC is a list of all landscape on the whole of every countries territory. Only a few countries until now have fulfilled this task. Outstanding examples are Great Britain and Slovenia; for Austria there exists a proposition by ECOVAST Austria, called "Austrian Landscape Register" [Spiegler 2007].

Some further valuable hints about the European landscape dimension and praxis of implementation beside others you can get from the contributions of M. Dower, A. Spiegler in the proceedings of the 1st INTERREG Landscape Symposium [Spiegler 2006, Weber and Stöglehner 2006].

2.3. DYNAMIC ANALYSIS OF CHANGES IN CULTURAL LANDSCAPE OF WIŚNIOWA VILLAGE IN 1847-2006

Karol Noga, Monika Piotrowska, Jarosław Taszakowski

The study presents transformations of cultural landscape within 160 years on the basis of land cadastre documentation. Based on descriptive data, the analysis of landscape development in 1872-2006 was made in four periods of time for the whole village, whereas changes which took place in its cultural landscape from 1847 to 2006 were presented in fifteen selected łanș of forest on the basis of maps.

The spatial picture of a contemporary village is a result of multi-directional human activities conducted in close connection with ruling social-economic relations and natural conditions [Noga 1979]. In order to ensure means of support, man has changed natural landscape adapting it to his needs. The form of the present landscape has been strongly influenced by settlement type, resulting in a division of a settled area according to the established principles [Podkański 1906, Lenczowski 1957, Solecki 1977]. The land received by first settlers was mainly used for agricultural and building purposes as well as for transport routes. However, in the aftermath of demographic and economic development of the rural community, the original landscape arrangement has been subjected to continuous changes [Noga 1988, Noga 1993]. Such way of understanding this issue illustrates the aim of the study, which is to evaluate cultural landscape development in the village of Wiśniowa.

The scope of this study includes the analysis and evaluation of both cartographic materials created by Austria when the land register was created in our country as well as large-scale maps that were drawn in the investigated region in order to set up and keep the Polish cadastre. Map compilations allowed tracing the development of cultural landscapes starting from the first settlers' arrival up to the present moment. On the other hand, the descriptive-tabular part of the cadastre gives the possibility to estimate the size of the created spatial changes.

2.3.1 Genesis of cultural landscape formation in southern Poland and the Wiśniowa village.

The development of settlement up to the second half of the 15th century encompassed the most fertile areas of river valleys. This process ended up in the 16th century. As a result of the settlement, villages inhabited by people coming

from lowlands were created. Settlements of this kind were established under the German Law and based on a system of łans of forest [Lenczowski 1957]. The second form of occupying mountain areas was settlement under the Wallachian Law, also based on a system of łans of forest which were called zarębki. Such łans covered smaller areas and their soil was of worse quality than in case of łans created under the German Law [Lenczowski 1957]. The development of cultural landscapes in those villages manifested itself in larger and larger areas being occupied for agricultural land. Apart from peasants, new categories of rural population also originated. Among them, homesteaders operating farms of different sizes constituted the oldest historical category. After the end of the process of village spatial development, when more and more forest areas had been occupied, cultural landscapes started to develop internally. It consisted in enlarging both the area of arable land and pastureland at the cost of forests as well as the area of building land at the cost of agricultural land. Substantial population growth was a factor that contributed to this enlargement [Noga 1993]. An increase in population caused that the original łans of forest were divided into smaller parts creating privately-owned and cultivated landscape. In case of the investigated village, this is illustrated in Fig. 1.

Fig. 1. Łans of forest and their division in Wiśniowa (source: the authors' study)

The division of Wiśniowa according to the German Law took place in 1365. As it follows from Fig. 1, forty łans of forest belonging to the first settlers and two homesteads (Zagroda and Gizówka) were retraced in the investigated village on the basis of a cadastral map. Characteristic feature of łans of forest in Wiśniowa village was allotting them along both sides of the local river. Some of them were divided alongside into two parts. Names of łans and their divisions were derived from the first settlers' or their children's surnames. A profile of the allotted łans is included in Table 3.

Table 3. Profile of ' łans' of forest allotted to settlers in Wiśniowa in 1365 and retraced on the basis of a map of the Austrian cadastre

No. of *łan* of forest on Fi g. 1	Name of *łan*	Further division of *łan* and its name	Area of *łan* or its part		No. of *łan* of forest on Fig. 1	Name of *łan*	Further division of *łan* and its name	Area of *łan* or its part	
			ha	%				ha	%
1	Cyganówka		57.98	4.0	22	Kurpielówka		25.91	1.8
2	Kowalówka		46.27	3.2	23	Zwierzówka		23.21	1.6
3	without name		29.60	2.0	24	Plebańskie		32.92	2.2
4a		Graboszówka	18.32	1.3	25	Kaczmarzówka		25.11	1.7
4b		Płoszczkówka	24.79	1.7	26a		Zwierzówka	29.66	2.0
4	Total		43.11	3.0	26b		Tomerówka	15.25	1.0
5	Kalisiówka		30.23	2.1	26	Total		44.91	3.0
6	Matyjówka		37.67	2.6	27	Markówka		36.83	2.5
7	Pańskie		64.18	4.4	28a		Capówka	16.57	1.1
8	Mutówka		53.10	3.6	28b		Wilkówka	34.79	2.4
9	Flakówka		25.50	1.7	28	Total		51.36	3.5
10	Kluzówka		43.42	3.0	29a		Leśniakówka	19.69	1.3
11	Solarzówka		29.20	2.0	29b		Zawisówka	16.64	1.1
12	Murzynówka		57.63	3.9	29	Total		36.33	2.4
13a		Banachówka	18.99	1.3	30	Patykówka		33.01	2.3
13b		Michalika	7.18	0.5	31	Bąkówka		23.56	1.6
13	Total		26.17	1.8	32a		Polaków	8.48	0.6
14	Kośmidrówka		34.35	2.3	32b		Janikówka	8.88	0.6
15a		Bajerówka	14.29	1.0	32	Total		17.36	1.2
15b		Skowronówka	27.32	1.9	33a		Murzynówka	5.24	0.4
15	Total		41.61	2.9	33b		Śmiglówka	26.35	1.8
16a		Dyrdysówka	20.69	1.4	33	Total		31.59	2.2
16b		Hebdówka	36.36	2.5	34	Nawsicówka		17.71	1.2
16	Total		57.05	3.9	35	Libiosówka		20.28	1.4
17a		Tokarzówka	7.67	0.5	36	Jurkówka		36.02	2.5
17b		Marolówka	25.13	1.7	37	Pawełkówka		21.74	1.5
17	Total		32.80	2.2	38	Działkówka		30.10	2.1
18	Polakówka		33.42	2.3	39	Wilkówka		47.15	3.2
19a		Wieronkówka	5.48	0.4	40	Węglarzówka		71.93	4.9
19b		Kaniówka	15.62	1.1	All *łans* of forest			1 445.46	98.6
19	Total		21.10	1.5	41	Zagroda		17.18	1.2
20	Bieńkówka		23.94	1.6	42	Gizówka		2.89	0.2
21	Radoniówka		30.10	2.1		All homesteaders		20.07	1.4

Roads leading to arable land were most frequently located on boundaries between łans. Farm buildings were arranged along the river. The boundary lines of łans of forest specified in Fig. 1 and their areas (given in Table 3) have undergone further divisions over the centuries. Property divisions during distribution of an inheritance were made according to the principle of fair division, which meant that each child received grounds of similar soil quality and at a similar distance from a settlement. Due to the ground relief in the investigated village, further divisions were possible only perpendicularly to the gradient of slope creating a ladder-like arrangement of grounds.

2.3.2 Development of cultural landscape in Wiśniowa in 1872-1897

According to the exact cadastral records from 1872, the area of the investigated village was 1 614.14 ha. By the data included in Table 4, four basic types of land belonging to large and small estates (without building land, waters, or roads) covered 1 537.63 ha of that area. Agricultural land occupied the area of 1 297.67 ha (84.3%), whereas forests covered 240.56 ha (15.7%). As for the structure of agricultural land, the largest area of 792,41 ha was occupied by arable land, which constituted 51.5% of the analysed land of both estate forms. Pastureland had an area of 278.52 ha (18.1%), while the area of meadows together with gardens was 226.73 ha (14.7%). In the structure of ground possession small estates covered 1 428.87 ha (92,9%), whereas only 108.76 ha (7.1%) accounted for large estates.

Table 4. Structure of land ownership and use in 1872 in Wiśniowa (without building land, waters or roads) (source: Oksza-Orzechowski 1872, the authors' calculations)

No.	Form of land ownership	Overall area		Types of land							
				Arable land		Meadows and gardens		Pastureland		Forests	
		ha	%	ha	%	ha	%	ha	%	ha	%
1.	Small estate	1 428.87	92.20	704.94	49.30	218.10	15.30	268.16	18.80	237.66	16.60
2.	Large estate	108.76	7.10	87.47	80.40	8.63	7.90	10.36	9.50	2.90	2.70
	Total	1 537.63	100.00	792.41	51.50	226.73	14.70	278.52	18.10	240.56	5.70

Characteristic feature of this structure of possession was a very high percentage of arable land in large estates (97.3%). At the same time, it could be noticed that a percentage of grassland constituted 30% of the overall area of small estates.

Changes in the village's cultural landscape were defined on the basis of data from 1872 and 1897 [Oksza-Orzechowski 1872, Gemeidelexikon 1906] and illustrated in Table 5.

Table 5. Changes of the cultural landscape structure in Wiśniowa village in 1872-1897 (source: Oksza-Orzechowski 1872, Gemeidelexikon 1906, the authors' calculations)

No.	Land type	1872		1897		Changes indicator (per cent)
		ha	%	ha	%	
1	Arable land	792.41	49.1	833.00	50.5	5.1
2	Meadows and orchards	226.73	14.0	232.00	14.1	2.3
3	Pastureland	278.52	17.3	312.00	18.9	12.0
	Agricultural land altogether	1 297.67	80.4	1 377.00	83.4	6.1
4	Forests	239.97	14.9	195.00	11.8	-18.7
5	Building areas	5.60	0.3	5.84	0.4	4.3
6	Roads	55.20	3.4	56.45	3.4	2.3
7	Waters	15.70	1.0	16.10	1.0	2.5
	Total	1 614.14	100.0	1 650.39	100.0	

In the period of 25 years, the biggest changes could be observed in case of forests, the area of which diminished by 18.7% (44.95 ha). Deforested area was mostly allotted to pastureland, i.e. 12,0% (33.48 ha). At the same time, created land types enlarged their areas. Changes of their boundaries were multidirectional. Some of them, such as building land, extended the area at the cost of arable land and pasture. Since some parts of pastureland were also altered into arable land, the area of the latter increased as well. Originated changes resulted from population growth, which was confirmed by the enlargement of settlement area by 2,3%. This low growth indicator equivalent to 0.24 ha of the area was actually high, as in the Austrian cadastral registration only areas occupied by residential and farm buildings were listed.

From the data in Table 6, it can be concluded that from 1897 to 1987 the area of agricultural land decreased to 237 ha (17.2%). This decrease was particularly noticeable in case of grassland. Characteristic feature of the discussed period was an increase in forest land by 216 ha (110.8%). Similar tendency was observed in the case of building land, as its area enlarged by 22,16 ha (379.5%). Such a high growth indicator resulted not only from the population growth, but also from the fact that areas of building plots, not only built-up areas as it was in the Austrian cadastral registration, were listed in lands and buildings registration.

From 1987 to 2006, further development of built-up areas took place, which resulted from the investigated village function (the seat of local community council). There was also an increase in the area of meadows by 129.29 ha (9 281.1%) caused by changing arable land into meadows. Particular tendencies and directions of changes in that period are illustrated in Table 7.

Table 6. Changes in cultural landscape structure in Wiśniowa in 1897-1987 (source: Gemeidelexikon 1906, the authors' calculations)

No.	Land type	1897		1987		Changes indicator in percentage terms
		ha	%	ha	%	
1	Arable land	833.00	50.5	829.00	50.1	-0.5
2	Meadows and gardens	232.00	14.1	46.00	2.8	-80.2
3	Pastureland	312.00	18.9	189.00	11.4	-39.4
	Agricultural land altogether	1 377.00	83.4	1 140.00	68.9	-17.2
4	Forests	195.00	11.8	411.00	24.8	110.8
5	Building areas	5.84	0.4	28.00	1.7	379.5
6	Roads	56.45	3.4	57.00	3.4	1.0
7	Waters	16.10	1.0	16.00	1.0	-0.6
	Total	1 650.39	100.0	1 654.00	100.0	

Table 7. Changes of the cultural landscape structure in Wiśniowa village in 1987-2006 (source: the authors' calculations)

No.	Land type	1987		2006		Changes indicator in percentage terms
		ha	%	ha	%	
1	Arable land	829.00	50.1	691.92	43.0	-16.5
2	Meadows	46.00	2.8	175.29	10.9	281.1
3	Orchards	76.00	4.6	54.98	3.4	-27.7
4	Pastureland	189.00	11.4	137.37	8.5	-27.3
	Agricultural land altogether	1 140.00	68.9	1 059.56	65.8	-7.1
5	Forests	411.00	24.8	406.48	25.2	-1.1
6	Building areas	28.00	1.7	76.07	4.7	171.7
7	Roads	57.00	3.4	54.68	3.4	-4.1
8	Waters	16.00	1.0	11.56	0.7	-27.8
9	Different grounds	2.00	0.1	1.58	0.1	-21.0
	Total	1 654.00	100.0	1 610.40	100.0	

From 1872-2006 the process of changes in cultural landscape (Table 8) revealed a very positive tendency to restore natural landscape represented in the investigated village by forests. In the 4th period of investigation different directions of changes in forest land could be observed and eventually the area of forests increased by 166.51 ha (69.4 %). Similar growing tendency in the investigated period was noticed in case of built-up areas. Generally, building land enlarged its area by as much as 70.47 ha. Simultaneously, the area of meadows (orchards) slightly increased.

Table 8. Changes in cultural landscape structure in Wiśniowa in 1987-2006 (source: the authors' calculations)

No.	Land type	1872		2006		Changes indicator in percentage terms
		ha	%	ha	%	
1	Arable land	792.41	49.1	691.92	43.0	-12.7
2	Meadows and gardens	226.73	14.0	230.27	14.3	
3	Pastureland	278.52	17.3	137.37	8.5	-50.7
	Agricultural land altogether	1 297.67	80.4	1 059.56	65.8	-18.3
4	Forests	239.97	14.9	406.48	25.2	69.4
5	Building areas	5.60	0.3	76.07	4.7	1 258.4
6	Roads	55.20	3.4	54.68	3.4	-0.9
7	Waters	15.70	1.0	11.56	0.1	-26.4
	Total	1 614.14	100.0	1 610.40	100.0	

At the same time, areas of other land types were reduced. In the investigated period, roads were one of the most characteristic land types in the village. In fact, they have been stable elements of the investigated village since their creation up to the present moment. This particularly concerns roads leading directly to fields as their area and number have remained stable during the whole investigated period. This fact plays a significant function in the way fields are operated at present. In the first period of settlement, when there were 40 farms and the same number of plots, those roads duly fulfilled their roles. At present, when technical equipment in agriculture has changed and 4 000 of new plots have been created, these roads do not fulfil their functions any longer. However, they constitute distinctive elements of local cultural landscape since they do not only divide this landscape, but they also constitute its stable elements.

2.3.3 The profile of cultural landscape spatial transformations in Wiśniowa from 1847 to 2006

Spatial arrangement of cultural landscape boundaries in the investigated village was presented for the first time in 1847 in a map of the Austrian cadastre at scale of 1:2 880. In order to conduct spatial analyses of the originated changes, the cadastral system has been transformed to the national system of "1965" presently operating in Poland with the use of the method presented by Kubowicz, Noga, and Szczurek [Kubowicz 2006]. Standardization of reference systems made it possible to investigate transformations of cultural landscape boundaries in Wiśniowa.

The investigation was conducted in 15 selected original łans of forest. Łans accepted for detailed analyses represent the investigated village area in terms of natural conditions and methods of running agricultural and investment activities in such conditions. This is illustrated by Fig. 2. Selected łans of forest constitute 37.5% of all łans in the village and 35.3% of the village overall area. The principle of a uniform arrangement of łans applied in the investigation reflects intersections of the valley in which Wiśniowa is located. The investigated łans of forest present both the location of cultural landscape boundaries in the map of the former Austrian cadastre and the present state from 2006 given on an orthophotomap. Spatial arrangement of cultural landscapes is illustrated in Fig. 3, Fig. 4, Fig. 5, Fig. 6, Fig. 7, Fig. 8 and Fig. 9. Each Figure contains a comparison of cultural landscapes boundary lines existing in both analysed years (1847 and 2006) so as to illustrate the originated spatial transformations better. The extent and directions of changes occurring over 160 years are presented in Table 9. As it follows from numerical and spatial data, the location of cultural landscape boundaries demonstrates very characteristic extent and directions of changes. Arable land in all investigated łans of forest decreased its area from 13.1% in łans no. 35 and 36 up to 46.6% in łans no. 24 and 25 in relation to their original areas calculated on the basis of the cadastral map. This observed process of decreasing areas occupied in 1847 for arable land resulted from physiographic conditions and the extent of urbanizing the investigated łans of forest. Originated changes of boundaries and areas of arable land were multidirectional. Grasslands, forests, and orchards enlarged their areas at the cost of arable land. The extent of size and spatial changes of arable land were quite substantially varied which is confirmed by the data in Table 9 and the Figures. Thus revealed regularity of decreasing areas of arable land could be an evidence of growing economic and ecological consciousness of rural society while taking use of foothill and mountain areas. The developed network of roads leading directly to fields generally did not change after occupying the investigated village under the German Law which is proved by the numerical data (Table 9) and their spatial location (Fig. 3-Fig. 9). The analysed arrangement of roads did not change although a very high increase in areas occupied for building could be observed in the investigated village. The enlargement of built-up areas in particular łans of forest was fairly varied. The biggest increase in built-up areas was observed in łans no. 24 and 25 constituting the administrative-service centre of the village being the seat of the community council.

In 1847 there was a small percentage of wasteland which was completely liquidated in 2006 by its afforestation or building development.

Table 9. The profile of Wisniowa's cultural landscape in selected łans (source: the cadastral map from 1847 and orthophotomap from 2006, the authors' calculations)

No. of figure	No. of *lan*	Overall area of *lan* given in ha	Land type	State in 1847 according to the cadastral map		State in 2006 according to the orthophotomap		Difference in ha	Change indicator in %
				Area of particular land type		Area of particular land type			
				ha	%	ha	%		
Fig. 14	1 2 3 4a 4b	57.98 46.27 29.60 18.32 24.79	Arable land	98.1308	55.5	60.9351	34.4	-37.1957	-21.00
			Grassland	48.5982	27.5	59.6975	33.7	11.0993	6.30
			Gardens (orchards)	0.5073	0.3	5.1253	2.9	4.6180	2.60
			Forests	19.3617	10.9	35.0955	19.8	15.7338	8.90
			Roads	6.0196	3.4	7.2573	4.1	1.2377	0.70
			Built-up areas	1.5105	0.9	7.3209	4.1	5.8104	3.30
			Waters	2.0773	1.2	1.5365	0.9	-0.5408	-0.30
			Wasteland	0.7588	0.4	0.0000	0.0	-0.7588	-0.40
Total		176.96		176.9642	100.0	176.9681	100.0	0.0039	0.00
Fig. 15	12	57.63	Arable land	25.2629	43.8	14.5914	25.3	-10.6715	-18.50
			Grassland	16.6670	28.9	17.9697	31.2	1.3027	2.20
			Gardens (orchards)	0.0276	0.0	0.9659	1.7	0.9383	1.60
			Forests	12.6963	22.0	18.9064	32.8	6.2101	10.80
			Roads	1.0755	1.9	1.5040	2.6	0.4285	0.70
			Built-up areas	0.4472	0.8	3.1134	5.4	2.6662	4.60
			Waters	1.2624	2.2	0.6143	1.1	-0.6481	-1.10
			Wasteland	0.1903	0.3	0.0000	0.0	-0.1903	-0.30
Total		57.63		57.6292	100.0	57.6651	100.0	0.0359	0.03
Fig. 16	13a 13b 14	18.99 7.19 34.35	Arable land	43.8359	72.4	23.6580	39.1	-20.1779	-33.30
			Grassland	13.3381	22.0	24.7757	40.9	11.4376	18.90
			Gardens (orchards)	0.6349	1.0	4.1532	6.9	3.5183	5.80
			Forests	0.0000	0.0	2.3543	3.9	2.3543	100.00
			Roads	1.8706	3.1	1.8860	3.1	0.0154	0.00
			Built-up areas	0.1906	0.3	3.5681	5.9	3.3775	5.60
			Waters	0.6672	1.1	0.1201	0.2	-0.5471	-0.90
Total		60.53		60.5373	100.0	60.5154	100.0	-0.0219	-0.02
Fig. 17	24 25	32.92 25.11	Arable land	36.7879	63.4	9.7284	16.7	-27.0595	-46.60
			Grassland	13.8311	23.8	20.6138	35.5	6.7827	11.70
			Gardens (orchards)	0.3901	0.7	0.7901	1.4	0.4000	0.70
			Forests	0.1750	0.3	6.2515	10.8	6.0765	10.50
			Roads	3.5660	6.1	4.2105	7.2	0.6445	1.10
			Built-up areas	0.7783	1.3	14.0394	24.2	13.2611	22.80
			Waters	0.7740	1.3	0.6348	1.1	-0.1392	-0.20
			Wasteland	1.2280	2.1	0.0000	0.0	-1.2280	-100.00
			Cemetery	0.5227	0.9	1.8230	3.1	1.3003	2.00
Total		58.03		58.0531	100.0	58.0915	100.0	0.0384	0.04
Fig. 18	26 27	44.91 36.89	Arable land	51.1119	62.5	30.2378	37.0	-20.8741	-25.50
			Grassland	27.5306	33.6	32.6558	39.9	5.1252	6.30
			Gardens (orchards)	0.2247	0.3	2.4608	3.0	2.2361	2.70
			Forests	0.0000	0.0	7.2783	8.9	7.2783	100.00
			Roads	1.5762	1.9	2.9171	3.6	1.3409	1.60
			Built-up areas	0.3648	0.4	5.7867	7.1	5.4219	6.60
			Waters	0.8386	1.0	0.4714	0.6	-0.3672	-0.40
			Wasteland	0.1904	0.2	0.0000	0.0	-0.1904	-100.00
Total		81.80		81.8372	100.0	81.8079	100.0	-0.0293	-0.030

Fig. 19	35 36	20.28 36.02	Arable land	16.4585	29.2	9.0568	16.1	-7.4017	-13.10
			Grassland	33.8149	60.0	13.2084	23.5	-20.6065	-36.60
			Gardens (orchards)	0.1758	0.3	0.7262	1.3	0.5504	1.00
			Forests	3.9240	7.0	29.6610	52.7	25.7370	45.70
			Roads	1.6160	2.9	1.2053	2.1	-0.4107	-0.70
			Built-up areas	0.2437	0.4	2.2369	4.0	1.9932	3.50
			Waters	0.0822	0.1	0.1880	0.3	0.1058	0.20
Total		56.30		56.3151	100.0	56.2826	100.0	-0.0325	-0.03
Fig. 20	38 39	30.10 47.15	Arable land	35.4575	45.9	25.2122	32.6	-10.2453	-13.30
			Grassland	35.7594	46.3	29.9155	38.7	-5.8439	-7.60
			Gardens (orchards)	1.4463	1.9	4.8773	6.3	3.4310	4.40
			Forests	0.9913	1.3	10.5347	13.6	9.5434	12.40
			Roads	1.0673	1.4	2.0875	2.7	1.0202	1,30
			Built-up areas	0.3053	0.4	2.5542	3.3	2.2489	2.90
			Waters	2.2212	2.9	2.0537	2.7	-0.1675	-0.20
Total		77.25		77.2483	100.0	77.2351	100.0	-0.0132	-0.010

Fig. 2. Arrangement of selected łans of forest subjected to further analysis (source: the authors' study)

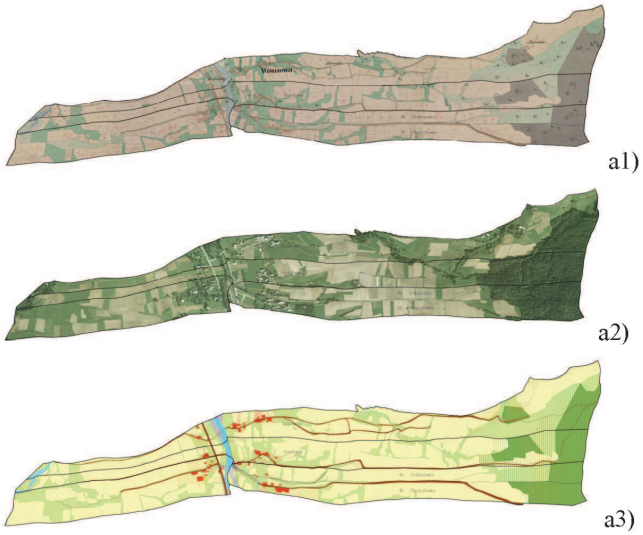


Fig. 3. Spatial arrangement of cultural landscape in Wiśniowa in the case of łans no. 1, 2, 3, 4a, and 4b presented on: a1) the cadastral map from1847; a2) the orthophotomap from 2006; a3) comparison of points a1 and a2

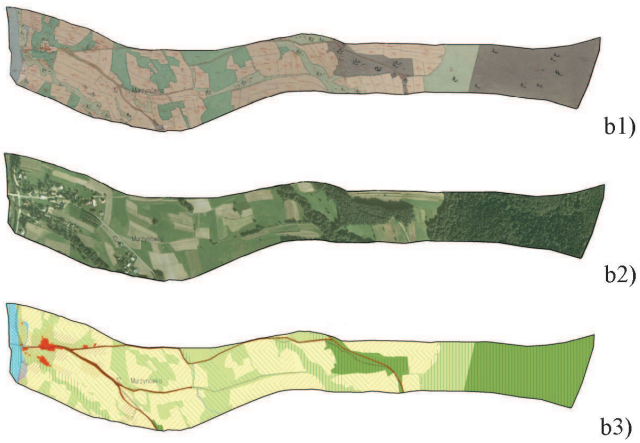


Fig. 4. Spatial arrangement of cultural landscape in Wiśniowa in the case of łan no. 12 presented on: b1) the cadastral map from1847; b2) the orthophotomap from 2006; b3) comparison of points b1 and b2

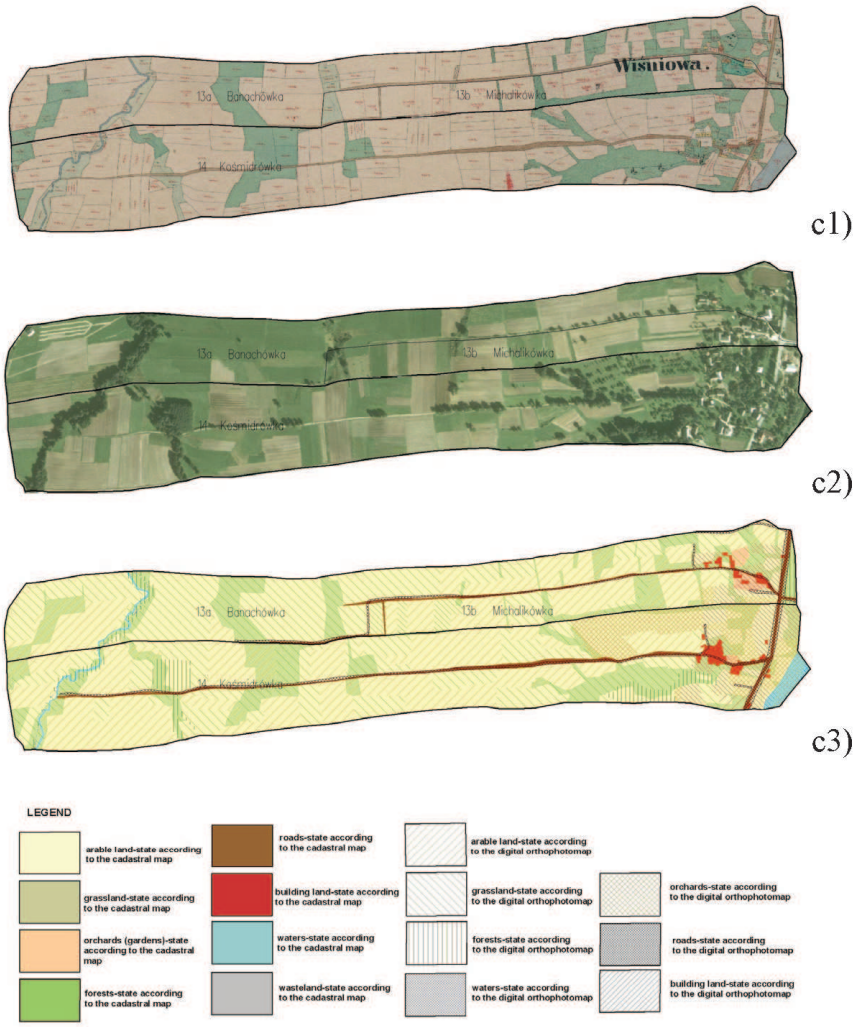


Fig. 5. Spatial arrangement of cultural landscape in Wiśniowa in the case of łans no. 13a, 13b and 14 presented on: c1) the cadastral map from1847; c2) the orthophotomap from 2006; c3) comparison of points c1 and c2

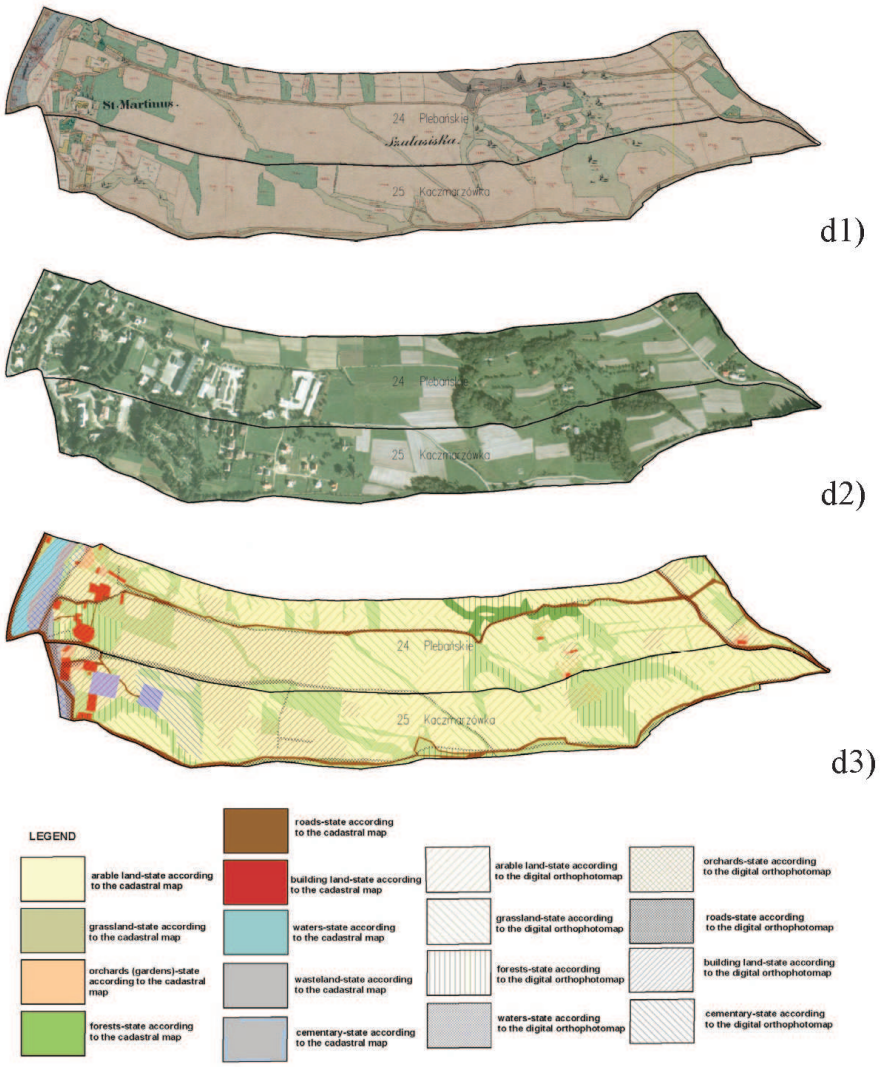


Fig. 6. Spatial arrangement of cultural landscape in Wiśniowa in the case of łans no. 24 and 25 presented on: d1) the cadastral map from1847; d2) the orthophotomap from 2006; d3) comparison of points d1 and d2

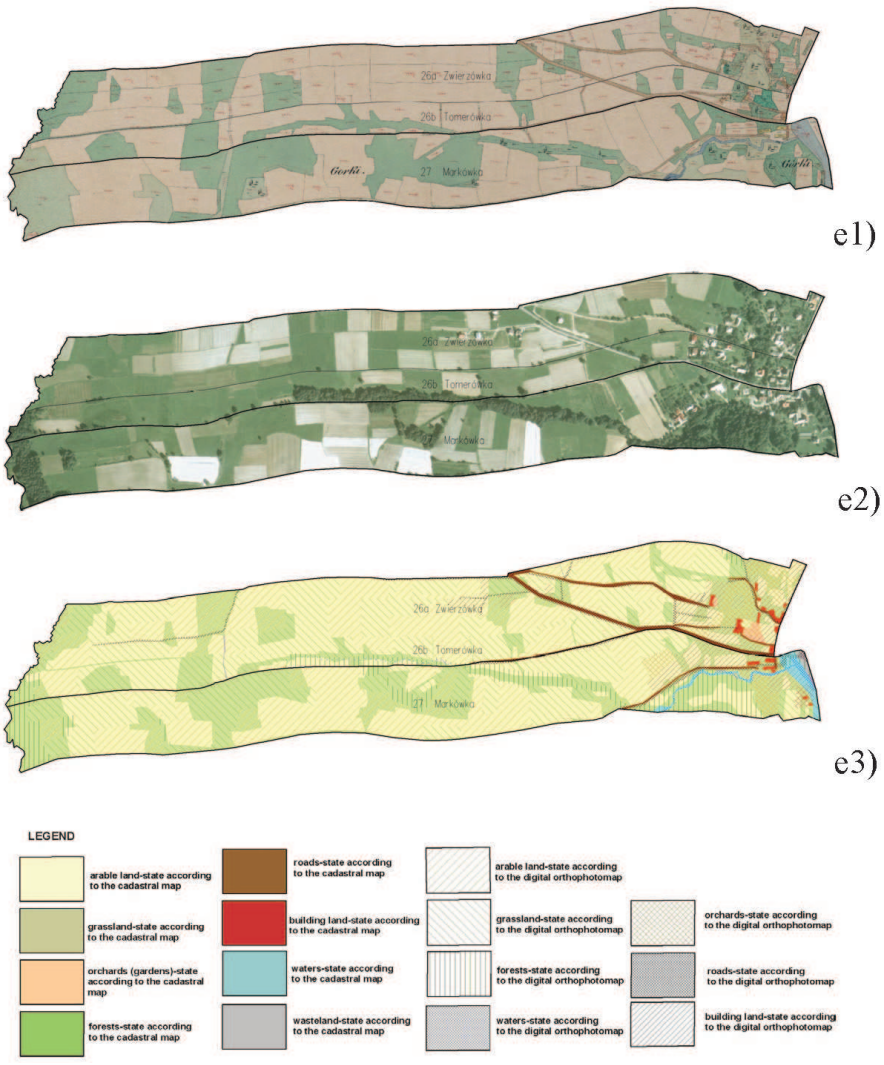


Fig. 7. Spatial arrangement of cultural landscape in Wiśniowa in case of łans no. 26a, 26b and 27 presented on: e1) the cadastral map from1847; e2) the orthophotomap from 2006; e3) comparison of points e1 and e2

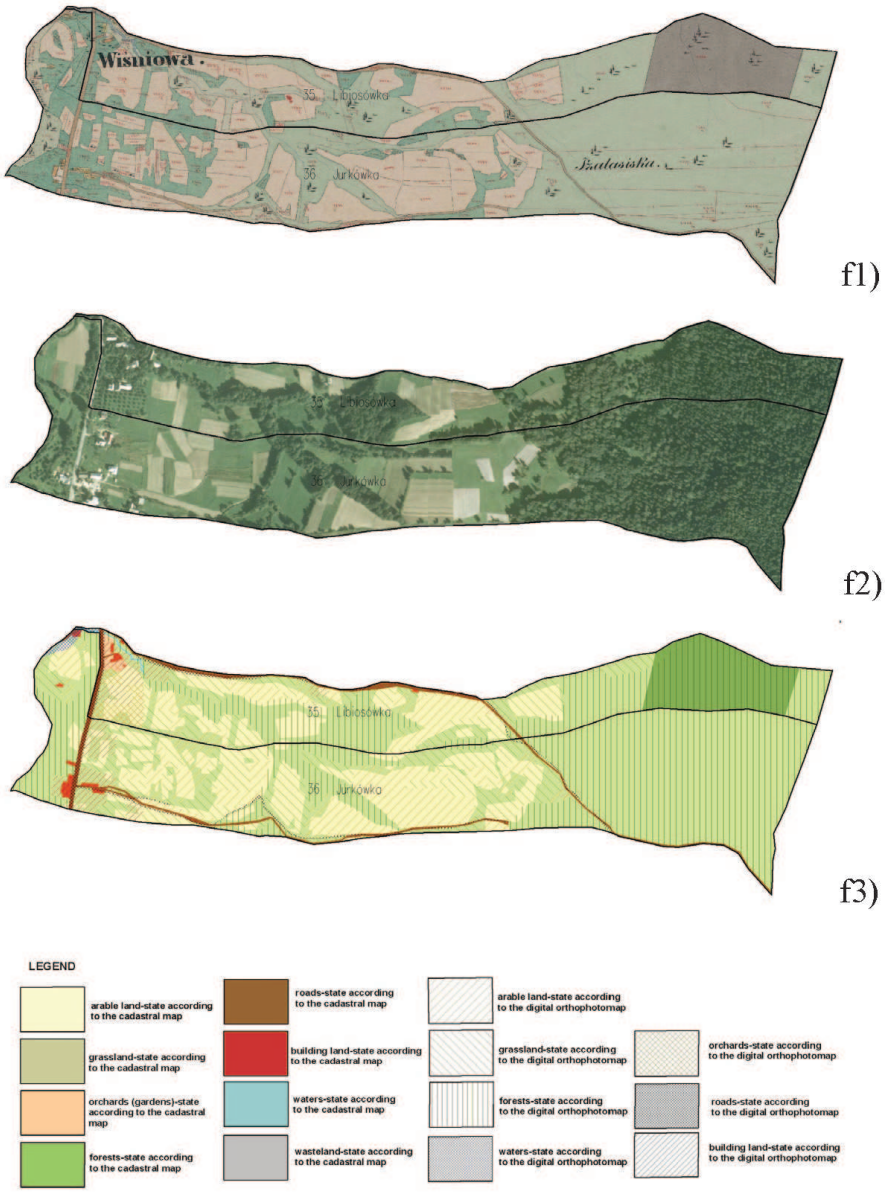


Fig. 8. Spatial arrangement of cultural landscape in Wiśniowa in the case of łans no. 35 and 36 presented on: f1) the cadastral map from1847; f2) the orthophotomap from 2006; f3) comparison of points f1 and f2

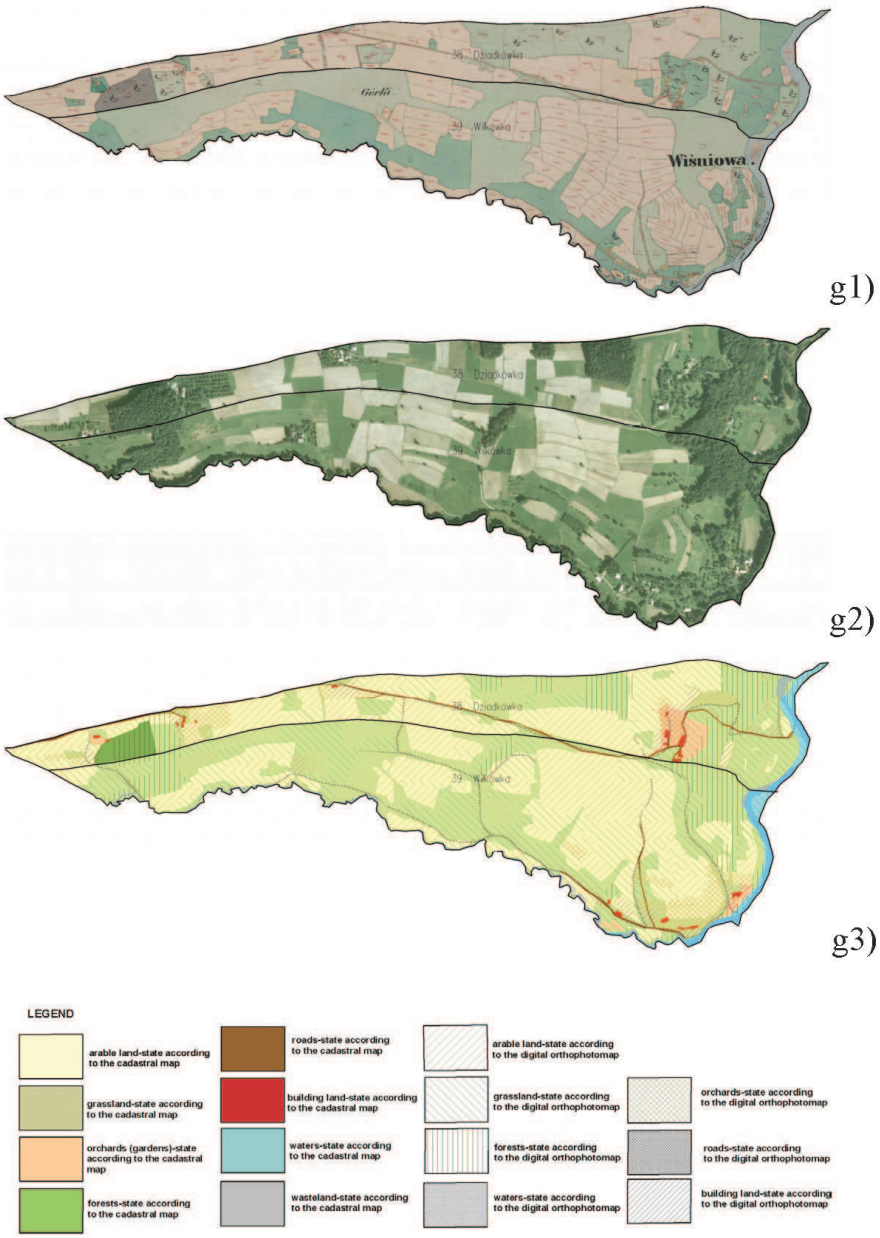


Fig. 9. Spatial arrangement of cultural landscape in Wiśniowa in case of łans no. 38 and 39 presented on: g1) the cadastral map from1847; g2) the orthophotomap from 2006; g3) comparison of points g1 and g2

Conducted investigation of the cultural landscapes development within 160 years in Wiśniowa village revealed many interesting directions and tendencies in their transformation. Estimating the size and the directions of changes in cultural landscapes boundaries of the investigated region was possible because detailed maps of the former Austrian cadastre have existed. They were created in the local datum with a reference point in Lvov and they were transformed to the national system '1965' presently operating in Poland for comparative analyses of boundaries and areas of cultural landscapes. Accomplished transformation of cadastral maps to the '1965' system allowed for the detailed comparative investigation of the cultural landscapes boundaries location from 1847 to 2006.

2.4. INFLUENCE OF WATER SUPPLY AND SEWERAGE INFRASTRUCTURE ON LANDSCAPE SHAPING WITH SPECIAL CONSIDERATION TO THE MUNICIPALITY OF WIŚNIOWA

Jan Pawełek, Grzegorz Kaczor

Poland and Europe are currently starting to appreciate the significance of cultural historical landscapes. Our country boasts a rich variety of natural landscapes and cultural heritage, which, however, are not being protected sufficiently in the context of economic and social developments and particularly in the context of transformations in built-up areas [Żarska 2005, Gadomska et al. 2005, and Żarska 2006]. They are also threatened by poor environment protection and restoration work.

The shape of landscape is significantly influenced by network of technological infrastructure localized in a given area, that is the systems of water supply, sewerage and rainwater treatment, heat, electrical power, gas engineering, and telecommunications infrastructure. The location of particular elements of these systems is mainly conditioned by their effectiveness. Whether they harmonize with the architectural style of other buildings of a town or with natural landscape is a side issue. As a result, we observe ubiquitous mobile phone masts or large-size steel constructions supporting high-voltage transmission lines dominating the landscape. It needs to be underlined that during the communist rule in Poland visible elements of technological infrastructure were supposed to reflect thriving development of the country and its modernity. Thus, the choice of location was influenced by extremely different philosophy, entirely disregarding the question of nature and landscape protection.

The 19th century saw dynamic development of sewage discharge and treatment facilities. In rural areas, collective water supply and sewage discharge systems started to be built in the 1970s. Priority was given to water supply, fulfilling the most urgent expectations of local people. Particularly in rural areas, sewage discharge and treatment were put off in time due to lack of financial resources and also because, in the earlier years, people did not fully realize the danger that untreated waste could pose to the environment.

Recent decades have witnessed significant progress with regards to sewage management. Every year, Poland opens 165 new sewage treatment plants in average [Rocznik statystyczny RP 2006]. We can expect that more and more objects of this type will appear in rural communes, influencing rural landscape. The selection of a suitable sewage treatment plant is mostly governed by the costs of

building and operating it, whilst little attention is paid to how the object will harmonize with the architectural style of a village or town or its landscape. Sewage treatment plants are usually built in the vicinity of receiving water bodies, most often a watercourse. These objects are situated on meadows neighbouring rivers; they are very well-exposed and visible even from farther distances.

Due to recurrent periods of drought groundwater table has lowered significantly over the recent years. This made people give up the majority of household water sources in the form of dug wells. For most villages which had not expressed any interest in collective systems of water supply so far, building such a system became a matter of priority. As the existing water supply systems have been extended and new ones being built, more and more facilities and objects of technical infrastructure have appeared in landscape, such as water intakes, water treatment plants, and water tanks. These objects, and particularly tower tanks, significantly influence the shape of rural landscape.

2.4.1 Water supply and sewerage infrastructure

The role of a water supply system is to take water, treat and store it, and subsequently distribute it to individual consumers and industry in the required quality, quantity, and under suitable pressure. Each system of water supply consists of [Żuchowiecki 2002b]:

– surface or groundwater intakes,
– water treatment plants,
– water pumping devices (pumping stations),
– water storage devices (tanks),
– water supply networks, composed of transit pipes, water mains, dividing water pipes, and water supply connections,
– internal water supply installations which supply water to draw-off points inside buildings.

With respect to territorial scope (the size), water supply systems can be divided into [Heidrich 2004]:

– local systems (involving one city, town or village, one industrial plant),
– central systems (involving an agglomeration and its satellites),
– group systems (involving a few towns, settlements, or industrial plants)
– regional systems (involving towns and villages of a given area).

Taking into consideration the hydraulic structure of water supply systems, we can distinguish:

– gravitational systems (pumping or mixed),
– systems with one or more water sources,
– single- or multizonal systems.

Keeping in mind the classification presented above, we can conclude that water supply infrastructure can involve a wide variety of technological solutions, which indirectly exerts specific influence on landscape shaping. In the case of water supply systems, a significant part of this infrastructure is located below ground. Water intakes, water treatment and storage facilities (tanks) are the objects which influence landscape to the largest extent.

Areas inhabited by people must have a suitable sanitary state. Facilities and devices used for sewage discharge from inhabited areas are called sewerage. Sewerage systems are supposed to collect, dispose of, and treat waste of the following types: human waste (from water used by people for individual purposes), industrial (from water used for production purposes), and precipitation waste (rainwater waste, water produced as a result of thawing collected from streets and squares). With respect to the level of segregation of disposed waste, sewerage systems can be divided into the following: combined, separate, and semi-separate systems. The hydraulic criterion of waste transportation yields the following classification: gravitational systems (flow with free wastewater table), pumping (flow forced by pumping aggregates) and mixed (flow forced by the difference in under pressure between the tank situated on the site and the vacuum tank close to the sewage treatment facility).

With regards to territorial range of the system [Szpindor 1998, Żuchowiecki 2002b], we can distinguish the following types: individual systems (household) and collective systems. In the case of individual systems, waste is treated on the spot. As a result, no facilities significantly influencing landscape are used. Waste is collected in airtight tanks and periodically transported away in sewage disposal vehicles or treated on the spot most often with the help of the drip dispersal system or groundwater filters [Błażejewski 2003]. In collective sewerage systems, waste is channelled away from the household to a designated place, most often to a collective sewage treatment plant. In the latter case the pipes are conduced below ground level, whilst, in terms of size, sewage treatment plants themselves constitute a very significant element which influences landscape to a considerable degree.

2.4.2 Legal and formal questions connected with locating facilities of water supply and sewerage infrastructure

Legal and formal questions connected with facilities of water supply and sewerage infrastructure are regulated by the following Act of Parliament: the Act on Collective Water Supply and Waste Disposal (Ustawa o zbiorowym zaopatrzeniu w wodę i zbiorowym odprowadzaniu ścieków) [Ustawa 2001b]. This act regulates the principles and conditions of collective drinkable water supply and collective waste discharge, involving the principles of managing water sup-

ply and sewerage companies, ensuring continuity and quality of water supply, the principles of effective waste disposal and treatment, and the principles of protecting consumers' interest, taking into consideration the requirements of nature protection and cost optimisation. According to this Act, a community or an association of communities are responsible for collective water supply and sewerage treatment (Article 3). It is the community (being best informed as to one's development trends) that defines the directions of developing this system in the study of the conditions and directions of the spatial management and the local spatial management plan. Operating a system of collective water supply and waste treatment requires a permit issued by wójt (the head of the local administrative unit). This service is usually provided by water supply and sewerage companies or other community organizational units without legal entity but conducting this type of activity within the area of the community. A water supply and sewerage company is obliged to provide effective water supply and sewerage devices which would supply water in the required amount and discharge waste in a continuous and reliable way. Such company is also expected to ensure a suitable quality of supplied water and discharged waste (Article 5).

A water supply and sewerage company is obliged to build water supply devices and sewerage facilities, defined by the community in the community study of the conditions and directions of the spatial development and the local spatial management plan within the scope determined by the multiannual development plan. It is also expected to modernize these devices and facilities (Article 15). A multiannual development and modernization plan for water supply and sewerage devices and facilities defines in particular (Article 21):

- planned scope of water supply and waste discharge services;
- development and modernisation programmes for particular years;
- programmes of water use and waste discharge rationalisation;
- financial outlays in particular years;
- methods of financing planned investments.

This plan should be consistent with community development directions defined in the community study of the conditions and directions of the spatial management, with local spatial management plans, and permits issued to this company for collective water supply and waste discharge services (Article 21, item 3). Water supply and sewerage companies which do not plan building water supply or waste disposal facilities are not required to develop this plan.

A community study of the conditions and directions of the spatial management helps to define community spatial policies taking into consideration a community development strategy. This study is created on the basis of the following conditions:

- previous land use, management, and development,
- location of protected objects and areas, defined in specific regulations,

– natural and cultural environment, taking into consideration agricultural production related to the environment state and functioning,
– land ownership,
– standard of living.

The study also presents:
– areas under special protection or designated for special protection,
– areas of local natural environment assets as well as threats,
– areas of agricultural production, including those excluded from building development,built-up areas, indicating areas which require transformation or rehabilitation,
– areas designated for building development,
– areas designated for communication and technological infrastructure, water intakes, sewage treatment plants, development directions, etc.

A study is not a community regulation and does not serve as a basis for issuing decisions on building development conditions and land management. A local spatial management plan is a community regulation.

A local spatial development plan serves as a basis for spatial planning within a community. According to the Act of Parliament: the Act on Spatial Planning and Spatial Management (Ustawa o planowaniu i zagospodarowaniu przestrzennym) [Ustawa 2003a], this plan is an act of the local law. The community council is the body responsible for its preparation. Regulations of a community study of the conditions and directions of the spatial management are binding in the process of local plan preparation under a clause of nullity. Fundamental issues regarding spatial planning in Poland are regulated by the Act on Spatial Planning and Spatial Management. This Act regulates the scope and principles of conduct when designating land for particular use and provides principles of its management. These activities are based upon the principle of sustainable development. The Act includes a detailed list of studies which comprise the local spatial management plan and separately for the community study of the conditions and directions of the spatial management. The local plan includes regulations regarding spatial order protection and shaping. These principles concern information about designating land for particular purposes (e.g., for family housing or services), about lines demarcating roads, about public roads, building lines, borderlines of protected areas (e.g., landscape parks); and also principles and conditions of dividing land into building plots, the size and particularly the height of buildings, their orientation, roof geometry and other elements subsumed under the term spatial management, including fences, infrastructure, small architecture, and green areas. The plan also defines where individual or collective systems of sewage discharge and treatment shall be used [Łyp 2005]. It should take into consideration forward-looking issues, such as where to locate residential housing, recreational areas and where to introduce a building ban. A spatial management plan is composed of a descriptive

part, that is a written text of the plan passed by the community council, and the illustrative part. The descriptive and illustrative parts complement each other. The text includes details which could not be presented on maps, for example information about admissible height of buildings, roof covering and pitch.

Detailed regulations concerning water supply and sewerage infrastructure are usually enclosed in a local spatial management plan in the chapter regarding the principles of territorial development. The plan particularly focuses on the so-called landscape protection areas which require carefully planned architectural development. Any constructions or investments in these areas should be coordinated with the architecture department and a monument conservation officer. This is usually done when the plan is drawn up for areas with historical objects such as palaces or landscape parks. Urban planners are then entitled to mark out the so-called dominant, that is the highest building in the area (e.g. a church tower), around which building development would be designed.

A spatial management plan is prepared by a team of specialists such as urban planners, highway engineers, sanitary industry specialists, water supply and sewerage experts, and energy specialists. Urban planners design the whole area of the plan while highway engineers adjust it to reality creating a system of roads. Water supply and sewerage experts, as well as power engineering and gas specialists include their corresponding systems in the plan. An environment protection consultative body systematically gives its opinion on these operations. It examines the effect the execution of the plan might have on the environment. In the case when cultivated land is turned into a residential plot the opinion of a land valuation specialist is essential as well. After the plan has been developed, the design department sends it to various institutions, such as: Generalna Dyrekcja Dróg Krajowych (National Roads Management Office), fire department, Sanepid (Sanitary and Epidemiological Station), monument conservator, and environmental protection department for consultation. The above mentioned institutions are required to provide their feedback concerning the plan within a month. When they have all submitted their observations and after these observations have been included in the plan, the project is brought forward to public knowledge for the period of twenty one days. It is the time to voice any opinions (file a protest or put in a plea). The protest can be filed even by a person living outside the community, whereas the only person who can tender a plea is somebody whose legal interests have been violated (e.g., a road, water supply or sewer system is supposed to run across someone's land, or a water storage reservoir is going to be built there). The person concerned lodges a complaint or files a protest in writing. The community department takes one month to look into all the protests and objections from the time they have been filed; they may be overruled or taken into account. When the latter is the case, a correction of the plan takes place. Both in the case when the objections and protests are overruled and when they are taken into consideration,

the community is required to pass a suitable resolution. It has to be delivered to the people concerned, who have 30 days for appeal.

2.4.3 Description and examples of water supply and sewerage devices and facilities influencing landscape

2.4.3.1 Water treatment plants and intakes

As far as water supply systems are concerned, water intakes have a major impact on the shape of landscape. The location of water intakes depends on the area, the occurrence of water in the required quantity (that makes it possible to cover the greatest demand possible), and on its being suitable for water-supply purposes. Other factors that influence the decision concerning the location of a water intake include: technical conditions and economic aspects of its creation and subsequent exploitation. Water is usually supplied from surface water and groundwater intakes.

As far as groundwater intakes are concerned, surface technological infrastructure is not very complex. Such water intakes built nowadays do not play a major role in landscape shaping processes. Exceptions involve old historical wells with wooden or stone walls (Phot. 15), equipped with wooden windlasses or sweeps (Phot. 16). Such objects, well-preserved, constitute a precious element of cultural landscape. First wells in the world were already built 8 thousand years ago while sweeps were used almost 3000 years B.C.

Since groundwater table has been lowering over the recent years, most of the household methods of water supply, such as dug wells, have been put out of use and replaced by deep wells and collective water supply systems.

Surface water intakes exert greater influence on the shape of landscape. In the case of flowing watercourses there is a requirement to bank them up. Thereby, intakes of this sort are located in the vicinity of weirs and dams, where the water is banked up and forms either a small or a large reservoir. Such artificial reservoirs change landscape considerably, nevertheless, in a positive way. Phot. 17 depicts an example of a water intake from a dam reservoir on the stream of Gościbia for the needs of water supply in Harbutowice. The water intake is located in a picturesque valley surrounded by forested hills. The creation of this reservoir, which was necessary for the water intake, has been of great value to the beauty of the local landscape. What raises objection is the obsolete structure of the weir built as an open concrete structure. Rock fillings, rock rollers, vegetative facing plates, gabions with bulrushes or other elements currently used for covering embankments and components of hydrotechnical constructions help to integrate these objects with the natural environment and landscape.

Phot. 15. Well with a wooden case (photo: G. Kaczor)

Phot. 16. Well with a sweep (photo: J. Pawełek)

Phot. 17. Water intake from a small dam reservoir on the stream of Gościbia for the needs of water supply in Harbutowice (photo: G. Kaczor)

Phot. 18. A water intake from the Dobczyce reservoir for the needs of Krakow (photo: G. Kaczor)

Phot. 19. A bird's eye view of the water treatment plant in Dobczyce (photo: from the database of Miejskie Przedsiębiorstwo Wodociągów i Kanalizacji - MPWiK S.A. Krakow (Krakow Waterworks and Sewerage Municipal Enterprise JSC)

Phot. 18 depicts a tower water intake for water supply from the Dobczyce reservoir. Several buildings in the vicinity of the dome of the reservoir have a design similar to the architectural style of the Podhale region in Poland. Picturesque ruins of a 16th century castle can be found in the neighbourhood of the reservoir. Given such a background, the modern building architecture clearly does not match the rest of the landscape.

Currently, most of available water resources do not fulfil quality requirements to be classified as drinking water. Particularly in the case of surface water intakes, water has to be treated at water treatment plants. Water treatment plants are composed of many facilities and devices which sometimes cover a considerable area (Phot. 19). They are mainly located within a small distance from the intake, which narrows the range of choices for location. In most cases, facilities and technological infrastructure of water treatment plants do not improve aesthetic features of the landscape. This problem may be partially overcome by planting trees or decorative shrubs (thujas, spruces, pine trees, larch trees) around such facilities.

2.4.3.2 Water reservoirs

Water-supply reservoirs are these objects of water supply infrastructure that often occur in landscape and influence its shape to a large extent. The main task of water-supply reservoirs is to alleviate the results of uneven water collection within a given settlement unit, that is to stabilize water collection from an intake and the functioning of the water treatment plant. Being set up at an adequate altitude, the reservoir generates the required hydrostatic pressure that enables gravitational flow of water to consumers. The reservoirs are being filled with water when the amount of water supplied from an intake or a water treatment plant is greater than the consumption itself. The adopted classifications of water reservoirs take into account: their purpose, location in terms of place and height, structure, and shape.

Taking into consideration water reservoir location in terms of height we can distinguish ground reservoirs (situated right on the ground or partly in it) and tower reservoirs (built on special constructions when the shape of the terrain does not allow ground reservoirs). In most cases ground reservoirs are covered with soil and overgrown with grass (Phot. 20 and Phot. 21), which ensures good thermal isolation. Such a construction affects landscape in the least degree. Unfortunately, such reservoirs tend to be finished up with concrete structures as shown in Phot. 21.

Tower water reservoirs most significantly interfere with landscape shape. Those are built in areas were landform features do not allow ground reservoirs. In flat areas, water reservoirs dominate over the landscape. What makes the situation

Phot. 20. Ground water reservoir in the community of Łapanów (photo: J. Pawełek)

Phot. 21. Ground water reservoir in the community of Koniusza (photo: G. Kaczor)

Phot. 22. Tower reservoir in the community of Pałecznica (photo: G. Kaczor)

Phot. 23. Location of a tower reservoir in Kocmyrzów-Luborzyca (photo: G. Kaczor)

Phot. 24. Tower reservoir in a poor technical condition (photo: J. Pawełek)

Phot. 25. Tower water reservoir in Kraków - the district of Skotniki (photo: J. Pawełek)

worse is the typical construction of the reservoir shown in Phot. 22. The reservoir, made of shiny metal, is located on a vividly painted column with a prominent logo or the producer's name (advertisement). Such a construction brings to mind rather a space base facility than an element of rural landscape. Phot. 23 presents a panorama of the community of Kocmyrzów-Luborzyca with a dominating tower water reservoir perfectly visible within the distance of many kilometres.

Painting such objects green alone would considerably help to integrate them into rural landscape, where this colour is most natural. The presence of high trees would also facilitate the integration of the reservoir with the landscape.

In some cases, poor technical condition, unsuitable construction or workmanship can have additional negative consequences (Phot. 24).

It might be very important to improve the design of water reservoir with some elements linked with the surrounding architecture, e.g., a stylish roof, a brick construction of the load bearing column, some additional ornaments. The object in Krakow-Skotniki (Phot. 25) is an example of a tower reservoir whose architectural style harmonises with the style of surrounding buildings. Unfortunately, here as well some elements of the reservoir were painted blue whereas the roofs and other elements of surrounding buildings are mainly red. The highest point in the area, the roof of the reservoir, has been crowned with an unattractive 'forest' of cellular radio or other relay antennas. Cellular radio antenna masts are yet another element that destroys the harmony of rural landscapes. One may get the impression that relay antennas are installed chaotically without any plan on the roofs of historical bell-towers, church towers and other high buildings. Installing antennas on tower reservoirs additionally ruins aesthetic qualities of the objects.

2.4.3.3 Sewage treatment plants

As far as sewage discharge and treatment systems are concerned, sewage treatment plants influence landscape to the largest extent. Collective sewage treatment plants, similarly to water treatment plants, require large space on which individual technological objects are located. Sewage treatment plants are mainly located in the suburbs, in the vicinity of water courses which become target receivers of purified sewage. In order to enable gravitational flow of sewage from sewers to sewage treatment plants, these objects are built in lower parts of a given area. In some cases, the location of sewage treatment plants may be advantageous as far as technical conditions are concerned, however, it may be disastrous in terms of landscape aesthetics (Phot. 26).

Phot. 26 presents the sewage treatment plant in Nowy Wiśnicz. It is a vivid example of how an ill-considered location for a sewage treatment plant can spoil a beautiful panorama of the spot with the picturesque Lubomirski Castle in the background. Perhaps planting bushes and trees around the object and painting it green would improve the view.

Phot. 26. Sewage treatment plant in Nowy Wiśnicz (photo: G. Rudek)

Phot. 27. Overall view of the sewage treatment plant in Kończyce Małe (photo: G. Kaczor)

Phot. 28. Overall view of the sewage treatment plant in Książ Wielki (photo: G. Kaczor) (photo: G. Kaczor)

Phot. 29. A general view of the sewage treatment plant in Żary (photo: A. Chudecka)

Phot. 30. Pumping station in Wiśniowa (photo: G. Kaczor)

Phot. 27 presents a mechanical-biological sewage treatment plant in Kończyce Małe. The object was built on flat meadows, were it was perfectly visible. However, a well-thought-out move of planting the object with bushes and trees has influenced the visual effect to a large extent. Additionally, stylised architecture of the facility's administrative centre improves the overall impression.

Among sewage treatment plants which integrate into the landscape and local architecture, the objects in Książ Wielki and Żary are the examples to follow. In Książ Wielki (Phot. 28), all technological reservoirs of the plant are situated within the main building. For an outside observer, even the smell usually accompanying such objects does not disclose the destination of these facilities. The plant is located near a picturesque fishpond farm, at the foot of the hill were the Mirów Castle is situated. Despite this controversial location, the facility does not exert negative impact on the beauty of the local landscape. Additionally, the way the area is organized and well-thought-out colouring deserve praise.

The sewage treatment plant in Żary has been designed in a similar fashion. Phot. 29 presents a well-kept area around the facility and an elegant administrative centre. The architectural style and the colouring of the plant are in keeping with local landscape and buildings. The new sewage treatment plants in Książ Wielki and Żary have been designed and built with the help of the European Union funds. One can only hope that new-sprung elements of Polish water supply and sewerage infrastructure will stay in keeping with those two examples, which clearly show that it is possible to design and build objects in full harmony with the landscape and architecture of Polish countryside.

2.4.3.4 Sewage pumping stations

Within systems of sewage discharge and treatment, sewage pumping stations exert minor influence on landscape shaping processes. Most pumping station devices and facilities are situated below ground. Elements visible on the surface involve: a fragment of a drain, vent pipes, and electric box of the steering machinery (Phot. 30). The area is usually enclosed with a fence. Pumping stations are situated near roads along which sewage collecting pipes run. With buildings and fences painted green, a pumping station insignificantly influences landscape shape.

2.4.4 The community of Wiśniowa and its water supply and sewerage infrastructure

The community of Wiśniowa is situated in the southern part of the Małopolskie Voivodeship, in the powiat (second level of local government administration in Poland) of Myślenice about 50 km from Krakow. The area of the

community lies within the range of the Pogórze Wielickie Mountains, being a part of the Carpathians. The valley of Wiśniowa is situated in the southern part of the Pogórze Wielickie. It is cut across by the Krzyworzeka River, the Raba River's tributary. The valley of Wiśniowa is surrounded by high mountains on each side. The community is situated between forest complexes of the Beskid Średni Mountains (also referred to as the Beskid Makowski Mountains) and the Beskid Wyspowy Mountains, at the elevation of about 320-400 AMSL.

The entire area of the community equals 6 706 ha, which involves 2 168 ha of arable lands, 1 176 ha of meadows and pastures, 170 ha of orchards, 2 487 ha of forests, 212 ha of farms, 197 ha of roads, 109 ha of woodlots, 145 ha of wasteland, and 42 ha of floating water and other [Hernik 2004].

The community of Wiśniowa is composed of the following sołectwa (the lowest unit of local administration in Poland, usually comprising a single village): Klichów, Kobielnik, Lipnik, Poznachowice Dolne, Węglówka, Wierzbanowa, and Wiśniowa. The community of Wiśniowa has a population of 6 644 people, with population density of 99 persons per sq km. There are no larger industrial plants within the area of the community. About 300 people work within widely understood craftsmanship. There are 448 registered companies. 41 people are employed within industry and construction, 280 people in market services, 8 people in agriculture and forestry, 155 people in non-market services [Hernik 2004].

Wiśniowa is a tourist and agricultural community. Most inhabitants work within 1 202 individual small farms. Agrotourism is growing in importance as a part of economic development of the community. Agrotourism farms are grouped in an organization called Galicyjskie Gospodarstwa Gościnne ("Guesthouses of the Galicja Region"), offering private rooms with full board or a possibility to prepare one's own meals.

The community is supplied with water mainly through household wells which are used by as much as 58% of households. The remaining 482 households get water from the water supply network. There are three water intakes in Wiśniowa whose daily productive capacity equals 447 m3·d-1. Total length of the water supply network in Wiśniowa amounts to 37.5 km [Hernik 2004].

A part of the community of Wiśniowa is connected to the sewage discharge network. Currently, the network measures 15.297 km and operates about 260 buildings. 14% of local people (1 600 people) use the sewage discharge network at the moment. The remaining households possess individual holding tanks [Hernik 2004].

There is a mechanical-biological sewage treatment plant in the community, located in the village of Wiśniowa with a capacity of 120 m3·d-1. The plant is going to be modernized due to certain maintenance problems. After expansion, its capacity will grow up to 210 m3·d-1. There are also plans to connect further 150 buildings to the network. Sewage disposal network is also planned for Węglówka whilst sewage treatment plants are going to be raised in Lubień and Poznachowice Dolne.

2.4.5 Location of water supply and sewerage infrastructure objects in the municipality of Wiśniowa in the light of landscape shaping

2.4.5.1 Objects of water supply infrastructure

There are three surface water intakes within the area of the community of Wiśniowa. These intakes are located on the Na Padoły stream, the Smarkawa stream and in the village of Lipnik. They are situated in forests, therefore remain invisible for an outside observer. Their location can be regarded as appropriate both with regards to technological aspects (collecting water directly in water streams, suitable water temperature maintained thanks to surrounding trees, suitable elevation with regards to water reservoirs) as well as landscape aspects. With heavy rainfall, water intakes are periodically filled with slime. Consequently part of the filter bed placed under openwork concrete blocks needs to be exchanged. Water intakes of the community of Wiśniowa have been generally presented in Phot. 31, Phot. 32 and Phot. 33.

Water collected from streams is channelled into three water reservoirs: in Kobielnik, Wiśniowa, and Lipnik. All three reservoirs are partially built into the ground and covered with grass. As a result they look like small green mounds, without any technical infrastructure visible from the outside. Thanks to these measures, the reservoirs in Kobielnik (Phot. 34) and Wiśniowa (Phot. 35), visible from the distance, do not exert negative influence on the surrounding landscape. The water reservoir in Lipnik (Phot. 36) is located in a densely forested area, which makes it practically invisible in the village's landscape. The location and construction of water reservoirs in Wiśniowa, in terms of their landscape impact, should be regarded as a model.

2.4.5.2 Objects of sewerage infrastructure

Household sewage produced within the community of Wiśniowa is discharged to the mechanical-biological sewage treatment plan in the vicinity of the Krzyworzeka River (Phot. 37). Such a location of the sewage treatment plant should be regarded as very favourable. The object is situated in the vicinity of the river which acts as the receiving water, at a low elevation enabling gravitational flow of waste from buildings situated higher. There are two main communal roads running just next to the sewage treatment plant. However, the object is not visible from roads, thanks to a thick avenue of trees (Phot. 38). A pumping station is located near the sewage treatment plant in Wiśniowa, which makes it possible to transport sewage under the bed of the Krzyworzeka River (Phot. 39). A significant part of the pumping station facilities is located below ground level. The elements visible from the outside involve: drains, vent pipes, and the electric box of the

Phot. 31. Water intake on the Na Padoły stream (photo G. Kaczor)

Phot. 32. Surface water intake on the Smarkawa stream (photo: G. Kaczor)

Phot. 33. Surface water intake in Lipnik (photo: G. Kaczor)

Phot. 34. Ground water reservoir in Kobielnik (photo: G. Kaczor)

Phot. 35. Panorama of Wiśniowa with a view of the ground water reservoir (photo: G. Kaczor)

Phot. 36. Ground water reservoir in Lipnik (photo: G. Kaczor)

steering machinery. The area of the pumping station is surrounded by a green fence. One may conclude that the infrastructure of the pumping station does not influence the surrounding landscape in a significant way.

Phot. 37. Sewage treatment plant in Wiśniowa (photo: G. Kaczor)

Phot. 38. Sewage treatment plant in Wiśniowa seen from the road (photo: G. Kaczor)

Phot. 39. Pumping station in Wiśniowa (photo: G. Kaczor)

Despite the fact that a part of its devices is located below ground, water supply and water infrastructure can exert significant influence on landscape shape. The objects which most significantly influence landscape involve: water intakes, water treatment plants, water reservoirs, sewage treatment plants, and accompanying buildings. Some objects can have positive influence (e.g., surface water intakes and adjoining open reservoirs of untreated water creating picturesque lakes) or negative influence on landscape (water tower reservoirs or unsuitable localization of sewage treatment plants and water treatment plants). One should be particularly careful when locating these objects in areas highly valuable in terms of tourist or landscape qualities, and also in the vicinity of existing historical objects. Due to

their specific character, water tower reservoirs must be located on hilltops, that is, exposed places. It is however possible to minimize their influence on landscape by subdued colours and architectural construction similar in style to surrounding building. In the case of sewage treatment plants and water treatment plants located over a substantial area, positive results can be obtained by planting shrubs, trees, maintaining green lawns, as well as suitable colours of particular buildings. Pumping and hydrophore station are those elements which exert lesser influence on landscape. They are smaller in size when compared to technical infrastructure localized mainly below ground level.

Many rural communities can reveal both positive and negative examples of water supply and sewerage infrastructure objects influencing landscape in a variety of ways. This chapter presented a field review of objects situated in the community of Wiśniowa. There are 3 surface water intakes within the area of Wiśniowa, 3 water reservoirs, 1 collective mechanical-biological sewage treatment plant with a pumping station of untreated waste. The particular objects of water supply and sewerage infrastructure in Wiśniowa are suitably located with regards to technological aspects (linked with their effective functioning) to their ability to harmonize with local landscape.

Obligations linked with the EU membership that Poland has to fulfil, regarding for example achieving a good state of all waters, accompanied by the possibility of obtaining financing are significantly accelerating attempts at modernizing the existing systems of sewage discharge and treatment and building new ones. These investments will particularly concern rural areas, within which only 20% of people have access to collective sewerage systems. It must be therefore emphasized that new elements of water supply and sewerage infrastructure in Poland should be built in accordance with technological requirements but also in harmony with landscape and local architecture. Positive examples presented here illustrate that it is possible to design and build such objects.

2.5. WOODEN HOUSES OF THE BEGINNING OF THE 20TH CENTURY IN WIŚNIOWA - SHAPES, DETAILS AND COLOURS

Wacław Bieda, Piotr Herbut

Buildings and architectural styles are significant reflections of local material culture in the cultural landscape of rural areas. A survey of historic buildings in the community of Wiśniowa, conducted by the authors [Bieda and Herbut 2007], later broadened with a study of factors that have determined local architectural styles and building shapes in the 20th century, has revealed valuable distinctive features of wooden houses, when compared to neighbouring municipalities, as well as unfavourable changes in the landscape of the area. Certain features characteristic for folk architecture and wooden buildings, which have developed in Wiśniowa over the centuries thanks to experienced and skilled local building craftsmen (in afforested areas these included mainly carpenters and joiners), are positively reflected in its contemporary cultural landscape. Among building craftsmen who contributed to creation of such pieces of architecture as wooden houses from the first half of the 20th century, surviving to this day, we should name the following: Marcin Dominik and his sons: Stanisław and Andrzej, Józef and Edward Murzyn, brilliant carpenters; Józef and Władysław Kus, Andrzej Paździo and his son Franciszek, joiners; and Franciszek Pachacz from the village of Zasań, his son Władysław, and his grandson Stanisław, blacksmiths.

Situated in a wide mountain valley between the Beskid Średni and the Beskid Niski Mountains, Wiśniowa and its surroundings are more and more often visited by tourists, who should be convinced that current owners of farms and houses duly fulfil their duties towards the heritage they have received from their ancestors by respecting the architectural tradition of the region. It is difficult to come to terms with the process of losing regional identity which takes place when the principle of good continuation is abandoned in favour of a momentary fad or when strange forms or details are transplanted. As a result, regional uniqueness as well as previous achievements of the material culture are lost. Following the principle of good continuation is visible in contemporary rural landscape, whilst the need to protect, conserve, and shape landscape in keeping with tradition is, according to Bogdanowski [1996], a precondition for improving the quality of life and preserving cultural identity in its various aspects. People living in the region of Podhale should be set as an example here, as they have grown attached to their local traditional architecture, and have learnt to adjust their houses to new conditions of life. At the same time, they have managed to combine the need for functional and formal house transformations with the preservation of most valuable features of traditional architecture. The strength of this tradition of wooden

architecture of Podhale, which astonishes with a beauty of details, is confirmed not only by numerous borrowings and transfers of architectural details to other regions but also by a number of the Podhale-style houses and whole homesteads visible throughout Poland.

Piechowicz [1998] offers a description of difficult conditions of life in the 19th century in Wiśniowa, under Austrian rule at that time, especially a detailed description of houses, furnishings, and the way particular rooms were used. The two houses from the second half of the 19th century and the beginning of the 20th century which have survived to this day differ significantly from the historic model of a Krakow-style house, that is a simple house, sometimes plastered with clay, more rarely covered with clapboards, with a hipped thatched roof (Phot. 40) and a ground floor almost at the ground level. The beginning of the 20th century was not an easy period for Wiśniowa. The war front moved across the village several times during World War I. In September 1939, Wiśniowa was the site of heavy defensive fighting; whilst in 1944 in retaliation for guerrilla warfare, the village was pacified by the Nazis. As a result, several houses and many farm buildings were destroyed. In 1950, a fire which broke out at the hamlet of Mutówka destroyed 4 homesteads. Several other wooden houses have been sold, pulled down, and taken away to other villages. At the moment, houses from the first half of the 20th century comprise only about 27% of all houses in Wiśniowa.

The current generation witnesses the remnants of historic architectural substance disappearing in Polish villages, as they are being replaced by brick buildings of strange shapes. According to Petelenz [1996], the disappearance of traditional forms and importation of strange ones in villages surrounding Krakow is an indisputable fact. In Wiśniowa, objects from the 19th century and earlier periods comprise a scanty proportion of the existing development; the exception being sacral objects: the wooden church of St. Martin from the 17th century and numerous shrines and roadside figures from the 18th and 19th centuries, particularly taken care of by local people.

At the end of the 19th century and the first half of the 20th century, houses in Wiśniowa were built of wood, in accordance with the traditional carpenter technology. However, the shape of the roof had been already reduced to a double-pitched form (Phot. 41 and Phot. 42), which after the World War II underwent further modifications obtaining the form of a half-hipped roof with characteristic narrow roofs in the gable (Phot. 43).

According to the classification made by Piaścik [1954], the scale of these houses is small, their orthogonal projection usually being of about 7x12 m. Such a house, referred to in Polish as półtoratraktowy, has two ceiling spans, one of which is longer (about 5 m) while the other one is generally shorter (about 2-3 m). Another house type present in Wiśniowa, even though more rarely, is referred to as jednotraktowy: it is characterised by a single-span ceiling, with a width of

Phot. 40. A photograph taken in 1947. It depicts the Cap family from Wiśniowa. In the background, a house with a thatched hipped roof (from the collection of Zofia Michalik from Wiśniowa)

Phot. 41. A house in Wiśniowa, the beginning of the 20th century (from the collection of Paweł Waśko)

Phot. 42. The year 1970, Na Sodku, the oldest farm in Wiśniowa; a house and a building for livestock with double-pitched thatched roofs (from the Kronika Szkoły Podstawowej w Wiśniowej of 1970)

Phot. 43. A house built in the years 1947/48 with a half-hipped roof: after the change of roof covering, the tympanum was separated from the wall with a narrow roof (photo: P. Herbut)

about 5 m and the length of 16-20 m. These buildings were originally used as living quarters, utility rooms, or service rooms; while at the moment, they have been all adapted for residential purposes. It can be recognized that both of these house types have been raised in accordance with the principle of good continuation.

2.5.1 House structures and shapes

Wooden houses in Wiśniowa are characterised by compactness, orthogonal projection, quite often a protruding porch, and a double-pitched roof. Wooden houses are exclusively one-storey buildings, sometimes with a basement and a usable loft. Quantitative diversification of building shapes has been presented in Fig. 11.

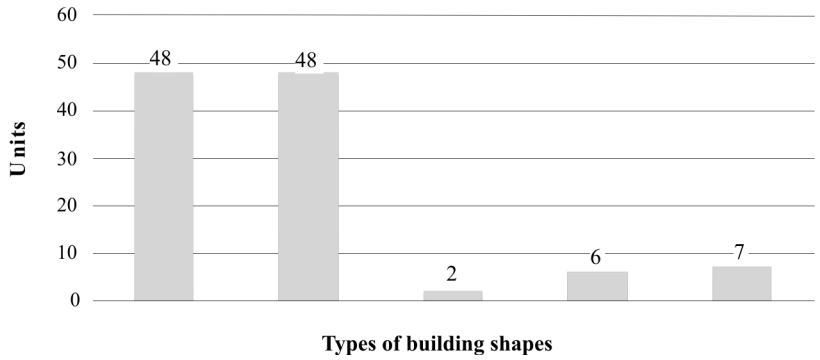


Fig. 11. The number of wooden houses depending on the type of building shape

Walls of houses built of solid coniferous wood have a corner-notched log construction. The ground beam, usually of soft, more rarely oak wood, was put on the foundation made of local stone (fieldstones and pebbles) laid dry (Phot. 44) or on an underpinning of hewn stone laid on cement mortar. Richer investors built underpinnings of at least 50 cm above ground level, while poorer ones were able to afford shallow stone spot footing at the corners and in the middle part of the walls. The ground floor was laid slightly above the ground level, while the empty space under the ground beam was filled with earth (Phot. 45 and Phot. 62). In the case of plots with a falling gradient, houses were located either along the contour line with the front wall oriented towards the sun (Phot. 46) or across the contour lines, while the empty space below the part of the house which was raised significantly above the ground level was adopted for a cellar with stone walls and vaults, accessed from the outside.

Beams used for building walls, either with sharp edges or wanes, commonly called oflisy were about 20 cm wide and were joined with a dovetail joint in the corners and at the point where they crossed with side walls. The gap between beams was sealed with moss or tails of straw. In the case of walls made of balks or beams with wanes, additional sealing with clay was applied (Phot. 47).

Phot. 44. A fragment of a wooden house from the end of the 19th century: a corner-notched log wall laid on a shallow stone foundation with clay mortar; a dove-tail joint. Empty spaces between beams filled with moss and tails of straw (photo: W. Bieda)

Phot. 45. A fragment of a wooden house with the ground floor almost at the ground level: walls plastered with clay laid on wooden slats; the entrance door covered with decoratively arranged clapboards and a transom window (photo: W. Bieda)

Phot. 46. A house on a plot with southern orientation situated parallel to contour lines: high stone underpinning; an entrance to the cellar with a stone vault; walls covered with clapboards; new windows differ from typical windows for that region in terms of size and structure; the glazed surface of the entrance hall with decorative shapes and panels (photo: P. Herbut)

Phot. 47. A house on a high stone underpinning: gaps between beams filled with clay; the southern gable has a natural colour of 'old' wood with brighter stripes along the eaves and under the upper clapboard overhang (photo: P. Herbut)

With time, some houses were plastered either completely or only at the front (Phot. 48 and Phot. 49). For this, slanting wooden slats were used (Phot. 45) or the so-called laski, that is wicket nets, with a mesh of about 10 x 10 cm, nailed to the beam so as to increase mortar adhesion. The next stage in the process of house transformations involved covering them with clapboards. This was usually applied to the front wall (Phot. 50) with the help of boards arranged in various patterns (Fig. 12).

Rich owners covered houses with clapboards on all sides. The clapboard pattern in the upper and bottom part is usually horizontal; less often, it is vertical in the bottom and horizontal in the upper part. The middle part of the wall very often used to have a vertical, diagonal, or herringbone pattern. Entrance door always had an upper transom window which was supposed to illuminate the hall. The front door was decorated with panels arranged in a characteristic pattern with a square in the middle part of the door (deskowanie w krosno), while the back door was covered with planks, without any ornaments. The door leads to the entrance hall, which is situated in the middle, in the case of houses with two ceiling spans (7 x 12 m), while for wide-frontage houses (5 x 16-20 m) the door is situated on one side of the building. Windows with window frames and double side hung sections are divided horizontally at 2/3 of their height. The windows in gables are simple structures with one window pane (okna krosnowe). Window and door casings are usually plain, without ornaments, whilst inside the porch there might be a door leading to the entrance hall. This door may be decorated with carved panels.

Except for the requirements concerning thermal wall insulation and exterior woodwork, the house structure described above meets the requirements of ecological engineering, as Wiśniowa's houses are made of local building materials and they are heated traditionally with firewood burned in a tiled stove or equipped with central heating and a boiler adjusted to burning wood or timber waste from local lumber mills. The current trend of improving external wall heat storage, which is a natural consequence of improving life standards, contemporary economic conditions, and natural environment protection, also refers to wooden houses of Wiśniowa. House walls are most often insulated with a light wet method as well as a light dry method. The light wet method of thermal insulation uses polystyrene with one coat plaster laid on a plastic lath, whilst the light dry method applies mineral wool, more often than polystyrene, which is covered from the outside with PCV siding; however, most often without systematic elements which would make it possible to dry the heat-insulating layer getting moist as a result of steam condensation. Covering the walls of wooden houses with smooth plaster changes their exterior facade when compared to their original style. Covering house walls with shiny siding imitating planks of wood arranged vertically on the wall surface (Phot. 51) constitutes another gross change with regards to the original appearance of the house. One cannot also disregard here the unsuitability of thermal

Phot. 48. A house plastered with clay and whitewashed with lime - only at the front (photo: P. Herbut)

Phot. 49. A house plastered with clay and whitewashed with lime and some addition of ultramarine: the gable with a double overhang, finished up with a decorative element; a hedge separates the house from the road (photo: P. Herbut)

Phot. 50. A house covered with clapboards with an underpinning plastered only from the front: the gable is separated from the wall with a double overhang finished up with a decorative detail (photo: W. Bieda)

Phot. 51. A house raised in 1935, currently after thermal modernisation: the walls covered with shining siding; the porch with a dormer window; everything richly decorated; large glazed surfaces decoratively divided into smaller parts; new windows are suitable in terms of size and their structure corresponds to traditional patterns (photo: P. Herbut)

modernisation solutions, as far as insulation materials are concerned, since both applied materials pose a threat to the wooden structure of the house. They may cause excessive humidity or develop mould which results from the character of heat-humidity phenomena taking place inside house walls whose external layer is unable to dry easily.

The roofs of Wiśniowa's houses have a raft construction based on eaves purlins laid on roof main beams. Rafts are joined at the ridge with a fish plate, creating a triangular roof truss. For houses wider than 6 m, an additional structure strengthening the roof triangle, called a collar beam, is applied. In the case of wider roofs, collar beams are supported by intermediate purlins laid on the roof structure. Until the end of the 1970s, roofs of farms buildings were covered with thatch, gradually replaced by cement tiles produced by local craftspeople, for example Józef Mistrz and Józef Węgrzyn. At the moment, cement tile is the most popular roof covering material, which means that it is a very durable material. Apart from cement tiles, various types of metal roofing are used, which have replaced worn out asbestos-cement materials dangerous for the health.

We can distinguish two types of roof shapes Wiśniowa's architectural style (Fig. 13), a double-pitched roof with eaves being the most popular one.

We can also encounter a certain modification of this type: a half-hipped roof with characteristic narrow roofs in the gable. Roof pitch varies between 35-45°, with the majority of roofs not exceeding 40°. House lofts were not generally used as a living area. At the moment, since rafter framings were generally quite steep, lofts in certain houses have been partly or completely adapted as living quarters. House gables in Wiśniowa have a triangular (in the case of double-pitched roofs) or trapezoid shape (in the case of half-hipped roofs) and they are covered with clapboards (Fig. 14). Most often the joint of the wall and the roof is marked with a single or double overhang (Fig. 15).

The separation of the house wall from the gable is a characteristic feature of Polish local architecture, and it is particularly distinctive in the region of Krakow because of ornamental carvings and gable plank perforations. A similar effect is obtained with the help of a narrow gable roof. A gable overhang emphasises the shadow on the wall, sometimes duplicating the decorative carvings (Phot. 52 and Phot. 53).

Wooden houses in Wiśniowa are characteristic for one more feature typical for the region: open porches, supported by 2 or 4 poles, or closed glazed porches. The porch, referred to in Polish as ganek or przysionek [Wieczorkiewicz 1995], plays important functional roles. It is a place where certain types of housework can be conducted with a simultaneous possibility of supervising the farmyard and the road leading to farm buildings. In the summer, a porch becomes a favourite place for rest.

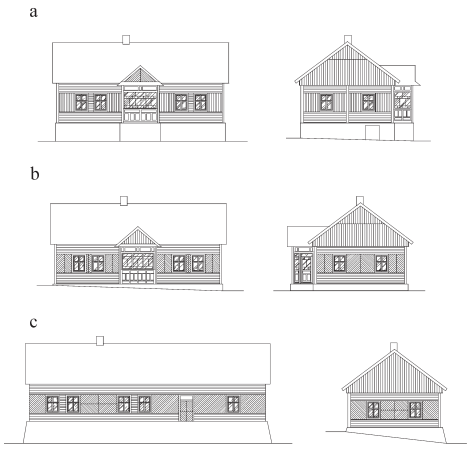


Fig. 12. Examples of clapboard patterns: a - horizontal in the upper and bottom part, vertical in the middle, b - vertical and herringbone pattern, c - horizontal in the upper and bottom part, with herringbone or diagonal pattern in the middle

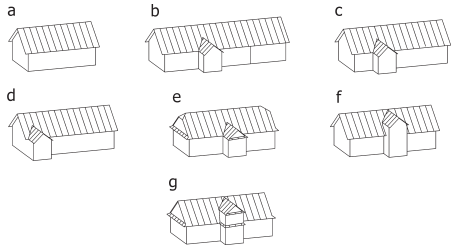


Fig. 13. Roof types: a, b, c, d, e, f - double-pitched roofs; g - double-pitched roofs with narrow roofs in the gable

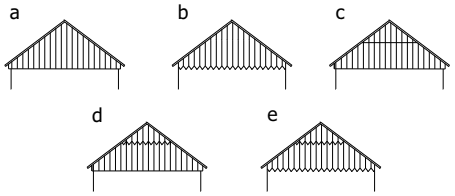


Fig. 14. Clapboard pattern separating the gable from the house wall: a, b - a single overhang; c, d, e - a double overhang; b, d, e - a gable finished up with a decorative detail (the so-called ‘fartuszek’)

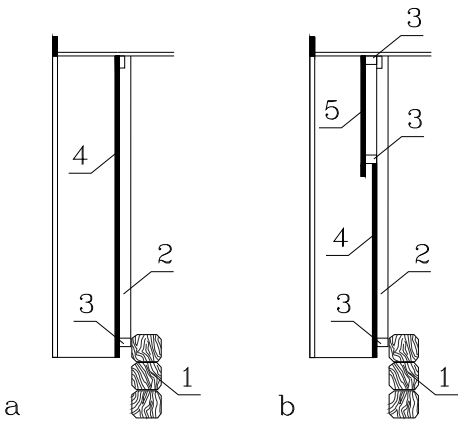


Fig. 15. Structure of an overhung gable: a-a single overhang; b-a double overhang; 1-a corner-notched log construction, 2-a rafter, 3 - die squares, 4 - clapboards, 5 - upper clapboards

Phot. 52. A gable with a double overhang covered with clapboards finished up with variously decorated details. The shadow on the wall highlights the overhang (photo: W. Bieda)

Phot. 53. A gable separated from the house wall with a double overhang covered with clapboards finished up with a decorative detail. The overhang casts a shadow on the wall, which duplicates the decorative detail (photo: W. Bieda)

2.5.2 Details

As far as wooden houses in Wiśniowa are concerned, there are two architectural details characteristic for this region: artistic ornamentation of overhang gables in the form of carved or carved and perforated clapboards referred to as fartuszek ("an apron") or more rarely as koronka ("a lace") (Fig. 16, Phot. 53) and openings in clapboards of various shapes and sizes (Fig. 17, Phot. 54). Sometimes, one can also come across decorated barge boards and finials at the apex of a gable (Fig. 18 c and d).

Porches are particularly decorative (Phot. 55, Phot. 56 and Phot. 57). Open porches are characterised by richly ornamented tympanums (Fig. 18, Phot. 57 and Phot. 62) and railings. Closed porches, apart from richly decorated tympanums, have large glazed surfaces which are decoratively divided into round, triangular, rhomb, or rectangular shapes (Phot. 51). Walls of porches have decoratively moulded panels whose contrastive colours highlight window frames and certain surfaces (Phot. 55). Apart from that, the walls (Phot. 56) and corner posts (Phot. 60) are sometimes covered with ornate plant-like motives. Details of some houses, and particularly house gables bear visible features of the architecture of the Podhale region. These involve radial ornaments on house gables called słonecka ("little suns"), two smaller roofs on house gables (Phot. 56 and Phot. 61), and even pediment roofs (Phot. 55).

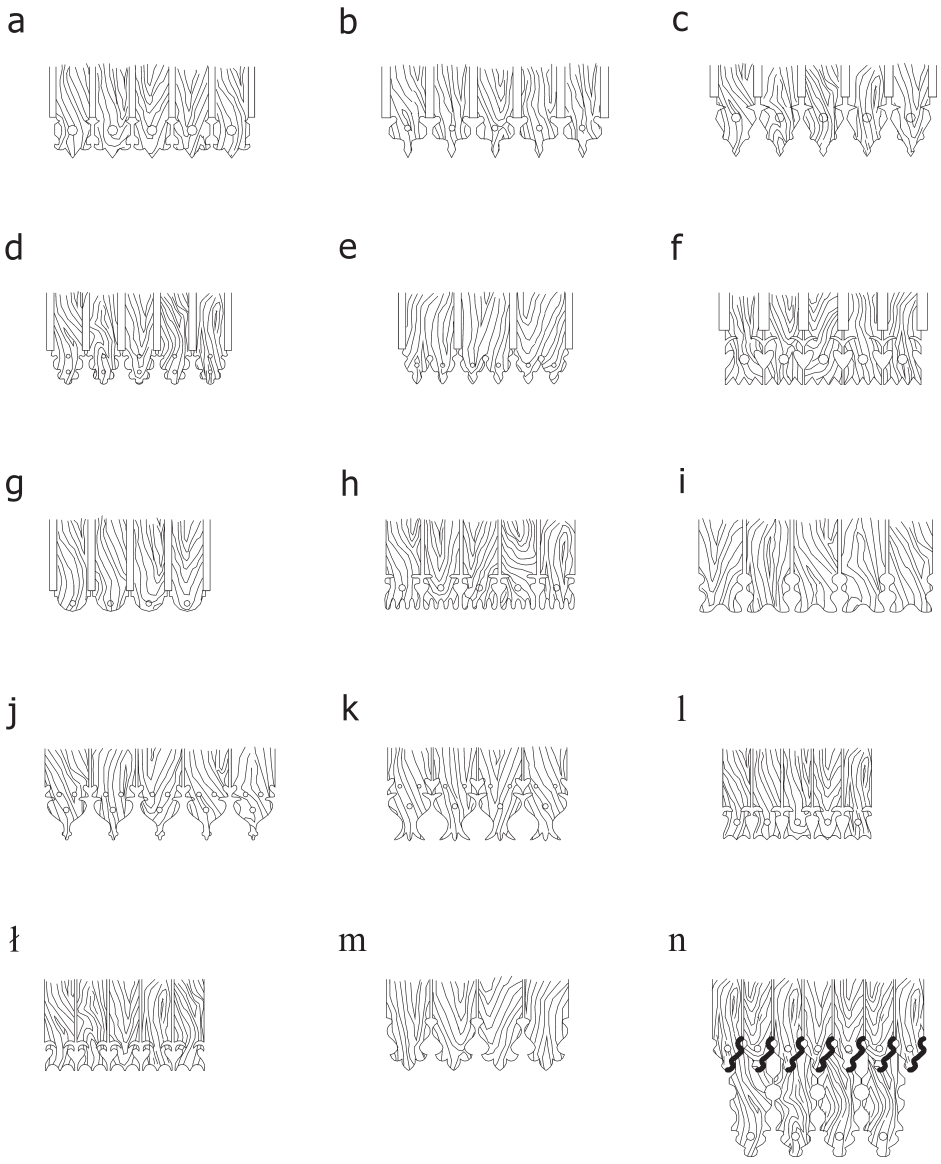


Fig. 16. Exemplary decorative patterns of the so-called ‘fartuszek’: a, b, c, d, e, f, g - with slats covering contact points; a, b, c, d, e, f, g, h, j, k, l, n - carved and additionally perforated patterns; i, ł, m - carved patterns; n - a double-layered pattern

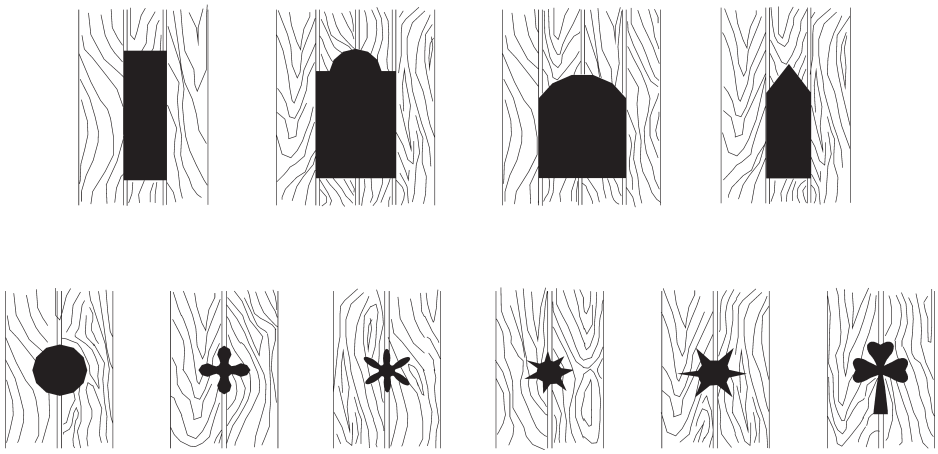


Fig. 17. Openings in gables

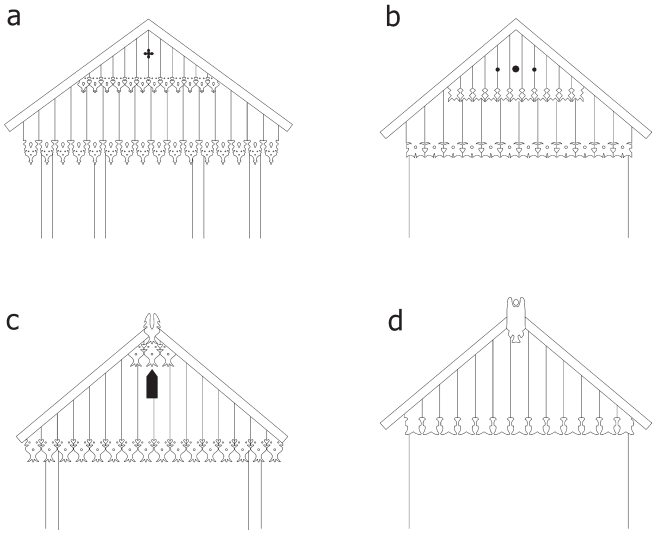


Fig. 18. Porch tympanums: a, b - with an upper and bottom decorative detail (the so-called ‘fartuszek’); c - with a bottom ‘fartuszek’ and a ridge decorated with a finial and another ‘fartuszek’; d - with a ‘fartuszek’ and a finial in the ridge

Phot. 54. A fragment of a gable with a beautifully patterned architectural detail: a star-shaped opening and a larger opening with a small balcony for pigeons (photo: W. Bieda)

Phot. 55. A closed porch with edges and window frames painted white, strongly contrasting with green walls. Below decoratively divided windows, planks covered with rhombuses and rectangles. In the upper part, the planks have different colours and patterns (photo: P. Herbut)

Phot. 56. A closed porch with large windows decoratively divided into smaller sections. Below, planks covered with geometric shapes. In the upper part, planks are covered with different patterns, including plant-like motifs. The tympanum of the porch is decorated with a carved barge board and a radial ornament called ‘słonecko’ borrowed from the architecture of the Podhale region (photo: P. Herbut)

Phot. 57. A spacious, closed porch with a cellar: large windows with characteristic division into squares and rectangles; similar patterns placed on planks on porch walls; white window sashes and planks strongly contrast with green walls; the tympanum finished up with decorative details (photo: P. Herbut)

2.5.3 Colours

Roof colours are dominated with grey cement tiles and asbestos-cement plates, which have darkened and become green in the shadowed and humid places and overgrown by moss and algae (Phot. 70). The colours of more modern metal or tile roof coverings correspond to the colours of ceramics, that is they range from brick-red to dark brown. Porches and less often walls and gables present the widest variety of colours. Walls are most often painted green, apart from window frames, door frames, and posts which are painted white (Phot. 46, Phot. 57, Phot. 63, Phot. 64). Quite often, we can also come across walls painted beige and light brown (Phot. 43, Phot. 58, Phot. 59, and Phot. 65) or unpainted at all, which have taken on colours proper to particular stages of softwood ageing: from light brown to very dark, almost black colours. They have also obtained rustic texture, which can be visible on walls exposed to sunlight (Phot. 47, Phot. 50, Phot. 53, and Phot. 66). Some exceptions in terms of colour involve houses plastered with clay and whitewashed with lime and some addition of ultramarine which gave the walls a shade of blue (Phot. 49). Houses with white walls are either plastered and whitewashed with lime (Phot. 45 and Phot. 48) or covered with siding after insulated (Phot. 51).

Additional colour elements can be only encountered on a few houses with closed porches, with colourful pieces of glass, usually red, green or cloudy, in the bottom and upper part of the glazed surface (Phot. 58). The colours of the roof and walls are complemented by the colour of the local stone used for underpinning, which varies from dark grey to brown, and which has remained unchanged since the time the houses or the underpinnings of front walls, later plastered with cement, were built.

Relatively rich vegetation surrounding houses not only plays a protective role, but also highlights or tones down the colours of the houses, depending on the vegetation period and tree or bush species (Phot. 47 and Phot. 49).

Most wooden houses in Wiśniowa, survived to this day, possess certain features which reveal the strength of regional identity and traditions coming from previous generations. They are also a proof of high material culture of local inhabitants. However, recent years have witnessed dramatic changes in the architecture of local houses; changes which have made these houses increasingly resemble modern buildings and which have revealed that the countryside might not be a place where rural landscape is preserved and shaped in accordance with cultural heritage.

The loss of regional assets of material culture, a social property developed over the years by previous generations, very often takes place with social consent and is influenced by decisions issued at various levels of local government. Many regions, which had developed varied forms of rural architecture in the area

of Pogórze Karpackie (the Carpathian Foothills), have not survived to this day; while some of them, like the region of Wiśniowa, have been preserved only fragmentarily. These changes can be attributed to sociological, economic, and technological-spatial factors [Petelenz 1996]. The assessment of the general state and level of technical wear of 50-year-old buildings clearly reveals that houses situated directly on the ground are more vulnerable to technical wear than houses on underpinnings. Civilisation transformations that have taken place after World War II have suddenly made wooden houses functionally old, which for young people who stayed in the country was a sufficient argument for building new houses with a functional layout and equipment that would match contemporary standards of living. Today, old houses are usually inhabited by older people who feel sentimentally attached to their own past and their ancestors. They value the healthy microclimate of a wooden house, warm in winter and cold in summer, and are fond of communicating with each other and with the outside world at a one-storey level, without stairs. Given the possibility of living in a new house built by their own children, situated in the vicinity or on the same plot, these people opt for loneliness in the old house. Inhabited old wooden houses are usually very well-kept, which is a proof of certain sort of refinement on the part of their inhabitants. Decorating houses with plants and flowers in the front yard is becoming more and more popular.

As far as factors which negatively influence the standard of living are concerned, we should mention here intensive traffic on the road connecting Wiśniowa with the nearby towns of Dobczyce and Kasinka Mała. This road is very intensively used in weekends because it serves as an alternative route to an overcrowded and overloaded parallel road leading from Krakow to Zakopane, the so-called zakopianka. Some houses are situated only within a few metres from the road, which is why the noise and vibrations caused by road traffic are so arduous both for people and for the technical state of buildings.

Taking into consideration phenomena which exert negative influence on cultural landscape, we should also mention the lack of detailed legal regulations. According to Krowicki [1996], municipal spatial management plans or directional guidelines for the building industry, just as in western European countries, should protect areas boasting historical cultural landscapes. These regulations should also include certain pattern books of architectural forms that must respect traditional style both in new and converted houses. The above-mentioned conditions do not aim at cultivating "parochialism" (narrow-mindedness), understood as restricting the inflow of new ideas and technologies, but rather try to promote "regionalism", understood as an ability to choose, that is to reject consciously some incoming ideas without adapting them to local conditions. For example, some negative changes have been caused by unsuitably installed thermal insulation, which not only changes the appearance of buildings but also poses a serious threat to their

stability and microclimate. We could ask now: why not use mineral wool, which easily permeates vapour? Why not use traditional clapboards arranged in typical local patterns, which equally easily permeate vapour, as an outside layer?

Available ecological preparations used for wood preservation and colouring significantly prolong wood permanence and are characterised by high resistance to colour change under the influence of climatic conditions. The next question, one should answer is: why do designers apply unsuitable, from the point of view of building physics, construction and material solutions, which in addition radically change house appearance?

We cannot also disregard negative visual consequences of exchanging old and used-up windows whose windowpanes were traditionally divided into smaller sections; or doors covered with characteristic panels or clapboards. Replacing windows and doors is certainly justified by the need to reduce heat losses and the noise coming from outside. However, this very often changes the appearance of the house since new windows are not divided into traditional sections (Phot. 46 and Phot. 66), whilst new doors do not resemble their predecessors.

Some old houses in Wiśniowa are being reconstructed in accordance with the principle of good continuation, confirming the need for preserving regionally traditional house shapes (Phot. 65). Others are being replaced by brick buildings (Phot. 67) or abandoned, they are deteriorating in front of our eyes, which inevitably leads to their technological death (Phot. 68, Phot. 69 and Phot. 70). We can only hope that they will leave a trace in the form of photographic documentation and entries in registers compiled by monument conservation offices, universities, government offices, or individual people.

Cultivating regionalism in folk architecture should become the principle implemented by competent offices in the process of defining development and land management conditions, evaluating notifications connected for example with thermal modernisation of buildings, as well as controlling whether suitable regulations are being followed. The project of the Miejscowy plan zagospodarowania przestrzennego gminy Wiśniowa ("local spatial management plan for Wiśniowa"), developed in Krakow by Instytut Rozwoju Miast in January 2008, defines the principles of cultural heritage and monument protection as well as the protection of contemporary cultural goods. It presents a list of 5 historic buildings, including house No. 17 in Wiśniowa, which have been entered into the monument register and which, consequently, are being legally protected as cultural goods, on the basis of detailed regulations. The local plan for Wiśniowa also includes a list of buildings placed under conservatory protection and entered into the monument register as well as other buildings identified as historic, for example 18 houses and 4 farms in Wiśniowa. One should hope that these regulations will be consistently realised, which will help to protect local cultural heritage and landscape.

Phot. 58. A closed porch: apart from the porch windows decoratively divided into smaller sections and planks covered with patterns on the walls, coloured panes preserved to this day in the upper and bottom part of the transom window, very popular in the past; the tympanum of the porch with an opening and a small roof separated from the wall (photo: W. Bieda)

Phot. 59. An open porch, supported by 4 poles: a balustrade at the sides fully covered with clapboards; the tympanum with overhang clapboards finished up with elaborate details and an opening in the shape of a cross (photo: P. Herbut)

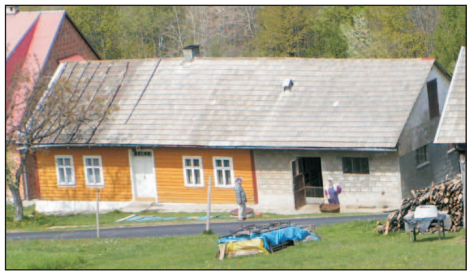
Phot. 60. A colourful plant-like motif decorating the corner of a house (photo: P. Herbut)

Phot. 61. A gable with two small roofs: a carved slat running along the eaves and a radial ornament - elements typical for the architecture of the Podhale region. New windows on the ground floor correspond to traditional patterns (photo: P. Herbut)

Phot. 62. The house of the organist build at the end of the 19th century: an open porch supported by 4 poles; a characteristic tympanum with a rare double ornamented detail (the so-called 'fartuszek'); window frames, the porch tympanum and vertical slats covering clapboard contact points, all painted white, contrast with green walls and shutters (photo: W. Bieda)

Phot. 63. A house from 1900, on an underpinning, with a closed porch: window frames, corners, slats covering clapboard contact points are painted white and strongly contrast with green walls (photo: P. Herbut)

Phot. 64. A house with a closed porch, situated on the side: green walls, white window frames, while the corners; the ground beam, and the tympanum of the porch are painted light brown (photo: P. Herbut)



Phot. 65. A house with an attached building for livestock, after the latter has been converted into a brick structure. The building has retained its original shape. The wall of the house is covered with clapboards arranged horizontally and painted light brown (photo: W. Bieda)

Phot. 66. A house on a stone underpinning being adapted for a holiday cottage: an open porch supported by 2 poles has been added; roof covering and window frames have been exchanged. New windows do not retain the traditional pattern while the window in the gable strikes with excessive size (photo: P. Herbut)

Phot. 67. A house with a beautiful porch, partially taken down to make space for a new building (photo: W. Bieda)

Phot. 68. An abandoned and dilapidated house of the beginning of the 20th century (photo: W. Bieda)

Phot. 69. A house with an attached building for livestock of 1947. After the building for livestock has been taken down, the house awaits technological death (photo: P. Herbut)

Phot. 70. An abandoned and dilapidated building of the end of the 19th century (photo: P. Herbut)

Phot. 71. A local slaughterhouse of 1929 converted into a regional exhibition room "Izba regionalna" (photo: W. Bieda)

Another important, probably even most important, task would be to begin systematic and multidirectional activities aiming at persuading local inhabitants that they cannot regard their own, incredibly rich, regional identity as less valuable. Accepting the loss of regional uniqueness, following fashion and importing strange standards into regional architecture result in dynamic, unfavourable, and irreversible cultural landscape transformations. This consequently leads to the loss of identity and achievements of material culture in the region. We have to agree here with Łaś [1996], who claims that in order to preserve regional identity one has to be aware of the fact that not all things inherited from previous generations have become dated to such a degree as to be useless at the moment. What is new and strange is not always better from what is old and local. Converting an 80-year-old wooden building of a local slaughterhouse into a regional exhibition room called Izba regionalna (Phot. 71) was an appropriate initiative undertaken by Wiśniowa's local authorities with the aim of cultivating knowledge about rich achievements of the past. The exhibition presents historic domestic devices, furniture, photographs, and literature.

Besides, it seems necessary at the moment to take up initiatives encouraging local communities to revive their villages, but taking into consideration their local tradition. As experiences from the processes of education and upbringing reveal, what helps to strengthen regional identity is persuading young people that achievements worked out by their predecessors are very valuable and that it is necessary to continue these achievements for the sake of future generations. In the beginning, apart from teachers, a lot can be done by local cultural activists, self-government authorities and individual enthusiasts willing to devote their time and share their knowledge to preserve tradition and cultural landscape of Wiśniowa and its surroundings. Afterwards, active members could create a group, for example, in the form of an association of higher public purpose, which will have an increased capability of influencing national and local authorities as well as other institutions and achieving assumed programme goals for the sake of local strategy of landscape protection and development. It will be also able to raise financial resources to protect historical cultural landscapes thus strengthening regional identities and local economies, significant elements of the local development.

The authors would like to express their gratitude to Mr Julian Murzyn, mayor of the community of Wiśniowa, for his help in preparing this publication and for providing valuable information about local people, particularly those who contributed to the development of craftsmanship in Wiśniowa and its surroundings, about houses raised by these people which have survived to this day and confirm their masters' exceptional skills as well as their excellent feel for beauty expressed in richly ornamented details.

2.6. IMPACT OF ANTHROPOPRESSURE ON CHANGES IN HYDROLOGICAL REGIME OF THE KRZYWORZEKA RIVER IN THE MUNICIPALITY OF WIŚNIOWA

Wojciech Bartnik, Tadeusz Bednarczyk

Rivers have been the best communication trails for groups of people and have served as routes of cultural exchange. A river, therefore, plays an important creative role in the process of shaping the cultural space, conceived as a complex structure of various influences. These influences are determined both by the range of the river valley (often morphology of the river bed, flooding areas, etc.) as well as the area of the river basin (catchment area). It is assumed that a river's cultural space is a structure composed of various interactions, in which the river participates.

Due to the specific character of river valleys, the methodology of assessing cultural landscape shaping requires an analysis developed on the basis of the following: the mapping of the river bed structures (river bed morphology), the dynamics of the river bed change and the flooding area change, hydrotechnical constructions in river beds, hydrological regime, the function of flow, and ecological corridor.

The defined morphological and hydrological indexes should constitute a component which would help to determine both the features of the catchment area as well as the influence the river has exerted on the given cultural landscape.

2.6.1 Description of the Krzyworzeka River

2.6.1.1 Morphological description

Geographers came up with the term Beskid Wyspowy (the Island Beskid) to name the unique and incredible characteristic part of the Carpathian Mountains in the south of Poland. This mountain formation is dominated by isolated hills with concave slopes and gentle hilltops, often covered with meadows, protruding several hundred metres above the foothill landscape.

The Beskid Wyspowy boundary lines are determined by the following mountain ranges: in the north, the Pogórze Karpackie, between the valleys of the Dunajec and Krzyworzeka Rivers; in the west, the Beskid Średni Mountains and partly the Pasmo Podhalańskie Mountains (through the valley of the Raba River); in the south, by the Gorce Mountains (the valleys of the Mszanka and Kamienica Rivers); and in the east, by the Beskid Sądecki Mountains and the Kotlina Sądecka (the valley of the Dunajec River). The highest hills of the area include:

Mogielnica (1170 m AMSL), Ćwiliń (1072 m AMSL), Jasień (1062 m AMSL), Luboń Wielki (1022 m AMSL), Śnieżnica (1006 m AMSL), and Lubomir (905 m AMSL). Northern slopes of the Beskid Wyspowy are steeper than the slopes of the southern exposure. The mountain ridge system loses its "island-like" character in the eastern part of the Beskid Wyspowy, adjoining the Kotlina Sądecka (the Pasmo Łososińskie Mountains and the Modyń Range) [Zalewska 1982]. It is striking that the flat hilltops of the Beskid Wyspowy run at nearly the same height. They take on a form of a plain inclined towards the north, which implies the conclusion that they all used to form a wide plateau cut across by streams and rivers with time [www.beskidwyspowy.prv.pl].

The climate of the Beskid Wyspowy bears characteristics typical for mountain and foothill areas of medium mountains with strong temperature fluctuations and significant precipitation. The area boasts lush and rich vegetation even though well-developed fruit farming and agriculture reach as high as about 900 m AMSL. As for forests, beech-fir forests predominate with elements of spruce, sycamore, and ash.

For centuries, the area of the Beskid Wyspowy has been cut across by significant trade routes. Currently, an extensive road network and the communication system with a diverse network of tourist trails enable a thorough exploration of Beskid Wyspowy. The "island-like" character of this mountain range remarkably increases its landscape qualities thanks to vast panoramas [Zalewska 1982].

A mountain stream called Kobielnik, having its source on the northern slopes of Beskid Wyspowy, has been recognised as the beginning of the Krzyworzeka River. Further on along its course, already under the name of Krzyworzeka, the river flows across a hilly region called Pogórze Wiśnickie, within the area of the community of Wiśniowa. The total length of the river is about 18 km. Krzyworzeka is a right-bank tributary of the Raba River. It flows into Raba at the 55.9th km of its course, at the town of Marwin, below the Dobczyckie Lake. Along its course, the Krzyworzeka receives three small tributaries: a right-bank tributary called Sikornica, and two left-bank tributaries: Lipnik and Olszynka.

In its upper reach, the Krzyworzeka traverses areas of compact settlement and absorbs waste, for example, from the local sewage treatment plant at Wiśniowa. In its middle and lower reaches, the river flows across markedly agricultural areas, which is why the sources of contamination involve both surface runoff and household sewage from villages situated along the river [www.wios.tarnów.pl/raporty/ocena/region02/krzyworzeka].

In 2002, the programme of regional monitoring was established for the Krzyworzeka at a check and control point located at the river mouth (km 0. 700). At that time, water quality in the river, according to physical-chemical indices, presented as follows:

– organic substances content corresponded to quality class I,
– salinity: quality class I,

– the amount of suspensions did not exceed the norms allowed for quality class I,

– biogenic compounds: quality class I, including both the group of nitrogen and phosphorus compounds,

– specific contaminants did not exceed the values allowed for water quality class I.

Taking into consideration physical-chemical parameters, the water of the Krzyworzeka River corresponded to the required quality class I. As for hydrobiological indicators, Krzyworzeka represents the mesosaprobic zone: quality class II. Sanitary state of the water at the researched reach corresponded to water quality class III.

2.6.1.2 Geological description

Geological structure of the Beskid Wyspowy is the basic element underlying the present specification of the Beskid Wyspowy's relief. The area under discussion is characterised by the presence of two types of flysch rocks. The term flysch refers to alternate layers of conglomerates, sandstones, and claystones. Flysch is formed at sea bottoms as a result of so-called suspension currents, which lead to the characteristic fractional stratification. This stratification is distinguished by the fact that the thick rock material is accumulated within the layer's floor with finer material accumulating above, up to clay deposits within the layer's roof. Apart from the Beskid Wyspowy, flysch rocks can be found, for instance, in the outer Alps [www.karpaty.edu.pl/teams/drugac/bieszcz/flisz].

The upper part of this mountain formation (mountain ridges and tops) is made of thick shoal sandstone. Below that, rock complexes occur, such as thin shoal sandstone and shale layers, marls, and mudstone, which are more vulnerable to damage processes. The presence of rocks which are less resistant to erosion is connected with the existence of gentler slopes and vast depressions between particular mountains, whose relief bears characteristics typical for foothill areas. The "island-like" forms have been preserved thanks to caps of hard sandstone covering mountain tops.

The river basin is made of flysch formations of the Cretaceous period, covered with sandstone, shale, and mantle rock deposits. The entire area of the Krzyworzeka basin at the river mouth amounts to 80.2 km2. In the upper course, the basin bears features of a mountainous basin, whilst in the middle and lower course its agricultural character predominates [www.wios.tarnow.pl/wios/raporty/ocena/region02/krzyworzeka].

Situated in the south-east of Wiśniowa at the border of the water divide, Lubomir (905 m AMSL) is the highest mountain of the river basin.

Table 12. Results of discrete measurements of flow capacity of the Krzyworzeka River at the gauging section of Marwin

Item no.	Year	Measure-ment date	Water level	Flow capacity	Surface area of channel cross section	Water table width	Maximum depth in the cross section
			H	Q	F	B	h_{max}
			[m]	[$m^3 * sec^{-1}$]	[m^2]	[m]	[m]
1	2	3	4	5	6	7	8
1	1961	03.07	0.84	0.119	0.47	3.7	0.23
2	1964	31.07	0.55	0.084	0.56	8.0	0.11
3		7.08	0.56	0.089	0.54	7.0	0.14
4		14.09	0.58	0.160	0.98	8.5	0.25
5		10.10	0.53	0.048	0.26	3.2	0.14
6		13.10	0.55	0.130	0.70	8.6	0.13
7	1965	30.03	0.68	2.410	3.51	13.6	0.40
8		20.05	0.73	4.590	5.08	18.5	0.45
9	1966	12.08	0.54	0.388	0.91	7.2	0.24
10	1967	24.04	0.76	5.340	4.67	14.4	0.60
11		18.05	0.51	0.406	0.81	6.3	0.20
12		28.05	0.6	0.837	1.66	10.5	0.28
13	1968	18.01	0.68	2.750	3.33	14.0	0.40
14		13.06	0.64	1.340	1.85	10.3	0.30
15		7.08	0.63	0.387	0.74	6.7	0.18
16		23.09	0.64	1.890	2.21	10.3	0.36
17	1969	17.05	0.48	0.269	0.57	6.5	0.13
18	1970	12.03	0.49	0.944	1.80	11.5	0.28
19		28.04	0.46	0.451	1.12	9.5	0.19
20		19.06	0.48	0.749	1.61	11.3	0.23
21		24.08	0.50	1.150	2.06	10.2	0.35
22	1971	21.09	0.34	0.139	0.47	5.0	0.14
23	1973	24.09	0.22	0.138	0.34	4.0	0.12
24	1974	18.11	0.32	0.573	1.78	10.5	0.28
25	1975	22.01	0.31	0.510	1.56	10.0	0.25
26		8.11	0.20	0.285	0.89	7.0	0.20
27	1976	17.02	0.15	0.357	1.10	8.5	0.18
28		12.10	0.19	0.427	1.20	10.3	0.20
29	1977	20.10	0.19	0.170	0.39	3.4	0.18
30	1978	23.03	0.2	0.339	0.58	5.6	0.18
31		26.07	0.16	0.264	0.81	4.9	0.35
32		6.09	0.22	0.439	1.34	5.5	0.58

2.6.1.3 Hydrological description

Hydrological characteristics of the river have been determined on the basis of flow measurements and multiannual stream gauging observations at the section of Marwin.

2.6.1.4 Defining maximum annual flow

Stream gauging observations at the Krzyworzeka River were conducted only at the section of Marwin. They involved discrete flow measurements and continuous water level measurements within the hydrological decade of 1971-1980, as well as in individual hydrological years of 1959, 1960, and 1982. With the help of information about daily water levels for the above-mentioned hydrological years and a previously developed rating curve for the section of Marwin, maximum flows at the section of Marwin were determined. Their values are presented in Table 13.

Table 13. Maximum annual water levels, with corresponding flows for the Krzyworzeka River at the section of Marwin

Item no.	Hydrological year	Maximum observed water level [m]	Corresponding flow [$m^3_*s^{-1}$]
1	1959	1.55	65.337
2	1960	2.20	149.815
3	1971	0.72	3.138
4	1972	1.40	49.854
5	1973	0.68	1.959
6	1974	1.02	18.462
7	1975	1.84	99.694
8	1976	0.54	0.711
9	1977	0.46	0.531
10	1978	0.68	1.959
11	1979	0.57	0.786
12	1980	1.41	50.835
13	1981	1.36	46.005
14	1982	1.56	66.427

The obtained flow values for the gauging section of Marwin were transferred to the section of Wiśniowa (the site of the future investment) with the help of the extrapolation method, based on the assumption of phenomena (flow) continuity if these take place within certain distance from the measurement cross section. For that purpose, the area of the Krzyworzeka catchment, until the section

of Wiśniowa, was calculated with the help of a topographic map at a scale of 1:10 000. After planimetring, this area equalled: FWIŚNIOWA = 14.0 km^2.

According to the data recorded in hydrological yearbooks, the area of the river catchment until the gauging section of Marwin equals: FMARWIN = 77.7 km^2.

The extrapolation method, described in detail by Zielińska and Brzeziński [1997], consists in determining the right flow correction factor from the observation section. In the case of transposing the values of maximum flow from the gauging cross section to the ungauged section, one needs to take into consideration not only the size of partial catchment but also the phenomenon of flood wave flattening, triggered by channel storage. According to Zielińska and Brzeziński [1997], in the case of transposing maximum flow values one has to assume that the index of flow transformation function equals $\phi_{max} = {}^2/_3$.

$$\left(\frac{F_{WISNIOWA}}{F_{MARWIN}}\right)^{\phi_{max}} = \left(\frac{14.0}{77.7}\right)^{\frac{2}{3}} = 0.319$$

Table 14. presents flow values at the gauging section of Marwin as well as the corresponding corrected flow values at the section of Wiśniowa.

Table 14. Maximum annual flow values for the Krzyworzeka River at the section of Wiśniowa in the years of 1959 to 1982

No.	Hydrological year	Marwin gauging site		Correction factor	Flow at the section of Wiśniowa
		Maximum observed water level	Corresponding flow		
		[m]	[m^3*s^{-1}]	[-]	[m^3*s^{-1}]
1	1959	1.55	65.337	0.319	20.843
2	1960	2.20	149.815		47.791
3	1971	0.72	3.183		1.015
4	1972	1.40	49.854		15.903
5	1973	0.68	1.959		0.625
6	1974	1.02	18.462		5.889
7	1975	1.84	99.694		31.802
8	1976	0.54	0.711		0.227
9	1977	0.46	0.531		0.169
10	1978	0.68	1.959		0.625
11	1979	0.57	0.786		0.251
12	1980	1.41	50.835		16.216
13	1981	1.36	46.005		14.676
14	1982	1.56	66.427		21.190

2.6.1.5 Determining the cumulative distribution function of annual maximum flow at the section of Wiśniowa

The cumulative distribution function of annual maximum flow for the section of Wiśniowa was developed on the basis of the decile method created by Dębski. This method, based on estimating the parameters with the quantile technique, does not take into consideration the arithmetic mean of the studied unit. The value of the central location is the middle value, that is the median, not the average, as in the case of the methods in which parameter estimation is carried out with the help of the moment technique. The results obtained with the help of Dębski's method are not encumbered with an error resulting from the mean average of the described unit, which makes this method widely useful in engineering practice.

Table 15. Empirical exceedance probability of annual maximum flows for the Krzyworzeka River at the section of Wiśniowa

No.	Q	p
	$[m^3*s^{-1}]$	[%]
1	47.791	7.14
2	31.802	14.29
3	21.190	21.43
4	20.843	28.57
5	16.216	35.71
6	15.903	42.86
7	14.676	50.00
8	5.889	57.14
9	1.015	64.29
10	0.625	71.43
11	0.251	78.57
12	0.227	85.71
13	0.169	92.86

On the basis of the Empirical exceedance probability, an empirical curve was drawn on a semi-logarithmic scale. It was smoothed by hand at the range between 10% and 90% (Fig. 19).

Cumulative distribution functions of annual maximum flow were also calculated with the empirical method developed by Punzet (Table 16, Fig. 20).

Flow values calculated with the help of the above-mentioned methods coincide in the probability range of 3% < p < 50%. Outside this range, in the zone of small probability values, the obtained flow values differ significantly.

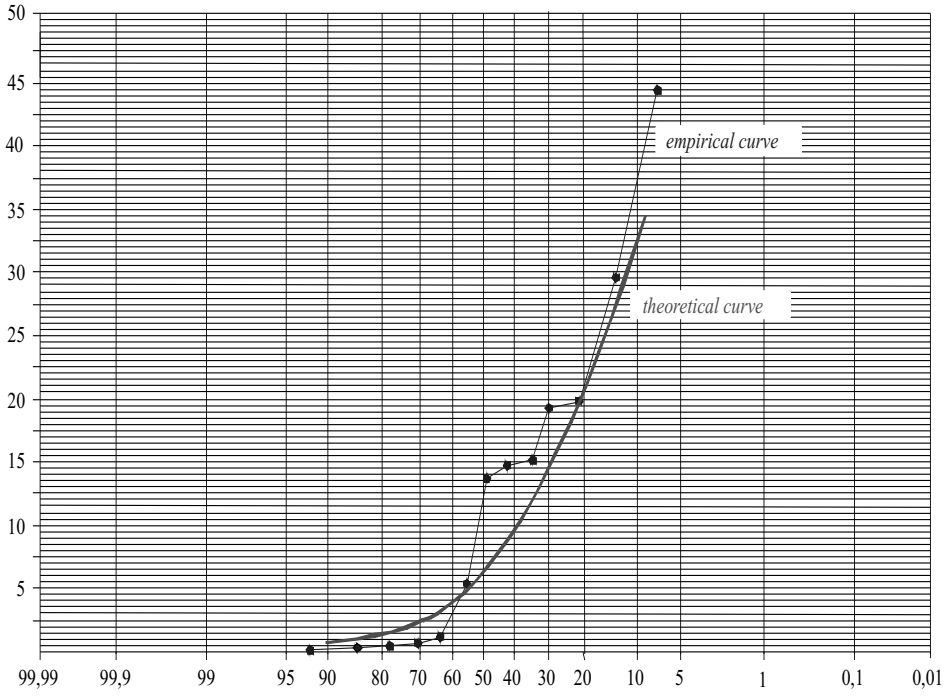


Fig. 19. Empirical probability distribution of annual maximum flow at the section of Wiśniowa

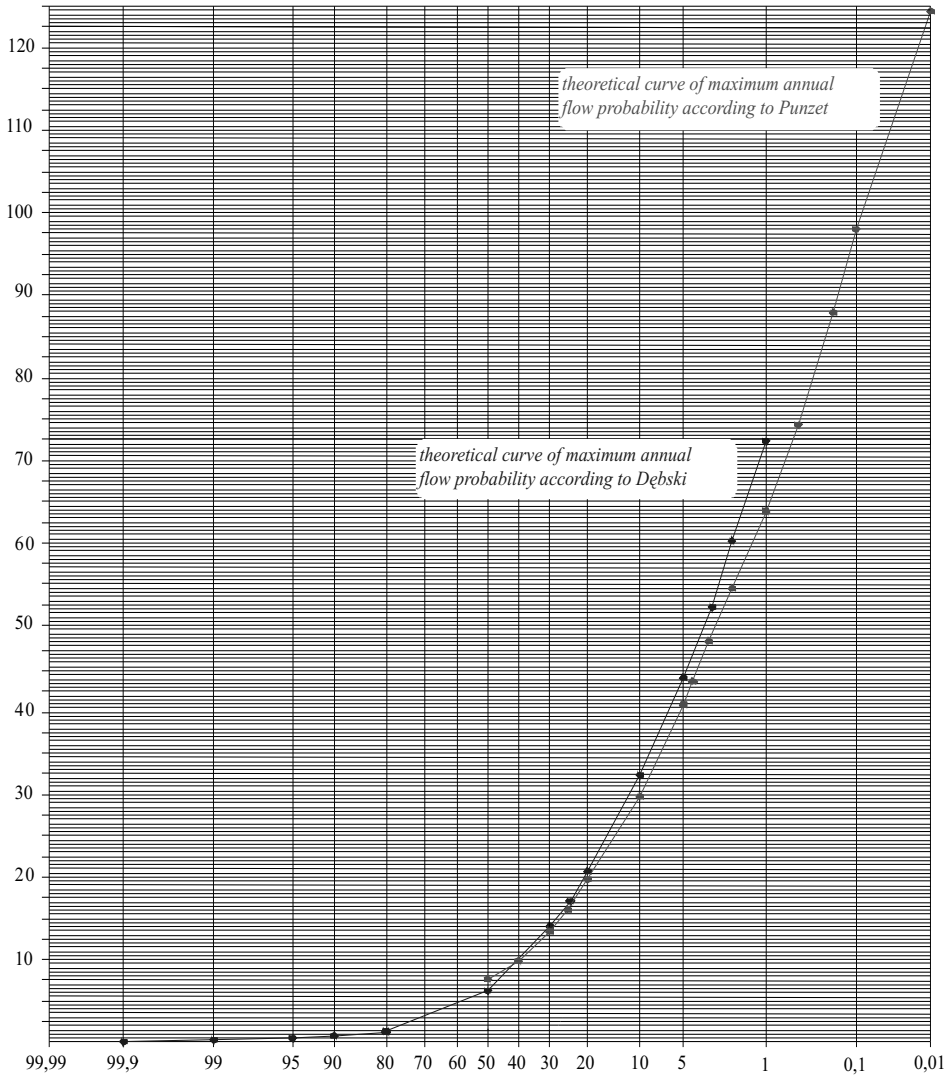


Fig. 20. Cumulative distribution functions of annual maximum flow obtained with the help of Dębski's and Punzet's methods

Table 16. Exceedance probability of maximum flow calculated with Dębski's and Punzet's methods

No.	p	Punzet's method	Dębski's method
		Q	Q
	[%]	[m^3s^{-1}]	[m^3s^{-1}]
1	0.01	129.370	-
2	0.10	97.840	-
3	0.20	88.080	-
4	0.50	74.910	-
5	1.00	64.800	72.206
6	2.00	54.520	60.016
7	3.00	48.370	52.014
8	4.00	44.000	-
9	5.00	40.610	44.061
10	10.00	29.920	32.216
11	20.00	19.230	20.640
12	25.00	15.880	17.002
13	30.00	13.270	14.072
14	40.00	9.590	-
15	50.00	7.830	6.150
16	80.00	-	1.362
17	90.00	-	0.716
18	95.00	-	0.417
19	99.00	-	0.169
20	99.90	-	0.007

2.6.2 Determining channel width-to-depth ratios for the Krzyworzeka River

In order to calculate channel width-to-depth ratios, three channel cross-sections of the Krzyworzeka River were established.

Channel width-to-depth ratio is defined as: $\alpha = \frac{B}{h}$

Table 17. The values of channel width-to-depth ratios for the Krzyworzeka River

Cross-section	Cross-section area F	Width B	Depth h	Width-to-depth ratio α
	[m^2]	[m]	[m]	[-]
I	2.70	5.90	0.46	12.893
II	2.25	4.40	0.58	7.592
III	2.65	6.15	0.43	14.273

The mean width-to-depth ratio equals α mean = 11.586 which means that the river channel of the Krzyworzeka can be referred to as a compact cross-section.

2.6.3 Impact of anthropopressure on available flow size at the section of Wiśniowa within 1872-2007

A multiannual analysis of climatic conditions is a prerequisite for an accurate evaluation of anthropopressure impact on river runoff. It is also necessary to be acquainted with the character of water regime interferences in the river catchment area and the time when they were initiated. Only by knowing economic undertakings, one is able to examine their impact and interpret thus obtained results.

In order to evaluate runoff changes, one needs to obtain a multiannual series of runoff values, which should be divided into two types of periods:

– periods of natural or quasi-natural runoff conditions called calibration periods,

– periods of runoff conditions altered as a result of anthropopressure, called evaluation periods.

Lack of data for the period of human interference (that is the calibration period) makes it impossible to carry out the evaluation process.

The problematic question is whether or not economic interference has brought about runoff changes. It is possible to approach this problem twofold:

– by examining runoff within one catchment area: in the first period, runoff occurred under natural conditions (calibration period); then as a result of human interference, there was a change in runoff magnitude or runoff regime (evaluation period);

– by examining runoff in two catchment areas: in one of these, runoff is continuously shaped by natural conditions (reference basin); in the other one (the examined basin), initial runoff has been also shaped by natural conditions (calibration period) only to be later disturbed as a result of human interference, which brought about a change in runoff magnitude or runoff regime (evaluation period).

The latter method is also called the method of hydrological analogy.

We can divide the methods evaluating the impact of anthropopressure on runoff into two groups: methods defining the change in runoff magnitude and methods defining the change in runoff regime.

Since none of the above-mentioned methods can be applied at the moment, due to the lack of suitable observations and measurements, the methodology applied in this study combines the methods defining changes in runoff magnitude with methods defining changes in runoff regime. The changes in runoff factors in

the catchment area of the Krzyworzeka River at the gauging section of Wiśniowa which occurred as a result of economic changes between 1872 and 2007 along with the consequences leading to the development of new erosive material accumulation conditions and available flow modification, were defined on the basis of catchment area erosion rate. With the help of the universal soil loss equation (USLE), the change in the amount of material eroded from 1 km2 of the catchment area was calculated. Thus calculated change in erosion rate helped to estimate catchment area water permeability between 1872 and 2007, which in turn made it possible to calculate probability curve of maximum flow, taking into consideration the impact of anthropopressure, in the above-mentioned period. This is widely justified in the specialist literature.

Specialist publications on geomorphology and hydrology devote a lot of attention to human impact on the processes of erosion and fluvial sedimentation in Carpathian valleys, which result in river regime transformation. As field studies and hydrological research confirm within the studied area, it is valley floors and particularly the morphology of river beds that have undergone most significant changes.

Human activity has significantly influenced the processes of shaping valley and river systems in the Beskid Niski. Slope deforestation accelerated rainwater and melt-water surface runoff and triggered intensive wash-off and soil cover washing. Removing the natural and protective role of vegetation, and agriculture intensified slope degradation and increased material transport to river channels. Excessive transport of material from slopes into river valleys generated positive alluvial transport balance. As a result, the amount of material eroded from slopes exceeded water transport capability and the transport of material was partial. River channels became shallower due to fast sediment accumulation. At the same time, it is a phase of increased alluvium restoration.

Surface runoff reduction resulted in augmented feeding ground waters and increased their level. Research carried out by J. Słupik [1981] confirms these observations. He states that high density of meadow vegetation reduces inflow several times more than in the case of bulb and root plants. The predominance of surface runoff over linear runoff has limited material transport from slopes into water channels and caused negative alluvial transport. Diffused wash-off, in the light of W. Froelich's research [1982], comprises only 1% of suspended material transport.

Biological slope management resulted in reduced sediment transport and intensified erosive river channel modelling.

Table 18. Basic changes in land use patterns in Wiśniowa between 1872-2007

Land use pattern	State as of 1872 %	State as of 2007 %
arable lands	49.1	43.0
grasslands	31.3	22.8
forests	14.9	25.2
urbanised areas	4.6	9.0

Table 19. Changes in the amount of soil eroded from the catchment area surface

Erosion	State as of 1872	State as of 2007	State as of 2007 taking into consideration surface runoff routes
from the unit area [t km^{-2} $year^{-1}$]	2 219	1 923	1 900
from the unit area [%]	100	87	86
from the entire drainage basin [t $year^{-1}$]	31 074	26 919	26 597
transported from the drainage basin [t $year^{-1}$]	6 544	5 669	5 601

Table 20. Flows with a particular exceedance probability in the researched timeframe of 1872-2007, taking into consideration building development as a factor which influences surface runoff

State as of 1872		State as of 2007	
P [%]	Q [m^3s^{-1}]	P [%]	Q [m^3s^{-1}]
0.01	108.66	0.01	119.37
0.10	82.18	0.10	90.27
0.20	73.98	0.20	81.26
0.50	62.92	0.50	69.12
1.00	54.43	1.00	59.79
2.00	45.79	2.00	50.31
3.00	40.63	3.00	44.63
4.00	36.96	4.00	40.60
5.00	34.11	5.00	37.47
10.00	25.13	10.00	27.61
20.00	16.15	20.00	17.75
25.00	13.34	25.00	14.65
30.00	11.14	30.00	12.24
40.00	8.05	40.00	8.85
50.00	6.57	50.00	7.22

The analysis of hydrographical network in the researched period (1872-2007) did not reveal any significant changes in the main river channel course. This results from the fact that the river channel is deeply cut into the valley while river gradients are relatively significant.

The impact of anthropopressure in the analysed period was mainly noticeable with regards to the considerable changes of the catchment area land use patterns. Particularly significant here is the fact that forested areas diminished by about 10%, grasslands by over 8%, while built-up areas increased by about 5%. As a result of the last phenomenon, the catchment area has become more watertight and surface runoff has increased.

The impact of anthropopressure contributed to the increase of available flow by about 10%. This resulted in increased channel filling: from 0.15 to 0.30 cm, which in certain river fragments increases sedimentation transport capacity, therefore, also river bed erosion and river side erosion.

Increased surface erosion has increased the amount of sedimentation transported to the river, which in turn within certain fragments can contribute to sedimentation accumulation, making the river channel shallower and increasing the range of floodwater impact.

2.7. THE ROLE AND FUNCTIONS OF SELECTED ELEMENTS OF THE NATURAL ENVINRONMENT IN THE CULTURAL LANDSCAPE OF WIŚNIOWA COMMUNITY

Krzysztof Boroń

This chapter analyses the impact of selected natural environment elements, mainly soil as a spatial factor, on the cultural landscape of Wiśniowa community. Spatial diversity of soil cover is a characteristic feature of this area. It results from basement complex variability, topographic features, and specific soil formation processes. The existence of particular plant species depends on climate and soil conditions. In the case of this community, the location of species groups across the area has a belt-like character (foothills and lower timber belt). Natural environment assets within the community are complemented by the existence of protected and particularly significant natural elements. According to the nature-landscape evaluation carried out for Wiśniowa community, the entire area of the community belongs to the class of great environmental and landscape value.

2.7.1 Description of the Wiśniowa community

2.7.1.1 Geographical location

The Wiśniowa community consists of seven villages: Glichów, Kobielnik, Lipnik, Węglówka, Poznachowice Dolne, Wierzbanowa and Wiśniowa. The total area of the community amounts to 6706 ha. It is situated in the southern part of the *powiat* (second level of local government administration in Poland) of Myślenice. The southern part of the community of Wiśniowa borders with Mszana Dolna village. In the west, the community borders with Pcim village and Myślenice town, in the north – Dobczyce town and Raciechowice village, while in the east it borders with Jodłownik and Dobra villages.

According to Kondracki [Kondracki 2001], the Wiśniowa community belongs to region of the Zewnętrzne Karpaty Zachodnie Mountains and the Zewnętrzne Karpaty Wschodnie Mountains, on borderline between the Pogórze Zachodniobeskidzkie Mountains (northern part of the macroregion) and southern part of the Beskidy Zachodnie Mountains. The Pogórze Wiśnickie Mountains belong partly to the Karpaty Zachodnie mesoregion, while southern part belongs to the Beskid Wyspowy Mountains.

2.7.1.2 Climatic conditions

The climate of Wiśniowa is generally referred to as a mild mountain climate. It is characterised by different climatic stages depending on the height above sea level. Places below 600-700 m AMSL belong to the mild warm stage with annual mean temperature amounting to 6-8 ºC. The top area of the Beskid Wyspowy Mountains is under the influence of mild cold climate stage with annual mean temperature between 4-6 ºC. The average annual precipitation total for mild warm stage equals 800 mm, but for mild cold stage it reaches 900 mm. The average wind speed for mild warm stage is 2 m/s, while for mild cold stage it equals 3 m/s. Snow cover holds 80 and 100 days a year for the mild warm and mild cold stage, respectively [Kotula 2006].

2.7.1.3 Geological soil conditions

Soil cover in the area of Wiśniowa community has developed on the subgrade of the Carpathian flysch. Typical soils between Lipnik and Wierzbanowa include leached brown soils. These are heavy soils with calcium carbonate and some small addition of iron compounds. They have been developed on the Magurska nappe precincts from Ciężkowice sandstones and as well as Krosno calcalline schists and sandstones.

The Glichów village is cut across by the Lipnik stream (between Poznachowice and Wierzbanowa villages). In this area (the Lipnik stream valley), some inoceramic stratums are present in the form of sandstones and schists with a ferruginous binding agent. They are a basement for leached brown soils. Some hilly areas between Wiśniowa and Poznachowice villages and additionally some small patches of land south of Wiśniowa are covered with black marly schists and sandstones with yellow-red siderite insertions. They belong to the Cieszyn schists of the Silesian nappe. On that basement, leached and typical brown soils have been formed. In the northern part of Lipnik village, the southern part of Gilchów village, and the north-eastern and central part of Wiśniowa, loess-like basal complex occurs as a substratum for lessives soils. The valleys of rivers such as Krzyworzeka, Lipnik, Wiśniówka and their tributaries have been filled up with alluvial sediments. They are basements for usually shallow and middle deep river alluvial soils [Nowak 1998].

2.7.1.4 Influence of relief on soil formation

The relief of Wiśniowa community varies significantly, with two basic types of relief configuration:

– The foothills - the northern part of the community is dominated with an upland relief configuration type.

– The southern, western, and eastern parts of the community are dominated with a low and middle mountain relief configuration type. This area is shaped in a form of prolate mountain range of the Beskid Wyspowy, with the highest elevations being: Lubomir (904 m AMSL), Łysina (891 m AMSL), and Kamiennik (758 m AMSL). The mountain range of Wierzbanowska Góra (778 m AMSL) runs from the south. The eastern part of the area is closed by the mountain range of Ciecień (829 m AMSL) on which a landslide headwall packed by schist and chalky clay is located.

– The middle part of the area is occupied by the Kotlinka Wiśniowej. It is a gently lowered area with Wiśniowa and Lipnik villages situated inside. The Kotlinka Wiśniowej and surrounding mountain ranges of Żabia (526 m AMSL) and Ostra Góra (523 m AMSL) belong to the Pogórze Wiśnickie Foothills.

– Deep river valleys are characteristic for the area as a result of river denudation processes caused by the Krzyworzeka, Lipnik, and Czerwin rivers.

Relief configuration is closely connected with soil formation conditions and soil agricultural value. From that point of view, relief configuration can be classified after Nowak [1977] as:

– very beneficial and beneficial: typical for flat plateaus, flat areas and slopes with an inclination of less than 6°; these relief configurations prevail in Glichów agricultural areas (70% of arable lands), Poznachowice, Lipnik and Wiśniowa (55-45%), the smallest percentage being in Kobielnik (9% of arable lands);

– fairly beneficial: this relief configuration occurs in narrow valleys (less than 50 m in width) whose slopes incline at 6-10°; this relief configuration is typical for Wierzbanowa (60% of arable lands) and Kobielnik; Lipnik and Wiśniowa villages have this type of configuration as well where it covers 50-40% of arable lands;

– hardly beneficial and unbeneficial; agricultural lands located on some steep slopes (inclination achieves even 15°) and on slopes with numerous ravines; the majority of agricultural lands in Węglówka can be classified to this category (70%), Kobielnik - 40 %, Wierzbanowa - 30%, and Wiśniowa - 15%.

Very beneficial and beneficial relief configuration for grasslands exists in the central and northern part of Wiśniowa community (Glichów, Wiśniowa and Lipnik villages).

Generally, the percentage of relief configuration type for Wiśniowa community turns out as follows: very beneficial and beneficial relief configuration - 38%,

fairly beneficial surface configuration - 39%, and hardly beneficial and unbeneficial surface configuration - 23%.

Unfavourable relief configuration has a very important influence on land-use management. Lands located on very steep slopes or in local depressions are usually too wet during the vegetation season, which makes cultivating these areas seriously difficult.

2.7.2 Soil types of Wiśniowa community

Soil typology was presented in accordance with the classification created by Polskie Towarzystwo Gleboznawcze and soil units according to the 7th Approximation1960, Soil Taxonomy 1975 [Polskie Towarzystwo Gleboznawcze 1989]. Some information about international soil classification from World Reference Base for Soil Resources (WRB 1998) was added as well. Soil classification has been conducted on the basis of soil pit studies, laboratory analysis, and available typological and agricultural maps of the community.

2.7.2.1 Lithogenic soils

Lithogenic soils in Wiśniowa are soils tightly connected with soil matrix properties. Noncalcareous soils, weakly developed from solid rocks (rankers) usually stone rubble and acid, have developed in mountain regions. Proper rankers are usually stone or gritty weathered rock soils, very often acid. Rankers present in the area of Wiśniowa have developed in mountain regions from sandstone and rarely from schists.

Initial clay soils (pelosols) have been generated from coherent soil matrix (heavy loam or clay). In Wiśniowa community, these soils occur on denudated areas. Their pseudogley horizons are weakly visible, while durable clay- humus-ferrous complexes in the upper soil horizon are missing.

<table>
<tr><td colspan="3">Soil location: the village of Kobielnik
Land use: beech forest
Relief configuration: a slope just underneath a hill top</td></tr>
<tr><td rowspan="3"> 
(photo: K. Boroń)</td><td>0-4 cm (A)</td><td>humus accumulation horizon, brown black (7.5YR3/2) mild silty loam, mild wet, grain like structure, mild coherent texture, numerous roots, pH 4.0, distinct transition</td></tr>
<tr><td>4-36 cm (C)</td><td>matrix rock horizon, yellow-brown (7.5YR6/6) silty mild loam, soil skeleton content growths with deepness of soil pit (15-80%), mild wet, block-like structure, mild coherent texture, mild number of roots</td></tr>
<tr><td>36 cm below (R)</td><td>massive rock</td></tr>
<tr><td rowspan="2">Division and order:</td><td>I</td><td>Lithogenic soils</td></tr>
<tr><td>IA</td><td>Noncarbonate soils, weakly developed</td></tr>
<tr><td>Type:</td><td>IA4</td><td>Noncalcareous soils weakly developed from solid rocks (rankers)</td></tr>
<tr><td>Subtype:</td><td>IA4a</td><td>Proper</td></tr>
<tr><td>Soil units according to the Soil Taxonomy (1975):</td><td colspan="2">*Lithic Haplumbrepts*</td></tr>
<tr><td>Soil quality class:</td><td colspan="2">Ps IV</td></tr>
<tr><td>Soil usefulness complex:</td><td colspan="2">3z</td></tr>
</table>

<table>
<tr><td colspan="3">Location: the village of Wiśniowa
Land use: Various use - currently grassland
Relief configuration: a steep slope (inclination of about 15°)</td></tr>
<tr><td rowspan="3"> 
(photo: K. Boroń)</td><td>0-8 cm (AC)</td><td>humus accumulation horizon, grey-brown (2.5Y3/3) heavy loam, 10% of soil skeleton, wet, coherent texture, abundant roots, pH 5.0, distinct transition</td></tr>
<tr><td>8-27 cm (Cg)</td><td>matrix horizon, upper gleyed rusty-grey (2.5Y 6/6) heavy loam, soil skeleton content 20% grows with depth of soil pit (15-80%), wet, coherent texture, mild number of roots, pH 5.0</td></tr>
<tr><td>27 cm below (R)</td><td>more than 80% of a soil skeleton and massive rock</td></tr>
<tr><td rowspan="2">Division and order:</td><td>I</td><td>Lithogenic soils</td></tr>
<tr><td>IA</td><td>Noncarbonate soils, weakly developed</td></tr>
<tr><td>Type:</td><td>IA3</td><td>Initial clay soils (pelosols)</td></tr>
<tr><td>Subtype</td><td>IA3a</td><td>Eroded</td></tr>
<tr><td>Soil units according to the Soil Taxonomy (1975):</td><td colspan="2">*Typic Udorthens*</td></tr>
<tr><td>Soil quality class:</td><td colspan="2">Ps V</td></tr>
<tr><td>Soil usefulness complex:</td><td colspan="2">3z</td></tr>
</table>

2.7.2.2Typical brown soils

Climatic conditions characteristic for these types of soil formations were conducive to processes of chemical weathering. These processes help to release ferric compounds from siliceous minerals and connect them with humus and clay in the form of relatively fixed colloidal compounds. As a result, colloidal compounds have been preserved in the same soil horizon in which the browning process emerged. The brown colour of the horizon comes from rust-brown sheets around silica grains of soil. Environmental abundance in calcareous ions stabi-

lized the process. After World Reference Base of Soil Resources (WRB 1998), that type of soil can be classified to the *Eutric Cambisols* (Bednarek et al. 2005). Typical brown soils in Wiśniowa community were formed from limy cemented sandstones and marly schist. They can be found in northern part of the area.

<table>
<tr><td colspan="3">Localization: the village of Wiśniowa
Land use: arable lad
Relief configuration: flat area, gently sloping in the eastern direction</td></tr>
<tr><td rowspan="4"> 
(photo: K. Boroń)</td><td>0-18 cm (Ap)</td><td>arable horizon, black-brown (7.5 YR 3/1) silty middle loam, high moisture, lock-like structure, coherent texture, numerous roots, pH 6.0, gradual transition</td></tr>
<tr><td>18-40 cm (Bbrg)</td><td>rusty-brown (10YR4/3) pseudo-gleyed soil enrichment horizon, bluish hue stains, heavy loam wet, clammy, prismatic structure, mild compacted, singled roots, pH 6.0, gradual transition</td></tr>
<tr><td>40-102 cm (Ccag)</td><td>soil matrix brown-rusty (10YR6/8) pseudo-gleyed horizon contained calcium carbonate compounds, brown-rusty with numerous bluish stains heavy loam, heavy wet and saturated with water in lower parts, clammy, prismatic structure, mild compacted, no roots, pH 6.0</td></tr>
<tr><td>≤ 102 cm</td><td>seeping water</td></tr>
<tr><td rowspan="2">Division and order:</td><td>II</td><td>Autogenic soils</td></tr>
<tr><td>IIB</td><td>Brown forest soils</td></tr>
<tr><td>Type:</td><td>IIB1</td><td>Brown soils</td></tr>
<tr><td>Subtype:</td><td>IIB1c</td><td>gleyed brown</td></tr>
<tr><td>Soil units according to the Soil Taxonomy (1975):</td><td colspan="2">Eutrochrepts: Aquic, Aquic Dystric</td></tr>
<tr><td>Soil quality class:</td><td colspan="2">R IVb</td></tr>
<tr><td>Soil usefulness complex:</td><td colspan="2">11</td></tr>
</table>

2.7.2.3 Leached brown soils

<table>
<tr><td colspan="3">Localization: the village of Lipnik
Land use: grassland
Relief configuration: a steep slope (inclination of about 15°)</td></tr>
<tr><td rowspan="3"> 
(photo: K. Boroń)</td><td>0-15 cm (Ap)</td><td>arable horizon, black-brown (10YR3/1) medium silty loam, mild moisture, lock-like structure, coher-ent texture, numerous roots, pH 5.0, gradual boundary</td></tr>
<tr><td>15-113 cm (Bbr)</td><td>brown (7.5YR4/3) soil enrichment horizon, silt loam, mild wet, granular structure, mild compacted, numerous roots, pH 5.0, gradual boundary</td></tr>
<tr><td>113-150 cm (C)</td><td>soil matrix horizon, grey-brown (2.5YR5/3) silt clay, mild wet, soil skel-eton about 10%, cloddy structure, mild compacted, roots, pH 4.5</td></tr>
<tr><td rowspan="2">Division and order:</td><td>II</td><td>Autogenic soils</td></tr>
<tr><td>IIB</td><td>Brown forest soils</td></tr>
<tr><td>Type</td><td>IIB1</td><td>Brown soils</td></tr>
<tr><td>Subtype</td><td>IIB1d</td><td>Leached brown</td></tr>
<tr><td>Soil units according to the Soil Taxonomy (1975):</td><td colspan="2">Eutrochrepts: Dystric Ruptic - Alfic</td></tr>
<tr><td>Soil quality class:</td><td colspan="2">Ps IV</td></tr>
<tr><td>Soil usefulness complex:</td><td colspan="2">12</td></tr>
</table>

Leached brown soils prevail in Wiśniowa. They have been formed on the basis of an acid soil matrix. Active calcium compounds leaching away and their movement down the soil profile was a result of rainwater infiltration. Leached brown soils usually have a weak acid reaction (pH) in the upper horizon of the soil profile. Below the leaching soil horizon, the iluvial soil horizon is formed. Leached brown soils in Wiśniowa have developed on silty clay or heavy clay in the subsoil.

2.7.2.4 Lessive soils

Lessive soils, typical among Wiśniowa's soils, have developed on silt deposits mainly in the upper parts of soil profiles (eluvial horizon) underlain by silty clay or heavy clay and silt materials (iluvial horizon). These soil types occur on some slopes of inclination less than 6°, mainly in the northern part of the community in Glichów, Poznachowice Dolne, Wiśniowa and Lipnik. The area covered by these types of soil amounts to about 500 ha.

2.7.2.5 Gley soils

Gley soils are connected with a high level of ground water table. These types of soil were formed in Wiśniowa community on the basis of heavy silty-clay solum. The area occupied by this type of soil does not exceed 20 ha.

2.7.2.6 River alluvial soils

River alluvial soils (*Fluvisols* – after WRB 1998) [Bednarek et al. 2005] have originated as a result of soil material sedimentation after the river had overflowed. Alluvial deposit is usually significantly diversified in its granulometric particle distribution. Brown river alluvial soils occupy higher elevations in river valley, situated beyond the area of permanent flooding. Plants growing on river banks play important role in the evolution of brown river alluvial soils. In Wiśniowa community, brown river alluvial soils have been created from sandy clay underlain by fluvial gravel. These soil types are located in the valleys of: Krzyworzeka, Lipnik, Kobielnik and Wiśniówka rivers and their side tributaries, occupying the area of about 200 ha.

<table>
<tr><td colspan="3">River alluvial brown soil
Location: the village of Wiśniowa
Land use: a meadow, pasture
Relief configuration: a flat area, near the Krzyworzeka river</td></tr>
<tr><td rowspan="3"> 
(photo: K. Boroń)</td><td>0-10 cm</td><td>humus accumulation horizon, brown-black (5YR2/4) silty clay, clod structure, middle coherent texture, numerous roots, pH 5.0, steeped transition</td></tr>
<tr><td>10-58 cm (Bbr)</td><td>browning horizon, brown (5YR3/6) silty clay, mild wet, clod structure, coherent texture, numerous roots, pH 5.5. steeped transition</td></tr>
<tr><td>58-150 cm (C)</td><td>matrix horizon, grey-brown (2.5Y6/3) with rusty ferric deposits, heavy loam with addition of soil skeleton (10%), mild wet, clod structure, mild compact texture, singled roots pH 6.0</td></tr>
<tr><td rowspan="2">Division and order:</td><td>V</td><td>Alluvial and deluvial soils</td></tr>
<tr><td>VA</td><td>Alluvial soils</td></tr>
<tr><td>Type:</td><td>VA1</td><td>River alluvial soils</td></tr>
<tr><td>Subtype:</td><td>VA1c</td><td>Brown</td></tr>
<tr><td>Soil units according to the Soil Taxonomy (1975):</td><td colspan="2">Dystrochrepts Fluvaquentic, Fluventic, Umbric; Eutrochrepts: Fluvaquentic, Fluventic</td></tr>
<tr><td>Soil quality class:</td><td colspan="2">Ps III</td></tr>
<tr><td>Soil usefulness complex:</td><td colspan="2">2z</td></tr>
</table>

2.7.3 Soil quality classes

Soil quality classes were established in 1957 for Polish soils (Mocek et al. 2004). Agricultural lands take up 55.0% of the total area of Wiśniowa community. Arable lands constitute 25% of all agricultural lands, 25.6% is occupied by grasslands, 4.0% by pastures and 0.4% by orchards.

There are no arable lands belonging to the highest soil quality classes I, II, IIIa in Wiśniowa. Arable lands classified to the medium good quality soil class (IIIb) can be recognized only as 0.1% of total arable lands. Medium better quality soil class (IVa) comprises 7.2%, while medium worse quality soil class (IVb) constitutes 25% of all arable lands. The majority of soils in Wiśniowa belongs to the inferior quality class (V). The area within that class covers 43.7% of the total area of the community. The lowest class (VI) comprises 24.0% of the total arable land area.

Altogether, low standard soil quality classes (IVb and V) occupy 68.7% of the total arable land area. The inferior quality of soil is mainly a result of improper soil properties, for example too heavy granulometric composition, low soil reaction (pH), or unbalanced water relationships. As a consequence, difficulties in soil cultivation occur. Plant yields on such soils depend mainly on climatic conditions during the vegetation season.

Grasslands usually exist on medium quality soil classes. Class III comprises 4.7% of the total grassland area. The majority of grasslands (58.5%) cover IV soil quality class; class V comprises 28.0% while class VI amounts to 8.8 % of total grassland area. Classes IV and V occupy 86.5% of the total grassland area. These classes are typical for worse relief configuration conditions or in the case of difficult access to the area. They usually have defective water conditions.

Woodlands occupy 39.9% of the total area of Wiśniowa community. The highest woodland concentration is located in the villages: Lipnik, Wierzbanowa and Węglówka: 50.7%, 50.1%, and 51,3% of the total area, respectively [Nowak 1977].

Soil agricultural usefulness complexes give information about possibility of plant cultivation on certain type of soil [Mocek et al. 2004]. There are no wheat or rye soil agricultural complexes in the area of Wiśniowa community. The cereal-grassland strong agricultural usefulness complex (complex no. 8 classification) takes up 6.2% of the total area of arable lands, but there is no soil cover in complex no. 9. Soils classified to the complex no. 10 (wheat mountain agricultural usefulness complex) occupy 16.5% of the total area of arable lands. The largest part of Wiśniowa is occupied by complex no. 11 (cereal-mountain), with 35.7 % of the total area. The remaining mountain complexes include: oat-potato no. 12 (33.7%), oat-grassland (1,9%), arable lands for grassland purposes no. 14 (5.3%). Durable grassland usefulness complexes are represented by: middle durable grassland

complex no. 2z (65.0%), poor and very poor durable grassland complex no. 3z (35.0%); there are no very good or good grassland complexes no. 1z within that area [Nowak 1977].

Non-arable lands comprise 0.8% of the total community area [Okręgowa Stacja Chemiczno-Rolnicza w Krakowie 1982].

2.7.4 The flora of the community of Wiśniowa

The existence of particular plant species depends on climate and soil conditions. In the community of Wiśniowa, their location in terrain has a layered character. There are two plant layers characteristic for the Carpathian flora. Carpathian Foothills reach 550 m AMSL; above that altitude, lower mountain timber belt can appear, dominated by mixed coniferous forests with pine and common oak. Leached brown soils very often act as their solum. Carpathian beech wood with tree species such as beech and fir occurs frequently as well (Phot. 72).

Natural plant cover considerably changes as a result of human activity. Coniferous forest has been replaced by mountain meadows and pastures, some of them rarely mowed and grazed. Semi-natural plant communities encroached on that area. The lower part of the Wiśniowa community is suitable for field cultivation; in many cases, it forms typical agrocenoses (Phot. 73).

Shallow soils with faintly differentiated soil horizons can be often met on foothills and within lower timber belt areas. These soils undergo soil erosion processes; they also have improper water and (or) configuration conditions. In the terrain, they have formed lower soil quality classes areas occupied by poor plant habitats and have been assigned as grassland (Phot. 74).

River alluvial soils are associated with streams and rivers flowing across foothills. These soils are the solum for riparian plant species. They involve marshy meadows communities developed on middle or heavy textured soils. In some cases, river sands and gravels constitute soil solum for periodically dry river alluvial soils of poor quality (Phot. 75 and Phot. 76).

River banks of the lower Krzyworzeka are thickly covered with trees. In some places, these tree clusters have a willow riparian character (Phot. 77 and Phot. 78). Some tree species, non-typical for that biotope, can be recognized along the Krzyworzeka valley as well.

The part of the community area above 550 m AMSL is occupied by the lower mountain timber belt. Mixed coniferous forest is formed by the forest community of fir, spruce, and beech trees with an addition of other tree species. In natural conditions, this type of local forest is referred to as Carpathian Beech Wood. Some higher parts of the mountain range within Wiśniowa community are covered by the forest communities mentioned above (Phot. 79).

Phot. 72. Carpathian beech wood in Wiśniowa community (photo: K. Boroń)

Phot. 73. Arable lands in Wiśniowa village (photo: K. Boroń)

Phot. 74. Low quality class grasslands on foothills area (photo: K. Boroń)

Phot. 75. Intermittent mountain stream (photo: K. Boroń)

Phot. 76. Gravel stream bed in mountain part of Wisniowa community (photo: K. Boroń)

Phot. 77. Middle part of the Krzyworzeka river with dense willow brushwood (photo: K. Boroń)

Phot. 78. Lower part of the Krzyworzeka river with river regulation structures (photo: K. Boroń)

Phot. 79. Countryside of Wiśniowa community (photo: K. Boroń)

Phot. 80. Sedge bog-spring on Polana Sucha (photo: K. Boroń)

Phot. 81. Polana Sucha – ecologically protected area (photo: K. Boroń)

Good examples can be found on the Lubomir, Łysina, Kamiennik and Ciecień mountain ranges. Ground water moving down from mountain and hill slopes finally stays stagnant in local basins, less inclined areas, and glades. This phenomenon forms local bog-springs, marshy grounds, and lowland bogs and is additionally supported by local climate. Organic soil development can be observed for example on a sedge bog-spring localized on Polana Sucha (Phot. 80 and Phot. 81). This area embraces about 5 ha of an ecologically protected area.

2.7.5 Protected objects and other objects of special significance

There are some protected and special significance objects in the community of Wiśniowa. The most important among them involve:

– protected natural objects:
– ecological land use Polana Sucha (Phot. 82 and Phot. 83)
– eight natural monuments:
  • a common oak in the village of Wiśniowa, at the crossroads towards the village of Lipnik (Phot. 84 and Phot. 85),

Phot. 82. Surroundings of Polana Sucha (photo: K. Boroń)

Phot. 83. Polana Sucha – tourist track and information for tourists (photo: K. Boroń)

Phot. 84. Common oak in the Wiśniowa village (photo: K. Boroń)

Phot. 85. The detail of common oak in Wiśniowa village (photo: K. Boroń)

- three small-leaved lindens near the church in Wiśniowa,
- a small-leaved linden close by the belfry in Wiśniowa,
- a small-leaved linden near the chapel in Wiśniowa,
- a small-laved linden near a stream in Wiśniowa
- a European white elm near a stream in Wiśniowa;

– protective forests on the slopes of Kamiennik, Lubomir and Łysina;

– ecological countryside corridor of the Beskid Makowski and Wyspowy mountains (country ecological net ECONET) [Kotula 2006].

2.7.6 Natural landscape scenic elements

The unique landscape qualities of Wiśniowa community can be observed in many places.

Wonderful views of the nearest communities and distant areas could be seen from the observation tower, until quite recently. However, situated on a tourist trail leading to the astronomical observatory on the summit of Lubomierz, the tower has been recently dismantled, due to safety reasons. The site of its previous location plays a role of an overview point now, with a beautiful full panorama over Wiśniowa countryside. The peak of Bydłoniowa Góra offers a wide panorama on the forested area of the mountain of Lubogoszcz. Red tourist trail leading from the mountain pass of Jaworzyce, across the summit of Wierzbanowska Góra, to the mountain pass of Wielkie Drogi and farther as well as the blue tourist trail across the mountain pass of Wierzbanowska to the mountain of Ciecień - all these offer the most picturesque landscape views of the community area. Information about tourist and recreational values of such places can be found in Krzymowska-Kostrowicka [1997]. A short review of natural landscape panoramas and the result of natural landscape evaluation [Boroń 2006] - all that supports a thesis that Wiśniowa community can boast very high landscape assets.

2.7.7 Natural environment and landscape evaluation

An outline of the method of landscape evaluation was presented Senera and Cieślak [2004]. According to Cymerman and Hopfer [1988], there are three basic groups of methods of landscape evaluation:

– methods based on evaluation of natural environment assets,
– methods based on aesthetic-panoramic environment assets,
– methods of evaluating landscape for a particular purpose.

Depending on the method of obtaining information, we can distinguish:
– field methods,
– cameral methods,
– mixed methods.

More information regarding these methods can be found in the cited work of Senetra and Cieślak [2004].

Sohngen's method, adapted by Cymerman and Hopfer [1998] to Polish conditions, belongs to the group of environment and landscape methods. This method is based on selected natural environmental points which undergo evaluation. Three groups of landscape elements are distinguished there: plant cover, relief, and surface water. The evaluated object needs to be divided into natural spheres or areas with similar environmental values. More information about geographical landscape methodology can be found in Ostaszewska [2002].

Oświt and Dembek's method [1995] is based upon a hypothesis similar to the one mentioned above. However, this method has a wider scale (usually a 10-point scale) in comparison to Sohngen's method. In this paper, Oświt and Dembek's method was used. The method is formally used for peat bog abundant areas, but as experience reveals, it can be adjusted for highly valuable natural environment areas as well. Some modification can be found in the works of Boroń [2006]. The final evaluation is presented below.

Table 23. Natural environmental and landscape evaluation of the area of Wiśniowa

TYPE AND FORM OF EVALUATION	SCORES
Evaluation on the basis of nature conservatory forms	20
Evaluation on the basis of universal nature forms:	
Forests	27
Meadows	11
Evaluation of landscape	
Relief	8
Water reservoirs	0
River network	8
Tree cover	5
Species assemblage	4
Flora	3
Total score	86
Area scoring	13
Evaluation class VII - area with great environmental and landscape value	

Selected elements of natural environment in the cultural landscape of Wiśniowa community reveal very high variability within that area. Geological conditions shape soil matrix properties in a fundamental way. Soil forming factors

are tightly connected with the specific climate of Wiśniowa, its hydrology, and area configuration. Soil forming processes developed on that area occur in many types of soils. The area is dominated by leached brown soils and typical brown soils. River alluvial soils are located in the river valleys of the Krzyworzeka, Lipnik, Kobielnik, Wiśniówka rivers and their tributaries. The high level of annual precipitation, unfavourable soil water relationships, specific area configurations, and heavy granulometric composition contribute to the formation of gleyed soils. Extreme subsoil watering is necessary for some peat, muck and bog soil development process. Some organic soil areas can be distinguished in the western part of the community of Wiśniowa. Highly elevated parts of this area are covered with lithogenic, noncalcareous soils, usually weakly developed from solid rocks (rankers) and eroded initial clay soils (pelosols). Soils are dominant factors in the process of natural environment and cultural landscape formation. The area of Wiśniowa is voted mainly for agricultural land use, it gives agrocenotic character of the landscape. Medium worse soil quality classes (R IVb) and inferior quality soil classes (R V) occupy the majority of the arable land areas. Grasslands usually have low soil quality classes (IV, V). The characteristic property of the community is the presence of two plant layers - foothill and lower forest zone. In natural conditions, the plant community of foothill layer comprises a mixed coniferous forest. Cultural landscape shaped by man on the area of the community is characterized by the fact that mixed coniferous forest (mainly pine and common oak) is replaced by meadows and pastures, on which semi natural meadow communities are maintained. Essential elements of cultural landscape are marshy meadow communities occurring along numerous streams. Plant communities of lower forest zone in natural conditions create a mixed coniferous forest. These are fir, spruce and beech communities with addition of other species. Protected natural objects in the community are: ecological land at Polana Sucha, eight natural monuments. Protection forests on the slopes of Kamiennik, Lubomir and Łysina play an essential role in Wiśniowa cultural landscape. The area of the community is covered by the country ecological corridor of the Beskid Makowski and Wyspowy (country ecological network ECONET). The nature-landscape evaluation carried out for Wiśniowa community classified the whole commune to value class VII - area of great environmental and landscape assets. Particular evaluations for selected areas may be the base for management processes within the area of Wiśniowa community.

2.8. A METHOD OF TRANSFORMING MAPS OF THE FORMER AUSTRIAN CADASTRE TO THE „1965" NATIONAL COORDINATE SYSTEM ON THE EXAMPLE OF THE WIŚNIOWA VILLAGE, MYŚLENICKI DISTRICT

Karol Noga, Monika Siejka, Zbigniew Siejka

Cadastre data document constitutional property rights. Since the historical continuity of the legal status of land should be guaranteed by law, this in turns guarantees the validity and reliability of this data. A reliable map, consistent with the actual situation on the ground at a specific moment in time, synchronised with a registry institution, is a very important element of every property cadastre. An example of such map was the map of the former Austrian cadastre, drawn up for the area of the former Galicia (the part of Poland under Austrian rule) at a scale of 1:2 880 in the so-called Lviv layout.

Until recently, those maps was incredibly difficult to use, primarily because they had been executed graphically based on a mathematical triangulation network of the 1st, 2nd, and 3rd order and a network of graphic triangulation points of the 4th order, which were not stabilised. This resulted in the lack of numerical data for these maps, which significantly restricted the scope of their use [Noga and Schilbach 1973].

The aim of this study is to present a method of converting maps of the former Austrian cadastre to the "1965" national system for the purpose of establishing the extent of the cultural landscape transformation in the village of Wiśniowa.

2.8.1 General characteristics of the Austrian cadastre

A significant proportion of the current land registry reports, particularly in south-eastern Poland, are based on cadastre maps at a scale of 1:2 880. These maps were drawn according to a uniform standard for the entire Austro-Hungarian Empire. They were developed in line with the rules and instructions in force at that time and based only upon direct plane table measurements. Field measurements were taken using a pre-assumed multi-order horizontal control network realised in a uniform reference system.

The reference system was established with four orders of triangulation:

– the 1st order consisted in triangulation chains with sides 15-30 km long running in the form of polygons through the centre of each country, calculated

and adjusted using four bases situated in the vicinity of Vienna, Upper Austria, Bukovina, and Tyrol;

– the 2nd order comprised a triangulation network with the sides of 9-15 km linked and adjusted as the filling network to the triangulation chain of the 1st order;

– the 3rd order consisted of a supplementary network with the sides of 4-9 km, which constituted a further development of the 1st and 2nd order networks; its basic purpose was to cover the country uniformly with triangulation points;

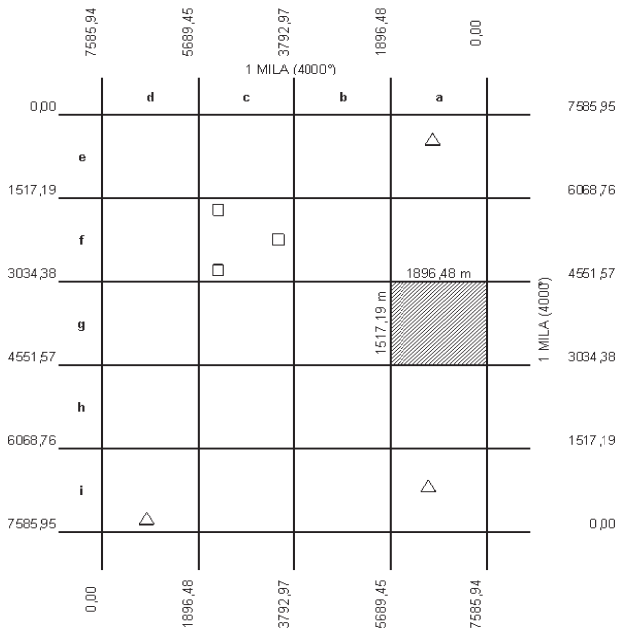
– the 4th order was a graphic triangulation network with sides up to 4 km long established using a plane table; this network constituted the basic cadastre control network for direct and detailed measurements.

The first three orders represented triangulation calculated analytically, while the 4th order consisted in graphic triangulation [Fedorowski 1974].

The 1st order was conceived as the basic one to which the 2nd order of triangulation was linked; both these networks were called primary networks. The coordinates of these points had been established using special military measurements. Then, they were supplemented by the 3rd order so that there were three points per every square mile. The coordinates of these points were established by the angular intersection from primary points. Then, as a result of desk work, so-called triangulation sheets, commonly called mile sheets, were executed in the rectangular layout. The land was divided along both axes into squares with the sides of 1 Austrian mile long (4 000^{o}). This generated basic units with the surface area of 1 square mile (10 000 Austrian *morgens*) on which 3 points of mathematical triangulation were distributed evenly. These sheets made up mile belts parallel to the meridian running through the beginning of the system and were called columns. They were designated with Roman numerals: I, II, III, etc., and the abbreviation OC (Ost Colonnen) for columns east of the zero meridian or WC (West Colonnen) for columns located to the west of it.

The mile belts parallel to the Y axis were called rows or layers and labelled with Arabic numerals: 1, 2, 3, etc. starting with the most northward mile belt. The intersection of belts and layers determined the triangulation sheet. Every sheet contained 57 triangulation points established using the graphic method and 3 points of mathematical triangulation, so every section of the cadastre map contained 3 triangulation points (Fig. 20).

A section of the cadastre map was created by dividing the triangulation sheet into four columns of 1,000 fathoms, labelled from east to west with lower case letters: a, b, c, d and five belts of 800 fathoms each parallel to the Y axis and labelled from north to south with the letters: e, f, g, h, i (Fig. 20). This resulted in establishing 20 detailed sections with the dimensions of 25” x 20” each and the surface area of 500 Austrian *morgen* equal to approximately 287.73 ha.



Key: Δ - mathematical triangulation points,
- graphic triangulation points

Fig. 20. Split of a triangulation sheet into sections of cadastre maps and the distribution of triangulation points

The sides of the section frame were divided with shorter dashes into 1-inch sections (26.34 mm) and with longer dashes into 5-inch sections, which can be used to calculate the deformation of the map sheet and to calibrate the scanned detailed sections of cadastre maps.

The symbol of the cadastre map was printed in the upper right corner of the section and contained a description of the directions of the world: WC (west) and OC (east) and then the description proper for the triangulation sheet: the Roman numeral, designating the column, and the Arabic numeral, designating the row, with the designation of the sheet of the detailed section at the end: (for example ***W.C. XXXIV13ah***).

The measurement work in the southern part of Poland under the Austrian rule was conducted in 1830-1860.

Field measurements were taken on a 70 x 80 cm table mounted on a special tripod which enabled it to be shifted, centred, and oriented on the position using a special 60 cm long sight rule. The positions for such measurements consisted in the previously established triangulation points. The cadastre map was drawn on high-quality paper with a watermark.

A map so drawn had many important advantages, but also one very major drawback, namely the lack of numerical elements describing the measured items which would allow for the reconstruction of the old property status in the future. Cadastre maps for the entire Austro-Hungarian Empire of that time were drawn based on the Cassini-Soldner projection in the flat rectangular layout. In order to reduce errors caused by the projection, the entire area of the former Empire was divided into seven zones; for every one of which an independent cadastre layout was adopted. The area in question was covered by the Lviv layout, with the starting point on the Lublin Union Mound in Lviv, in which the positive coordinates of the X axis were counted south from the beginning of the coordinate system, with negative coordinates counted to the north. The positive Y coordinates increased westward, while negative Y coordinates were calculated to the east of the starting point.

The quarters obtained by dividing the plane with the two axes of coordinates were numbered clockwise while the azimuth was calculated from the positive direction of the meridian.

2.8.2 Preparing rasters of the cadastre map for transforming

The analysed village of Wiśniowa is located in the *powiat* of Myślenice (Polish unit of local administration), Małopolskie Voivodeship, within the area of the former Galicia, which belonged to the Lviv cadastre layout. The distribution of sections of cadastre maps over triangulation sheets in Wiśniowa is shown in Fig. 21. The area of the studied village covers 4 triangulation sheets and 20 map sections. Plane table measurements were taken in 1847.

In order to calculate the cadastre coordinates of the corners of particular cadastre map sections, one must know the map symbol. The coordinates of cadastre map sections can be obtained from the table of coordinates presented in the cadastre instructions [Instruction 1904], shown for Wiśniowa in Table 19. Another method of determining those coordinates is to use mathematical formulas [Fedorowski 1974].

The first step in the process of raster calibration was to scan the maps borrowed from the National Archive in Krakow on a professional flat table scanner of the A-1 format and the resolution of 600 dpi. The process consisted in splitting the original into many smaller elements and then measuring their brightness. This yielded a binary image of the map in the form of a computer file which could then be visualised on a computer screen. The raster data model is used to collect, store, and process data obtained by scanning. In this model, the information about real objects world is stored in the form of pixels, i.e. regular surface elements. The image made up of pixels is called a raster. Rasters are now an attractive way of collecting historical archive data due to their two important characteristics: the universality of recording and the ability to process them using various types of software [Kubowicz 2007].

Table 19. Coordinates of map section corners in the Wiśniowa Village [Instruction zur Ausführung der trigonometrischen und polygonometrischen Vermessungen behufs Herstellung neuer Pläne für die Zwecke des Grundsteuer-Katasters 1904]

No.	Designation of the map sheet symbol	Coordinates of section corners according to the Austrian cadastre	
		X	Y
1	W.C. XXXVII 16 dg	4 551.56	-280 679.63
2	W.C. XXXVII 16 dh	3 034.37	-280 679.63
3	W.C. XXXVII 16 di	1 517.19	-280 679.63
4	W.C. XXXVII 17 de	0.00	-280 679.63
5	W.C. XXXVII 17 df	-1 517.19	-280 679.63
6	W.C. XXXVIII 16 ag	4 551.56	-282 576.12
7	W.C. XXXVIII 16 ah	3 034.37	-282 576.12
8	W.C. XXXVIII 16 ai	1 517.19	-282 576.12
9	W.C. XXXVIII 16 bg	4 551.56	-284 472.60
10	W.C. XXXVIII 16 bh	3 034.37	-284 472.60
11	W.C. XXXVIII 16 bi	1 517.19	-284 472.60
12	W.C. XXXVIII 16 cg	4 551.56	-286 369.08
13	W.C. XXXVIII 16 ch	3 034.37	-286 369.08
14	W.C. XXXVIII 16 ci	1 517.19	-286 369.08
15	W.C. XXXVIII 17 ae	0.00	-282 576.12
16	W.C. XXXVIII 17 af	-1 517.19	-282 576.12
17	W.C. XXXVIII 17 be	0.00	-284 472.60
18	W.C. XXXVIII 17 bf	-1 517.19	-284 472.60
19	W.C. XXXVIII 17 ce	0.00	-286 369.08
20	W.C. XXXVIII 17 cf	-1 517.19	-286 369.08

In the first stage of the digital processing of Wiśniowa rasters, with the use of Corel Photo Paint, they were trimmed to the nominal format of the cadastre map section and some areas of raster maps were brightened or darkened (Fig. 22).

Raster calibration consisted in recreating, in the layout of cadastre maps, their actual rectangular layout assumed when they were drawn, eliminating linear and non-linear errors resulting from deformations of old cartographic materials as well as errors occurring in the scanning process [Kubowicz and Noga 2007, Noga et al. 2007].

The calibration process was executed for every map sheet separately using the Iras/B software. Fitting into the actual cadastral system was done using the second order polynomial transformation based on 18 pairs of adjustment points which determined full inches along the nominal section frame of every map sheet. The coordinates of these points in the cadastral layout were determined for every section using the coordinates of section sheet corners previously determined based on the map sheet symbol. The maximum deviation of fitting the raster into its nominal frame did not exceed 0.5 m. This was mainly due to the fact that these

Fig. 21. An informative drawing of cadastre map sections in the analysed village

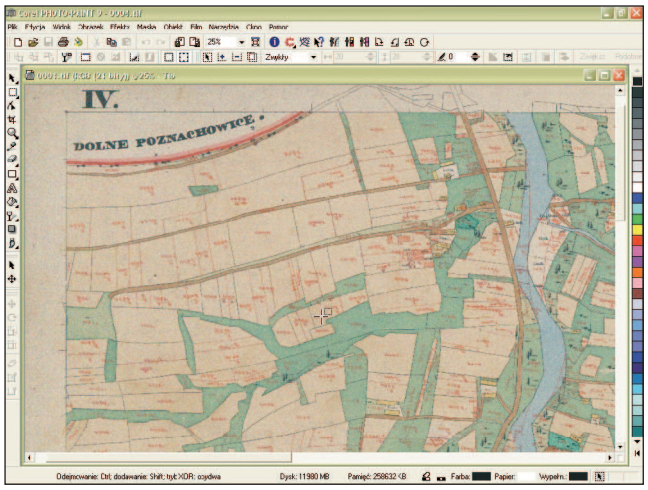


Fig. 22. The raster of 4 map sections prepared for calibrating

maps have been very well preserved and were free of mechanical damage. The calibration yielded 13 fully cartometric rasters in a rectangular, cadastral coordinate system.

2.8.3 Transforming maps from the Lvov cadastral layout to the "1965" national layout

The transformation consists in recalculating the coordinates of points from one mapping layout to the other. The task consisted of the following processes: the translation of the original layout by a certain ***u*** shifting vector to the secondary layout, the rotation of the layout by a certain γ angle of rotation, and the change of the scale by a certain ***s*** ratio, which may take place in both layouts.

The map transformation process from the Lviv cadastre layout to the "1965" layout encounters certain difficulties, mainly due to:

– the lack of a mapping in the mathematical sense for the cadastre triangulation network in SE Poland;

– too low precision of certain existing triangulation points compared to the current precision standards;

– doubts as to whether the adjustment points are really the same, due to the destruction and reconstruction of some cadastre triangulation points.

The formulas of transformation from the cadastre layout to the "1965" layout were determined using the existing points of the control network, which had coordinates in both layouts. The preliminary activity leading to the transformation between layouts was to collect points which exist physically in the field and whose coordinates are known in both analysed layouts. Coordinates of points in the "1965" national layout coinciding with points of the Lviv cadastre layout were found in the materials of the Powiatowy Ośrodek Dokumentacji Geodezyjnej i Kartograficznej (The Powiat Centre for Geodesic and Cartographic Documentation) in Myślenice [Michałowski and Sikorski 1932]. Then, based on field inspection, the points whose location has changed as a result of their destruction or reconstruction were eliminated. This yielded 50 adjustment points which were used in the first stage of the transformation. After preliminary numerical analyses, 28 adjustment points were finally adopted for the transformation, using a criterion that the deviations of coordinates of adjustment points cannot exceed 1.5 metre. These points were used to determine the final transformation ratios using the WinKalk ver. 3.85 software. The coordinates of selected adjustment points are presented in Table 20.

The transformation conducted as above yielded the following parameters:

Centre of gravity of the original layout:	XB = 2 113.66
	YB = -272 379.51
Centre of gravity of the secondary layout:	xb = 5 376 136.48
	yb = 4 577 435.84
Rescaling ratios:	u = -0.0394325
	v = 0.9989620
Average transformation error:	m = 0.5924933